Conformity and Leadership in Organizations

Shunsuke Matsuno*

March 27, 2025

Abstract

Some organizations are characterized by a conformity culture, where followers are expected to conform to the leadership's behavior. In contrast, other organizations exhibit an anticonformity culture. What drives the variation in conformity culture across organizations? This paper develops a model of leadership and (anti) conformity culture in organizations. Utilizing a stylized coordination game with many followers and one leader, I analyze how conformity culture affects followers' behavior and identify the optimal level of conformity. While conformity naturally aids coordination among followers, it can distort organizational performance by suppressing individual initiatives and forcing followers to conform to potentially misguided directions. The optimal culture balances the effects. I show that with strategic complementarity, conformity is optimal; whereas with strategic substitutes, anticonformity is optimal. Comparative statics of optimal culture sheds light on the origins of cultural variation across organizations from an informational perspective. Additionally, I analyze the optimal culture under ambiguity in the possible information environment. I show that this optimal culture, termed robust culture, is conservative. The model offers a new perspective on the interplay between leadership and corporate culture in organizations.

Keywords: Leadership, Corporate Culture, Conformity, Coordination
JEL Classification: D23, D82, M14, M21

*Columbia Business School (email: SMatsuno26@gsb.columbia.edu). For helpful comments and discussions, I thank Tim Baldenius, Wei Cai, Jon Glover, Ilan Guttman, Jacopo Perego, Sang Wu, Ran Zhao (discussant), and participants at the Columbia Accounting Theory Conference. I gratefully acknowledge financial support from Columbia Business School, the Bernstein Center for Leadership and Ethics, and the Nakajima Foundation.

"We are half ruined by conformity; but we should be wholly ruined without it."

— Charles Dudley Warner

1 Introduction

Corporate culture is increasingly recognized as a key driver of organizational behavior and outcomes. A growing body of research in economics, finance, and accounting studies how corporate cultural traits affect economic outcomes. Studies have shown that corporate culture affects firms' performances (Edmans, 2011; Guiso, Sapienza and Zingales, 2015), corporate misconduct (Liu, 2016), and financial reporting risk (Davidson, Dey and Smith, 2015; Bhandari et al., 2022). Although these findings underscore the economic significance of corporate culture, fundamental questions remain: what determines the formation and persistence of distinctive corporate cultures, and why do they vary widely across organizations? Understanding the sources of cultural heterogeneity is critical, given that culture can create or erode value through multiple channels (Edmans, 2011; Guiso, Sapienza and Zingales, 2015; Graham et al., 2022). However, such inquiry is complicated by that fact corporate culture is a multifaceted, nebulous concept. Therefore, as a first step towards understanding the role of corporate culture in organizations, it is essential to focus on a specific aspect of corporate culture.

A particularly interesting dimension of corporate culture I explore in this paper is the degree to which agents in an organization are expected to conform to established norms and directives: conformity. In companies with a high degree of conformity, employees are expected to follow leadership's directions and adhere to organizational norms. Conversely, some corporate cultures encourage employees to challenge leaders and organizational norms ("anticonformity"). The notion of conformity itself is also multifaceted, depending on who/what agents in an organization conform to. In this paper, I focus on leadership as a reference point for (anti)conformity. The role of leadership in shaping these cultural dynamics is palpable: leaders not only set the tone for expected behavior but also serve as role models whose actions are referenced by followers.

In this paper, I analyze a stylized model of an organization to explore how conformity culture and leadership interact and create value. In particular, I build on Morris and Shin (2002) and consider a coordination game with a continuum of followers and one leader. Each follower performs a task that exhibits externality. The tasks may exhibit strategic complementarity or substitutability. The followers and the leader face an uncertain state that determines payoffs of actions. The leader privately observes an informative signal about the state and moves first. The leader thus plays two roles: she provides information to the followers and coordinates their actions. The followers observe the leader's action and their private signals and choose their actions to maximize their payoffs. The leader's objective may not be perfectly aligned with the organization's.

The stylized model is meant to capture the essence of real-world productive activities in organizations. For example, consider a team of engineers developing a new product. They would like to develop a product that can dominate the market, but they are uncertain which product will be successful. A lead engineer proposes a design, based on which the team members also contribute their ideas. The optimal product corresponds to the state in the model. The product development process may exhibit strategic complementarity or substitutability; On the one hand, the team may efficiently develop a product by collaborating with each other rather than by working independently (complementarity). On the other, the team may benefit from diversifying their efforts and trying different approaches (substitutability).[1]

I model conformity (anticonformity) culture through nonpecuniary costs (benefits) that followers incur when they take actions that are different from the leader. The organization is characterized by a conformity parameter, which captures how much followers incur such costs or benefits by deviating from the leader's action. The degree of conformity affects equilibrium behavior of the followers and the leader. When the organization exhibits a high degree of conformity, the followers naturally tend to imitate the leader's action. In contrast, when the organization is characterized by a high degree of anticonformity, the followers react to the leader by taking actions that are different from the leader's. The leader, understanding the followers' incentives, determines her action. My primary goal of this paper is to characterize an optimal level of conformity that maximizes the organization's performance.

Since there is externality in the followers' actions, the organization suffers from an inefficiency due to miscoordination (Morris and Shin, 2002). Thus, there is a room for a culture to improve the organization's performance by mitigating the miscoordination problem.

[1] As another example of strategic substitutability, consider research activities in a university. The university would like their researchers to produce a high-quality research outputs. The university may benefit more if the researchers work on different topics and excel in various fields–certainly, the university would not want all researchers to work on the same specific topic.

Yet, whether the use of (anti)conformity culture improves the organization's is not trivial. Introducing a positive level of conformity culture has two effects on coordination. On the one hand, the followers mimic the leader's action to avoid the cost of not conforming. On the other, the followers' actions are more driven by the leader's action, making it easier to predict others' actions. The former effect is beneficial for coordination, whereas the latter is detrimental. I show that the former effect always dominates the latter.

Therefore, (anti)conformity culture facilitates (anti)coordination. But, this is not the end of the story. The followers possess valuable information about state. Absent (anti)conformity culture, the followers make use of their information to make decisions. Once (anti)conformity is introduced, they may rely less on their private information. In an extreme case where the cost of not emulating the leader is prohibitively high, the followers ignore their information altogether; the leader's action and culture solely dictate the followers' actions. This could be particularly problematic when the followers' information is superior to the leader's information. In addition, if the leader's objective is not perfectly aligned with the organization's, then the followers may be led astray by the leader's biased action.

I show that the optimal level of conformity balances the informational loss and coordination gain of conformity: the organization's value is maximized when the degree of conformity is carefully designed to coordinate the followers without causing them to ignore their own information. The nature of tasks determines whether conformity or anticonformity culture prevail: a conformity culture is optimal when there is strategic complementarity, whereas an anticonformity culture is optimal when there is strategic substitutability. This is because a conformity (anticonformity) culture mitigates the under-coordination (over-coordination) problem. Indeed, in my stylized model, the optimal culture achieves the constraint efficiency– the followers behave as if they commit to the efficient degree of coordination.

In addition to the direction of culture (conformity vs anticonformity), the comparative statics of the optimal culture sheds light on the origins of cultural variation across organizations from an informational perspective. Suppose that there is strategic complementarity, so that a positive level of conformity culture is optimal.[2] When the leader's information is more precise than the followers', the optimal level of conformity is higher. Intuitively, the followers should rely more on the leader's action when the leader's information is more precise. As a result, the followers coordinate more even when the culture is fixed. However, due to the

[2]The case of strategic substitutability is analogous.

externality in actions, the followers do not coordinate enough–if the followers rely more on the leader's information when the leader's signal becomes more precise, the organization's performance improves. Increasing the degree of conformity culture achieves this. Importantly, the degree of optimal culture is bounded for a given level of strategic complementarity. For example, even when the leader's information is infinitely more precise than the followers', it is not optimal to set the conformity culture to an infinite level.

Pioneering social psychology research argued that individuals exhibit conformity under great uncertainty (Sherif, 1935; Deutsch and Gerard, 1955). My findings formalize this idea within the context of a coordination game. In my model, when there is strategic complementarity, a higher degree of conformity culture is desirable when followers have less information, because the under-coordination problem is more severe. Additionally, my results highlight the importance of the nature of tasks. Moreover, my analysis highlights that the relationship between conformity and uncertainty depends on the nature of tasks. In settings characterized by strategic substitutability, greater uncertainty among followers instead fosters *anti*conformity, challenging the traditional proposition of social psychology research.

Having established the optimal culture, I explore two important issues to better understand the role of conformity culture and leadership. First, in my model, the optimal culture is set to maximize the organization's performance. However, it is not immediately clear if the followers individually benefit from such culture. In particular, when there is a positive level of conformity, the followers accept a "punishment" by deviating from the leader's action. Why do they accept such arrangement? Can the followers be better off by eliminating the conformity culture while keeping the leader's information? These questions are particularly relevant because a defining feature of leadership and culture is that following the leader and accepting a culture are voluntary (Hermalin, 2012). I identify conditions under which the followers are ex-ante better off under the optimal culture. Specifically, when the need for coordination (the degree of strategic complementarity) and the leader's informational advantage are sufficiently high, the followers benefit from the optimal conformity culture. This result illuminates why people often dislike conformity pressure but live with it in organizations.

Second, in the baseline model, the optimal culture is determined by relying on the knowledge of exact parameters of the environment. However, the organization may face unforeseen variations in the environment that affect the optimal culture. Corporate culture is persistent and difficult to change (Schwartz and Davis, 1981). A natural question then is what kind of culture is robust to fluctuations in the environment. To address this problem, I extend the baseline model to allow for uncertainty in the environment. Specifically, I consider the setting where the precisions of signals are randomly drawn from a set of possible values. I derive the optimal culture that maximizes the organization's performance for the worst-case scenario.[3] I call this the *robust culture*. A key step toward analyzing this problem is to derive the value of information–how much the organization benefits from increasing the precisions of the leader's and followers' signals. I demonstrate how a conformity culture changes the value of information in equilibrium. I show that the robust culture exhibits conservative with respect to the amount of available information: it is determined as if the organization has the least information among the possible environments. The analysis provides insights into how conformity culture can be designed to deal with unforeseen contingencies (Kreps, 1990).

I consider two extensions of the baseline model. First, I consider the possibility that coordination has only private value and not beneficial to the organization. In the main analysis, I focus on the case where coordination affects the organization's performance. This seems to be a natural assumption in organizations that perform productive tasks. That said, it may also be plausible that followers try to guess the others' actions, even though doing so does not contribute to the organization's performance. For example, consider a financial institution where individual traders are responsible for making trading decisions. Traders may believe that the market is driven by the investment decisions of other traders, much like Keynes's classic beauty contest. Alternatively, they may believe that they can "stand out" in the firm by making a unique investment that is different from others. Either way, such externalities may be purely private and wasteful for the organization.[4] I discuss how the prediction on the optimal culture changes in this case.

Second, I consider a more general specification of the leader's objective. In the baseline specification, even though the leader's preference can be misaligned with the organization's, the optimal level of conformity culture does not depend on the bias. This result is a consequence of a specific form of the leader's objective, where the change in the leader's incentive to distort actions due to a change in conformity is offset by the change in the followers' equilibrium actions. In a more general specification, I show how the leader's bias imposes cost on increasing the degree of conformity when the leader's objective functions is more general

[3]This maxmin formulation is similar in spirit to the problem of ambiguity aversion and maximin utility (Gilboa and Schmeidler, 1989).

[4]As another example, consider a research community. Researchers wish to write a paper that discovers a new idea (i.e., close to the unknown state variable). At the same time, they may engage in beauty contests, where they try to write a paper on a topic that is popular among other researchers, possibly because they believe that such papers are more likely to be published. Given a paper is written and knowledge is disseminated, the publication outcome would be less important, if not irrelevant, for the welfare.

than the baseline specification.

The rest of the paper is organizes as follows. After discussing the related literature, I describe the model in Section 2. This section also discusses the interpretation of (anti)conformity culture in detail. Section 3 presents the main analysis. I start with describing the miscoordination problem under the neutral culture. I then derive the equilibrium strategies of the followers and the leader. After characterizing the optimal conformity culture, I discuss the implications of the results. Section 4 takes up on the issue of robust culture. Section 5 explores two extensions of the baseline model. Section 6 concludes the paper.

1.1 Related Literature

Leadership This paper is related to the literature on leadership and corporate culture. Leadership is extensively studied in the management literature (see, for example, Burns (1978); Bass and Riggio (2005)). Traditionally, the majority of management studies employ qualitative methodology to develop theories of leadership. In contrast, I employ a formal model to analyze the role of leadership in organizations. In particular, my paper belongs to the literature that seeks to understand leadership from through the lens of economic theory (see Bolton, Brunnermeier and Veldkamp (2010); Hermalin (2012) for reviews). Particularly relevant to my work are the studies that utilize coordination games to analyze leadership (Dewan and Myatt, 2008; Bolton, Brunnermeier and Veldkamp, 2013; Landa and Tyson, 2017).

Bolton, Brunnermeier and Veldkamp (2013) analyze a coordination game with a leader and followers. In their model, there is time-inconsistency problem of the leader, who moves the first and the last. They show that a “resolute leader,” who possesses behavioral bias and overestimates her signal precision, can improve the organization’s performance. In my model, the leader does not face such commitment problem. I focus on inefficiency due to miscoordination. My analysis of how conformity culture helps organization thus can be seen to complement their research. Dewan and Myatt (2008) also considers a coordination game with a leader and followers. Their main focus is communication between the leader and the followers. In my model, the leader also communicates her private information to the followers, but this is achieved through signaling rather than direct communication.

Landa and Tyson (2017), like my paper, studies a coordination game with disutility from deviating the leader’s action. They call this a model of “coercive leadership.” They show that such coercion can help the performance of organization. In their model, such improvement stems from the fact that the leader observes the underlying state. They treat the degree of cohesiveness as fixed, but my main objective is to analyze the optimal degree of conformity culture. Indeed, in their model, an infinite level of conformity is always optimal absent the leader's bias, because the leader perfectly observes the state.

Corporate culture A growing number of studies in economics formally examine the role of corporate culture (Van den Steen, 2010*a*; Gorton, Grennan and Zentefis, 2022). An influential work of Kreps (1990) advocates for the importance of formally analyzing corporate culture. One of the ideas advanced in the paper is to understand corporate culture in terms of relational contracting and multiple equilibria. This approach gained significant popularity. My approach of modeling corporate culture is different from the relational-contracting perspective. Rather, my model is more closely related to economic models of social norm and peer pressure (Kandel and Lazear, 1992; Akerlof and Kranton, 2000; Fischer and Huddart, 2008). After I describe my model in Section 2, I will discuss how the conformity culture in my model relates to existing models of culture and norms.

Finally, Huck and Rey-Biel (2006) also offers a theory of conformity in a two-player leader-follower game. The paper analyzes a complete-information game of moral hazard in teams. They find that, if the follower incurs disutility by deviating from the leader's action, then the moral hazard problem can be mitigated. The modeling of conformity culture is similar to mine, but the setting and motivation are different. In their paper, the results are driven by the fact that the leader and the follower's actions are complementary. This is not the case in my model. Indeed, the leader's action itself does not directly enter the organization's payoff. Moreover, their complete-information model does not allow the analysis of how leadership and culture interact with information structure. Finally, they treat the disutility of deviating from the leader's action as fixed, whereas my main objective is to show the optimal degree of conformity culture.

Organizational Design Finally, my paper is broadly related to the literature on organizational design (Aghion and Tirole, 1997; Milgrom and Roberts, 1990; Garicano, 2000; Hart and Moore, 2005; Gibbons and Henderson, 2012). In particular, my paper is particularly related to studies that focus on the nature of the tasks and information environment as determinants of organizational design (Dessein and Santos, 2006; Dessein, Lo and Minami, 2022; Alonso, Dessein and Matouschek, 2008). I contribute to this literature by focusing on a novel aspect of organizational design, i.e., the degree of conformity culture.

2 Model

2.1 Setup of the Model

As a model of an organization that engages in productive activities, I consider a stylized coordination game (Morris and Shin, 2002; Angeletos and Pavan, 2007). There is a continuum of followers ("he") and one leader ("she"). The leader privately observes a signal and moves first. The followers, upon observing the leader's action and their private signals, perform a task ("action"). The organization's profit depends on an unknown environment ("state"). The signals that the leader and followers receive are about this state. The organization's task may exhibit strategic complementarity or substitutability.

In the analyses below, I often need to integrate over the followers' indices to compute an aggregate variable. As long as there is no risk of confusion, for a variable x indexed by i, I use the convention $\int x_i := \int_{[0,1]} x_i di$ to avoid cluttered notation.

Followers The organization is populated with a continuum of followers with a unit mass, each indexed by $i \in [0,1]$. Each follower i chooses an action $k_i \in \mathbb{R}$. The return π_i of the action k_i is given by

$$\pi_i = -(k_i - A)^2, \quad A = (1-\alpha)\theta + \alpha K,$$

where A is the action that maximizes the return. I call A the *best action*. The best action is a convex combination of an unknown state θ and the aggregate action level $K = \int k_i$. I assume that θ follows the normal distribution $\mathcal{N}(0, \tau_\theta^{-1})$ with precision $\tau_\theta > 0$ The parameter $\alpha \in (-1/2, 1) \setminus \{0\}$ captures the degree of strategic complementarity ($\alpha > 0$) or substitutability ($\alpha < 0$). I impose the lower and upper bound on α to ensure the existence of equilibrium. I exclude the trivial case $\alpha = 0$ for the sake of exposition. When there is strategic complementarity (substitutability), the return of an action is higher when it is closer (farther) to the aggregate action. I use $\Pi = \int \pi_i$ to denote the aggregate return of the organization and call it the *fundamentals*.

The organization is characterized by a conformity parameter $\beta \in \mathbb{R}$. Follower i's payoff is given by

$$u_i = \pi_i - \beta(k_i - k_L)^2, \tag{1}$$

where $k_L \in \mathbb{R}$ is the leader's action. The parameter β captures the degree of (anti)conformity. When $\beta > 0$, followers incur a nonpecuniary disutility deviating from the leader's action ("conformity culture"). In contrast, when $\beta < 0$, followers enjoy a nonpecuniary benefit by taking an action that is different from the leader's ("anticonformity culture"). When $\beta = 0$, the followers care only about the direct return π_i ("neutral culture").[5] I interpret π_i as the monetary profits that follower i's action generates and $\beta(k_i - k_L)^2$ as nonmonetary utility. I discuss that interpretation of β further below. The main goal of this paper is to characterize the conformity parameter β that maximizes the fundamentals Π.

The followers privately observe a signal $s_i = \theta + \varepsilon_i$, where ε_i follows the normal distribution $\mathcal{N}(0, \tau_F^{-1})$ with precision $\tau_F > 0$ and is independent across followers. The followers simultaneously choose their actions after observing the leader's action k_L, which is publicly observed, and their private information s_i to maximize $\mathbb{E}_i u_i$, where $\mathbb{E}_i$ is the expectation operator conditional on s_i and k_L.

Leader The organization has a leader, who moves before the followers. Before the leader takes an action, she observes a private signal $s_L = \theta + \varepsilon_L$, where ε_L follows the normal distribution $\mathcal{N}(0, \tau_L^{-1})$ with precision $\tau_L > 0$. The leader would like the followers to take actions that are close to the best action, but I allow for the possibility that her incentive is not completely aligned with the organization's objective. In particular, the leader maximizes the following payoff:

$$u_L = -\int (k_i - A - b)^2, \tag{2}$$

where $b \geq 0$ denotes the bias of the leader. When $b = 0$, the leader's objective is aligned with the organization's objective, i.e., $u_L = \Pi$. When $b > 0$, the leader's preferred actions of the followers are inflated by b from A. One possible interpretation of such bias is the empire-building incentive, where the leader wants the follower's action levels to be higher. The leader's bias may pose challenge to the value of conformity culture: when the degree of conformity is high, the followers may follow the leader's biased action, which may not be optimal for the organization.

A few remarks are in order regarding the leader's objective. First, the restriction of b being nonnegative is for the sake of exposition, and the model can be extended to allow b to be negative. Second, the leader is measure zero, so the leader's action k_L does not directly affect the aggregate return Π. However, the leader's action affects the followers' actions, which in

[5] Social psychologists often use the term "independence" as a middle ground of conformity and anticonformity (Levine and Hogg, 2010). I avoid this term to avoid confusion; the followers' actions have externality, so they care about others' actions even with $\beta = 0$, contrary to what the term independent might suggest.

turn affect the fundamentals. Third, the way I model the leader's bias is intentionally chosen to simplify the analysis and to delineate the role of conformity culture. In Section 5.2, I explore a more general specification of the leader's objective and discuss how the leader's bias affects the value of conformity.

Timeline To summarize, the timeline of the model is as follows.

1. The state $\theta \sim \mathcal{N}(0, \tau_\theta^{-1})$ realizes.
2. The leader privately observes the signal s_L and publicly chooses k_L to maximize $\mathbb{E}[u_L \mid s_L]$.
3. Each follower i observes the leader's action k_L and privately observes the signal s_i.
4. The followers simultaneously choose their actions k_i to maximize $\mathbb{E}_i u_i$.

The solution concept I employ is perfect Bayesian equilibrium. For simplicity, I assume that θ has the diffuse prior, $\tau_\theta \to 0$. The analyses can be extended to the case of non-diffuse prior in a straightforward manner at the cost of slightly more complicated expressions.

2.2 Discussion of the Model

Interpretation of β In the model, "corporate culture" is characterized by the degree of nonpecuniary benefit/cost that a follower incurs by deviating from the leader's action. I call it nonpecuniary (or nonmonetary) benefit/cost in order to highlight the fact that it is not a monetary transfer made from the profits of the organization. Alternatively, one may call the term "intrinsic motives" (Kreps, 1997), as opposed to extrinsic incentives. Indeed, social psychology research has long recognized the tendency of individuals to conform to social norms as well as the existence of anticonformity (Myers, 2009). Since the nonpecuniary benefit/cost is baked in the followers' utility function rather than endogenously determined, the modeling approach is similar to Akerlof and Kranton (2000, 2005), who argue for the importance of nonmonetary incentives in organizations.

There are several interpretations as to how an (anti)conformity culture operates in my model. For example, the follower may fear that the leader will "punish" him–say, by treating him poorly–if he deviates from the leader's action.[6] Such implicit punishment may carry out

[6] Alternatively, the organization can employ followers who are aligned with the culture (Prendergast, 2008; Campbell, 2012). For example, Cai (2023) empirically shows that introducing a formal culture-fit measurement system helps instill a desired culture among followers.

by other followers as well; If the follower does not conform to the norm of the organization, his peers may treat him poorly. Even if the leader or other followers do not seek any for of punishment to a deviator, the follower may feel a sense of guilt or shame by not listing to the norm of the organization. On the contrary, the follower may feel a sense of pride or satisfaction by deviating from the leader's action.

In this paper, I am agnostic about how corporate culture emerges. Rather, I treat it as an exogenous parameter and analyze the optimal level of such culture.[7] For example, if one takes a view that the leader actively punishes/rewards followers who do not conform, then it would be natural to think that the leader sets β.[8] Even if the leader does not explicitly set culture, the leader's personal traits can translate to culture (Benmelech and Frydman, 2015). Alternatively, if the nonpecuniary costs/benefits arise from a sense of organizational norms, then such norms can be viewed as something that naturally emerges over time. This perspective aligns with Schein (2016) who defines culture as accumulated social learning.[9]

Leadership In my model, there is one agent called the "leader." Why is this agent called such? There are two main reasons. First, the agent moves first. All the followers observe her action and learn from it. From this perspective, the model relates to the theory of "leading-by-example" (Hermalin, 1998). Second, and related, the agent's action is a focal point of the conformity culture. The followers' tendency to carefully observe the agent's action and base their actions off of it allows one to call the agent a leader.

The notion of conformity defined in this paper requires the presence of a leader in its definition. Of course, one could define conformity without a leader; conformity to the average behavior of others, conformity to some exogenous norm, etc. As I noted in the Introduction, I focus on the notion of (anti)conformity in relation to leadership. This approach enables me to analyze the interaction between leadership and culture, a topic that is interesting in its own right. (Hermalin, 2012; Grennan and Li, 2023).

The notion of conformity defined in relation to leadership may appear similar to the

[7] Prendergast (1993) and Bernheim (1994), among others, provide models of endogenous conformity.

[8] In the main model, if the leader's bias b is zero, then this interpretation can be formalized: if the leader publicly sets β at the start of the game, then the leader chooses the optimal degree of conformity identified in the analysis.

[9] In particular, he writes "The culture of a group can be defined as the accumulated shared learning of that group ... which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, feel, and behave in relation to those problems."

concept of authority (Van den Steen, 2009, 2010*b*). Since I consider anticonformity cultures as well, I prefer to avoid the term "authority", which may imply punishments for disobedience. In Section 3.4, I provide a more formal, albeit still partial, discussion and justification for using the term "leadership" over "authority".

3 The Role of Conformity

The goal of this section is to derive the optimal level of conformity in the organization. First, I demonstrate that the organization faces a coordination problem under the neutral culture ($\beta = 0$). The properties of the model under the neutral culture is now well-understood in the literature, but I summarize the results in the context of my model. This case serves as a benchmark case for the later analysis. Second, I derive the equilibrium strategies of the followers and the leader. Third, I characterize the optimal level of conformity and discuss its comparative statistics.

3.1 Miscoordination Problem under the Neutral Culture

Consider the case of neutral culture $\beta = 0$, where followers do not care about conforming to or deviating from the leader's action. To illustrate the issue of coordination, assume further that the s_L is publicly observed. In this case, the model reduces to a standard coordination game. In particular, the equilibrium action is the one described in Morris and Shin (2002):[10]

$$k_i = w_F^0 s_i + w_L^0 s_L, \quad w_F^0 = \frac{(1-\alpha)\tau_F}{(1-\alpha)\tau_F + \tau_L}, w_L^0 = 1 - w_F^0. \tag{3}$$

Follower i's action is a convex combination of his private signal s_i and the leader's signal s_L. The weight w_F diverge from the "Bayesian weight," $\tau_F/(\tau_F + \tau_L)$, i.e., the weight on s_i to compute $\mathbb{E}[\theta \mid s_i, s_L]$, reflecting the strategic interaction among followers. When there is strategic complementarity ($\alpha > 0$), the followers put more weight on the leader's signal than the Bayesian weight, because they want to coordinate on similar action levels. On the contrary, when there is strategic substitutability ($\alpha < 0$), the followers put less weight on the leader's signal, because they want to avoid taking similar actions.

[10]The existence and uniqueness of the linear equilibrium are discussed later for my main model (Proposition 2), which incorporates this case as a special case.

To understand the inefficiency in the organization, following Angeletos and Pavan (2007), define the *efficient degree of coordination* to be the weights (w_F^{FB}, w_L^{FB}) on the private and leader's signals that maximize the fundamentals Π:[11]

$$(w_F^{FB}, w_L^{FB}) := \underset{(w_F, w_L)}{\arg\max} -\mathbb{E}\left[\int (w_F s_i + w_L s_L - A)^2\right]. \tag{4}$$

That is, the weights (w_F^{FB}, w_L^{FB}) achieve the constrained efficient allocation under the incomplete information. The solution to the problem (4) is

$$w_F^{FB} = \frac{(1-\alpha)^2 \tau_F}{(1-\alpha)^2 \tau_F + \tau_L}, \quad w_L^{FB} = 1 - w_F^{FB}.$$

Say that there is *under-coordination* (*over-coordination*) problem when the follower's equilibrium weight on the leader's signal is lower (higher) than w_L^{FB}. Since $w_L^0 < w_L^{FB}$ when $\alpha > 0$ and $w_L^0 > w_L^{FB}$ when $\alpha < 0$, the nature of the coordination problem depends on the strategic nature of tasks. The following lemma summarizes this observation and serves as a benchmark to understand the role of corporate culture:

Lemma 1. *Suppose that the leader's signal is publicly observed by the followers. Under the neutral culture ($\beta = 0$), the organization faces an under-coordination problem when there is strategic complementarity ($\alpha > 0$) and an over-coordination problem when there is strategic substitutability ($\alpha < 0$).*

The lemma implies that there is room for improvement in the organization's performance by changing the followers' behavior.

Remark 1. Even though the equilibrium in the above scenario is the same as in Morris and Shin (2002), their specification of fundamentals ("welfare" in their paper) is different from mine. In my specification, coordination enters the fundamentals. There are other specifications of the payoffs such that coordination has a social value, most notably the "investment complementarity model" of Angeletos and Pavan (2004). My current specification is the most tractable one that I am aware of to deliver the economic intuition of this paper. Hellwig and Veldkamp (2009) use this specification to study information acquisitions in coordination games, but they do not consider welfare.

[11]The terminology here is slightly different from Angeletos and Pavan (2007). They define the optimal degree of coordination as the agents' perceived parameter value of α, under which the fundamentals are maximized.

3.2 Equilibrium

Signaling Equilibrium

The leader chooses an action level after observing her private signal s_L, so the game belongs to the class of signaling games. As is well known, potentially there are multiple equilibria in such games (Cho and Kreps, 1987). I assume that the leader plays either fully separating equilibrium (FRE) or pooling equilibrium. I employ this assumption for two reasons. First, these equilibria are the two extreme cases in terms of information transmission. Such extreme cases are arguably more "plausible" than the intermediate cases and clearly illustrate economic intuition. Second, on a technical side, in semi-separating equilibria, the followers' best response is nonlinear in signal realizations and the leader's actions, posing significant challenges in the analysis. I elaborate on the latter point in Appendix (Remark A.1)

Given that I restrict a signaling equilibrium to be fully revealing or pooling, without loss, I restrict attention to pure strategies.[12] The main focus of this paper is the FRE case. However, I also discuss pooling equilibria, because it illustrates how a conformity culture helps select an equilibrium (Kreps, 1990).

Follower's Equilibrium Strategy

I derive the followers' equilibrium strategies given the leader's equilibrium strategy $\kappa : \mathbb{R} \to \mathbb{R}$, which maps s_L to $\kappa(s_L)$. Note that κ is either a bijection (FRE) or a constant function (pooling equilibrium). In an FRE, the leader's action serves as a "public signal." In a pooling equilibrium, the leader's action does not convey any information about the state, but the followers still have the incentive to respond to the leader when the culture is not neutral ($\beta \neq 0$).

More specifically, from (1), follower i's best response given K is

$$k_i = \frac{1}{1+\beta}\mathbb{E}[A \mid s_i, k_L = \kappa(s_L)] + \frac{\beta}{1+\beta}k_L. \tag{5}$$

This expression reveals that the follower's action is an affine combination of the expectation

[12] By definition, in an FRE, the leader does not randomize. In a pooling equilibrium, the leader's (possibly mixed) strategy affects the fundamentals only when $\beta \neq 0$, in which case a pooling equilibrium does not exist (Proposition 3).

of the best action and the leader's action. The weight on the leader's action is increasing in the conformity parameter β. Naturally, when $\beta > 0$ becomes larger, the followers' actions converge to the leader's action. Therefore, a positive level of conformity helps coordination. When there is strategic complementarity ($\alpha > 0$), the increased coordination is beneficial. A high level of conformity, however, may impose some costs because the followers' valuable information is not utilized in the organization's decision-making. Analogously, when $\beta < 0$ becomes smaller, the followers coordinate less. With strategic substitutability ($\alpha < 0$), this improves the fundamentals. However, the leader's valuable information is utilized less as the followers more actively deviate from the leader's action. I will show that the trade-off of coordination and information utilization shapes the optimal level of conformity.

The expression (5) does not represent an equilibrium strategy, as the right-hand side depends on A, which in turn depends on $\{k_i\}$. In principle, the equilibrium depends on the higher-order beliefs and thus is potentially complicated. However, as in Morris and Shin (2002), the equilibrium takes a simple linear form. To state the result, define the higher-order expectations recursively as follows: $\bar{\mathbb{E}}^n := \int \mathbb{E}_j \bar{\mathbb{E}}^{n-1}$ for $n \geq 1$ and $\bar{\mathbb{E}}^0 := \theta$. The following result characterizes the equilibrium strategies of the followers:

Proposition 1. *Fix the leader's equilibrium strategy κ. Assume the non-explosive higher-order belief condition:* $\lim_{n\to\infty} \left(\frac{\alpha}{1+\beta}\right)^n \mathbb{E}_i[\bar{\mathbb{E}}^n[K]] = 0$. *Assume further that* $|\alpha/(1+\beta)| < 1$. *The followers' equilibrium strategy is unique and linear in s_i and k_L and takes the following form on the equilibrium path:*

$$k_i = \frac{1-\alpha}{1-\alpha+\beta} \sum_{n=0}^{\infty} (1-\alpha+\beta) \left(\frac{\alpha}{1+\beta}\right)^n \mathbb{E}_i[\bar{\mathbb{E}}^n[\theta]] + \frac{\beta}{1-\alpha+\beta} k_L. \tag{6}$$

Furthermore,

1 *If κ is an FRE, then* (6) *reduces to*

$$k_i = \frac{1-\alpha}{1-\alpha+\beta} \left[w_F^\beta s_i + w_L^\beta \mathbb{E}[s_L \mid k_L] \right] + \frac{\beta}{1-\alpha+\beta} k_L, \tag{7}$$

where $w_F^\beta = \frac{(1-\alpha+\beta)\tau_F}{(1-\alpha+\beta)\tau_F + (1+\beta)\tau_L}$ *and* $w_L^\beta = 1 - w_F^\beta$

2 *If κ is a pooling equilibrium, then* (6) *reduces to*

$$k_i = \frac{1-\alpha}{1-\alpha+\beta} \mathbb{E}[\theta \mid s_i] + \frac{\beta}{1-\alpha+\beta} k_L. \tag{8}$$

Proposition 1 generalizes the result of Morris and Shin (2002) to the case with the conformity parameter β. The equilibrium action (6) is an affine combination of the higher-order expectation term and the leader's action. Note that the proposition asserts nothing about the existence (or uniqueness) of FRE or pooling equilibrium. Rather, it characterizes the followers' equilibrium when FRE or pooling equilibrium happens to exist. I impose $|\alpha/(1+\beta)| < 1$ to guarantee the existence of the equilibrium. This assumption will be maintained throughout the paper. The proposition requires one mild restriction on the behavior of higher-order expectation (non-explosive higher-order belief). I relegate the discussion of this point and related issues to Remark 2 and move on to discuss the expressions (7) and (8).

Consider the FRE case. In an FRE, the leader's action reveals her private signal, so $\mathbb{E}[s_L \mid k_L] = s_L$. Define $\tilde{\mathbb{E}}^{\alpha,\beta}\theta := w_F^\beta s_i + w_L^\beta s_L$, which is the "modified posterior expectation" of the state.[13] It is an affine combination of the follower's signal and the leader's signal, where the weights w_F^β and w_L^β depend on the conformity parameter β, in addition to α. The expression (7) is, in turn, an combination of $\tilde{\mathbb{E}}^{\alpha,\beta}$ and k_L. Compare $\tilde{\mathbb{E}}^{\alpha,\beta}\theta$ to the Morris-Shin benchmark (3). If $\beta = 0$ in (7), then the two expressions (3) and (7) coincide. The expression (7) clarifies that the leader's action plays two roles in a FRE: it serves an informational role, reflected by $s_L = \mathbb{E}[s_L \mid k_L]$ inside $\tilde{\mathbb{E}}^{\alpha,\beta}$, and a coordination role, reflected by the last term.

The followers' best responses in a pooling equilibrium (8) takes a similar form as the FRE case (7), but now $\tilde{\mathbb{E}}^{\alpha,\beta}\theta$ is replaced by $\mathbb{E}[\theta \mid s_i]$. Since followers do not learn anything from the leader's action, the posterior expectation is based only on their private signal. In other words, the leader's action does not serve the information role. The followers put a weight on the leader's action only because of conformity culture. Notice that, when $\beta = 0$, the equilibrium action is simply $k_i = \mathbb{E}[\theta \mid s_i]$. Even though the followers observe the leader's actions, they do not coordinate using the publicly observed leader's action under a neutral culture. If the followers were to put some weight on the leader's action, the fundamentals could be improved due to the reduced miscoordination problem. However, such coordination is not sustainable in equilibrium because each follower benefits by unilaterally deviating to rely more on his private information unless the game is a pure coordination game ($\alpha = 1$), which is excluded by assumption.[14]

[13] More precisely, the expectation operator $\tilde{\mathbb{E}}^{\alpha,\beta}$ is induced by modifying the precision of the follower's signal to $(1-\alpha+\beta)\tau_F$ and of the leader's signal to $(1+\beta)\tau_L$. Under this modified signal structure, follower i's posterior expectation is given by $\tilde{\mathbb{E}}^{\alpha,\beta}$, hence the name modified posterior expectation. See Huo and Pedroni (2020) for further discussion on the relationship between modifying signal structure and higher-order beliefs.

[14] To see this point, observe that, if $\beta = 0$, then follower i's best response is $k_i = \mathbb{E}[A \mid s_i] = (1-\alpha)\mathbb{E}[\theta \mid s_i] + \alpha\mathbb{E}[K \mid s_i]$ from (5). If the followers were to put some weight on the leader's action, say $k_i = c_F s_i + c_L k_L$ with $c_L > 0$, then the aggregate action K also puts weight c_L on k_L. But then, the follower's best response puts weight $\alpha c_L < c_L$ on the leader's action, a contradiction.

The above argument applies to the case of FRE as well. If $\beta = 0$, then the followers put weight on the leader's signal only because of the informational role. This observation suggests the following important point: *when the leader's action does not convey any information about the state, the followers do not coordinate on the leader's action, even though doing so could make the organization better off.* That is, the presence of a conformity culture, positive or negative, is vital for the leadership to be effective in coordinating the followers.

Remark 2. The non-explosive higher-order belief condition is due to Dewan and Myatt (2008). Given the assumption that $|\alpha/(1+\beta)| < 1$, this restriction is mild. Given this assumption, Proposition 1 asserts that *any* equilibrium in the coordination subgame given the leader's equilibrium strategy κ (FRE or pooling) takes the form (6) and that the equilibrium is unique. Combined with the fact that $\mathbb{E}_i[\theta]$ is a linear function of s_i and s_L for both the FRE case and the pooling cases,[15] the followers' equilibrium strategy is linear in s_i and s_L. This result is a generalization of Morris and Shin (2002) to the case with the conformity parameter β.

Leader's Equilibrium Strategy

Having characterized the followers' equilibrium response to the leader's action, I now characterize the leader's equilibrium action. Recall that the leader's payoff is given by (2). The leader's action depends on whether the leader plays an FRE or a pooling equilibrium. The main focus of this paper is the FRE case, but I also discuss pooling equilibria because it illustrates how a conformity culture helps select an equilibrium (Kreps, 1990). A reader who wishes to skip the discussion of pooling equilibria can do so without loss of much continuity.

FRE Suppose that the leader plays an FRE. The leader chooses an action with a conjectured followers' response, and the equilibrium condition requires that such conjecture coincides with (7). Let $k_i = c_F s_i + c_{L,sig}\mathbb{E}[s_L \mid k_L] + c_{L,beta}k_L$ be the leader's conjecture about the follower's strategy. The leader's action affects the follower's action through the signaling channel ($c_{L,sig}$) and the conformity channel ($c_{L,beta}$). Thus, the leader solves

$$\max_{k_L} -\mathbb{E}\left[\int ((c_F s_i + c_{L,sig}\mathbb{E}[s_L \mid \kappa^{-1}(k_L)] + c_{L,beta}k_L) - A - b)^2 \,\middle|\, s_L\right], \tag{9}$$

[15] If κ is the pooling equilibrium, $\mathbb{E}_i[\theta]$ does not depend on s_L.

where κ is the leader's equilibrium strategy.[16]

Fixing the follower's belief, since (9) is concave in k_L, it is straightforward to show that κ is unique and linear. The first-order condition of the problem (9) is given by

$$\mathbb{E}\left[(1-\alpha)c_{L,beta}(k_L-\theta)-b \mid s_L\right]=0.$$

Therefore, the leader's optimal action is

$$k_L = s_L + \frac{b}{(1-\alpha)c_{L,beta}} = s_L + \frac{1-\alpha+\beta}{\beta(1-\alpha)}b. \tag{10}$$

The leader's action is the leader's posterior expectation of the state ($\mathbb{E}[\theta \mid s_L] = s_L$) plus a constant bias term. As the bias b becomes higher, the leader "inflates" the action more. When the leader is benevolent ($b = 0$), the leader's action is just her posterior expectation. To understand this, decompose the differences between follower i's action and the best action as $k_i - A = (1-\alpha)(k_i-\theta)+\alpha(k_i-K)$. The first term is the loss due to the action being different from the state, and the second term is the loss (or gain when $\alpha < 0$) due to the miscoordination. Since the leader's action is public information, the deviation from the average action $k_i - K$ does not depend on k_L. Therefore, the leader's action affects the fundamentals only through the first term. The followers utilize their private signal s_i, but the leader's expectation about the followers' signals are the leader's signal itself: $\mathbb{E}[s_i \mid s_L] = s_L$. Thus, $k_L = s_L$ minimizes the expected loss $(k_i - \theta)^2$.

From (10), it is evident that the FRE does not exist if $\beta = 0$ and $b > 0$. If the leader is biased ($b > 0$), then her incentive to deceive the followers is simply too high with the neutral culture ($\beta = 0$): in such a case, the leader's action is cheap talk. When the culture is not neutral ($\beta \neq 0$), the leader's action is disciplined by the possibility that the followers react to the leader's action *regardless of its information content.* The following proposition summarizes the above discussion:

Proposition 2. *An FRE exists if and only if $\beta \neq 0$ or $b = \beta = 0$. If an FRE exists, then the leader's equilibrium action is given by* (10).

[16]To be precise, the followers conjecture $\hat{\kappa}$ about the leader's equilibrium strategy κ and form the belief by $\mathbb{E}[s_L \mid \hat{\kappa}^{-1}(k_L)]$. The equilibrium condition requires that the leader's best response coincide with the followers' conjecture.

Pooling Equilibrium In a pooling equilibrium, the followers react to the leader's action only because of a conformity culture (see (8)). Under the neutral culture $\beta = 0$, the leader's action is completely irrelevant to the followers. Therefore, for any leader's strategy, this constitutes an equilibrium. The converse is also true: if a pooling equilibrium exists, then the culture should be neutral. This is because, as I have discussed, under a non-neutral culture ($\beta \neq 0$), the followers put a nonzero weight on the leader's action, which does not contain any information. Therefore, some leader types always have an incentive to deviate from the pooling equilibrium and lead the followers to take actions that are preferable to the leader.

Proposition 3. *A pooling equilibrium exists if and only if $\beta = 0$. If a pooling equilibrium exists, then the leader's equilibrium action can be any action level.*

In a pooling equilibrium, one needs to specify the off-path beliefs of the followers. There are many possible off-path beliefs that support the pooling equilibrium. Indeed, under a pooling equilibrium, the leader's incentive is solely shaped by the followers' conformity motive, so the specification of off-path beliefs is not crucial. See the proof of Proposition 3 in the Appendix for details.

FRE vs Pooling Equilibrium Table 1 summarizes the conditions under which an FRE or a pooling equilibrium exists. If the leader is unbiased ($b = 0$), then both pooling and FRE are possible under the neutral culture. When a conformity culture is introduced ($\beta \neq 0$), pooling equilibria are eliminated. In such a case, the followers care about the leader's actions due to the conformity culture, so the leader cannot help but adjust her action in a way that reveals some information.[17]

If the leader is biased ($b > 0$), then under the neutral culture ($\beta = 0$), the possibility of a pooling equilibrium is eliminated. This is because the leader's incentive to manipulate the followers is too strong as the leader's action is cheap talk. When the culture is not neutral ($\beta \neq 0$), the leader's action is disciplined by the followers' conformity motive, so the leader can fully reveal her information.

[17]The logic applies to the case of semi-separating equilibria as well–I conjecture that an FRE is the unique signaling equilibrium when $\beta \neq 0$. However, due to the difficulty in explicitly characterizing semi-separating equilibria (see Remark A.1), I cannot formally prove this.

Table 1: Signaling Equilibria

	$\beta = 0$	$\beta \neq 0$
$b = 0$	Pooling, FRE	FRE
$b > 0$	Pooling	FRE

3.3 Optimal Level of Conformity

The main goal of this paper is to characterize the degree of conformity that maximizes the fundamentals. As Table 1 shows, the case of $\beta = 0$ and $\beta \neq 0$ are fundamentally different as the set of possible equilibria change. Moreover, when the culture is neutral and the leader is unbiased ($\beta = b = 0$), there is an issue of equilibrium selection. Because of this, defining an "optimal" level of conformity is not straightforward. To address this issue, before I define an optimal level of conformity, I first show that the neutral culture can always be improved on by a non-neutral culture as long as $\alpha \neq 0$. I denote by $\Pi(\alpha, \beta)$ the fundamentals as a function of the parameters α and β given an equilibrium.

Lemma 2. *Suppose that $\beta = 0$. In any equilibrium, there exists $\beta' \neq 0$ such that $\Pi(\alpha, 0) < \Pi(\alpha, \beta')$.*

Intuitively, under a pooling equilibrium, the followers do not learn the leader's valuable information. However, by introducing a small level of (anti)conformity culture, the leader's information is revealed to the followers. Such information helps the followers predict the state better and coordinate more effectively. If a pooling equilibrium is played at $\beta = 0$, such adjustments strictly improves the fundamentals. Note that, when the leader is unbiased ($b = 0$), even at $\beta = 0$, the leader's information can be fully revealed in equilibrium. Thus, the informational benefit described above does not arise. Yet, it is still true that $\beta \neq 0$ improves on the neutral culture. This is because appropriate adjustments in β facilitates coordinating the followers' actions.

Given Lemma 2, I can restrict my attention to $\beta \neq 0$. In this case, I can assume that the leader plays a unique FRE. Since the followers' best response is unique by Proposition 1, the following is well-defined:

Definition 1. The *optimal level of conformity*, denoted by β^*, is β that maximizes the fundamentals:

$$\beta^* = \arg\max_{\beta \neq 0} \Pi(\alpha, \beta).$$

Equipped with this definition, I state the main result of this paper.

Theorem 1 (Optimal Culture). *The optimal level of conformity β^* uniquely exists and is given by*

$$\beta^* = \frac{\alpha}{1-\alpha}\frac{\tau_L}{\tau_F + \tau_L}. \tag{11}$$

The optimal level of conformity is positive (negative) when there is strategic complementarity (substitutability).

Theorem 1 characterizes the optimal level of conformity. From (11), it is clear that $\mathrm{sgn}(\alpha) = \mathrm{sgn}(\beta)$: a conformity (anticonformity) culture is optimal when there is strategic complementarity (substitutability). A rough intuition is as follows: without conformity culture, the organization faces a miscoordination problem (Lemma 1). When there is an under-coordination problem ($\alpha > 0$), a positive level of conformity culture helps the followers coordinate more efficiently. Alternatively, anticonformity helps the over-coordination problem ($\alpha < 0$). However, this intuition does not explain how β affects the information role and coordination role of the leader's action. Moreover, (11) does not depend on b. Why is this the case? Below, I explain more detailed intuition of Theorem 1. For the sake of discussion, suppose that there is strategic complementarity ($\alpha > 0$). The case of strategic substitutability is analogous.

The key is to understand how β affects the followers' equilibrium action (7). In particular, the conformity parameter β affects the weight on the leader's signal in the modified posterior expectation term (w_L^β) and the weight on the leader's action ($\beta/(1-\alpha+\beta)$). The former is the information channel while the latter is the coordination channel. I first observe that increasing β negatively affects the information channel but positively affects the coordination channel:

$$-\mathrm{sgn}\left(\frac{\partial}{\partial\beta} w_L^\beta\right) = \mathrm{sgn}\left(\frac{\partial}{\partial\beta}\frac{\beta}{1-\alpha+\beta}\right). \tag{12}$$

The expression (12) shows that a higher degree of conformity culture induces the followers to put less weight on the leader's information (negative information effect) but more weight on the leader's action (positive coordination effect). The latter part is intuitive: the followers have a stronger incentive to mimic the leader when there is a higher degree of conformity. The former effect is more subtle. Recall that, when $\beta = 0$, the followers place more weight on the leader's signal than the Bayesian weight (and the efficient weight) due to the coordination motive. When β becomes positive, each follower believes that others put more weight on the leader's action due to the conformity motive. But then, it is "easier" to predict the aggregation action for each follower, so there is less incentive to rely on the leader's signal to predict the state. This is not ideal as the efficiency would be improved if the followers put more weight on the leader's signal (Lemma 1).

What are the combined effects of the two? The followers put less weight on the modified posterior expectation ($\tilde{\mathbb{E}}^{\alpha,\beta}\theta$) and less weight on the leader's signal inside $\tilde{\mathbb{E}}^{\alpha,\beta}\theta$. Here, a key observation is that the leader's action k_L reveals the leader's signal in the FRE (10). Indeed, the net effect of increasing β on the weights on the leader's signal is positive: when $\alpha > 0$, have

$$\frac{\partial}{\partial \beta}\frac{\beta}{1-\alpha+\beta} > -\left[\frac{\partial}{\partial \beta}\frac{1-\alpha}{1-\alpha+\beta}w_L^{\beta}\right].$$

Thus, even though a higher level of conformity culture induces the followers to rely less on the leader's signal to predict the state, the followers end up relying more on the leader's signal, owing to the nature of FRE.

The above discussion fully describes the intuition for the optimal level of conformity when the leader is unbiased ($b = 0$). However, when the leader is biased ($b > 0$), there is one missing piece of intuition: one might wonder that if the leader's bias is larger, then increasing the degree of conformity would be costly, as the followers' actions will also be biased. It turns out that this is not the case. A primary reason is that the leader's payoff does not directly depend on her own action. Consequently, when β changes, the leader adjusts her actions to offset the effect of such change in β on the followers' strategy. This is evident by substituting the leader's equilibrium action (10) to the followers' equilibrium action (7):

$$k_i = \frac{1-\alpha}{1-\alpha+\beta}\left[w_F^{\beta}s_i + w_L^{\beta}s_L\right] + \frac{\beta}{1-\alpha+\beta}s_L + \frac{1}{1-\alpha}b.$$

The leader's bias b manifests as a constant bias in the leader's action that does not depend on β. Hence, conformity and bias does not interact in equilibrium, as evidenced by (11). As an extension, I explore alternative specifications of the leader's bias (Section 5.2).

Comparative Statics

Now, I discuss how β^*, the optimal level of conformity, changes for the strategic nature of the tasks that the organization performs (the degree of strategic complementarity/substitutability) and the information structure within the organization. The following result is immediate from (11).

Corollary 1 (Comparative Statics of β^*). *The optimal degree of conformity is*

1. *increasing in α;*
2. *increasing (decreasing) in the leader's signal precision τ_L and decreasing (increasing) in the followers' signal precision τ_F when $\alpha > 0$ ($\alpha < 0$).*

The first part is intuitive given the discussion of after Theorem 1; under strategic complementarity ($\alpha > 0$), an increase in α means that there is more need for coordination, and this can be achieved by a higher level of conformity. Similarly, when α is negative, a higher degree of strategic substitutability leads to a higher degree of anticonformity.

The second part highlights the relationships between the information environment within an organization and corporate culture. Consider the case of strategic complementarity ($\alpha > 0$). When the leader's signal is more precise, the followers put more weight on the leader's signal in $\tilde{\mathbb{E}}^{\alpha,\beta}$, i.e., $\partial w_L^{\beta}/\partial\beta \geq 0$. However, this adjustment is not enough; the fundamentals can be improved if the followers utilize more of the leader's information. This inefficient use of the leader's information is due to the externality of actions. Under the FRE, this is possible by increasing β. The case of strategic substitutability is the opposite.

Related to the second part of Corollary 1, it is insightful to consider the cases of extreme information structures. When the leader's signal is arbitrarily informative the optimal culture is $\lim_{\tau_L\to\infty}\beta^* = \alpha/(1-\alpha)$. This is because, as the leader's signal becomes more precise, the followers put more weight on the leader's signal, so the marginal benefit of increasing β diminishes. Alternatively, when the followers' signal is arbitrarily informative, the optimal culture is $\lim_{\tau_F\to\infty}\beta^* = 0$. This is because, as the followers' signal becomes more precise, the followers can achieve more efficient outcomes by themselves, so the marginal informational loss of increasing β outweighs the coordination benefit.

Optimal Culture and Efficiency

Recall that the organization is inherently beset by the inefficiency due to externality and incomplete information (Lemma 1). I have shown that an optimal level of (anti)conformity culture mitigates this inefficiency. In my stylized setting, however, a stronger statement can be made: the optimal culture *eliminates* the inefficiency and achieves the constrained first-best allocation.

Corollary 2. *At the optimal level of conformity, the efficient degree of coordination is achieved:* $(w_F^{FB}, w_L^{FB}) = (w_F^{\beta^*}, w_L^{\beta^*})$.

Therefore, carefully designed (anti)conformity culture solves the inefficiency arising from the information asymmetry and externality. In particular, the followers behave as if they corporate on and commit to how to utilize information.[18] Of course, this comes at a cost for the followers, as they have to incur a nonpecuniary cost of conformity when there is strategic complementarity. Indeed, it is not clear if the followers are better off by accepting the leadership and the optimal culture. If they are always worse off as a result of the conformity culture, then such culture is not sustainable and followers would not follow the leader. I take up on this issue in the next subsection.

3.4 Why Do Followers Follow the Leader?

One key distinction between authority and leadership is that the latter is voluntary (Hermalin, 2012). In my model, followers accept nonpecuniary punishment (if $\beta > 0$) by deviating from the leader. Why do they accept such leadership and culture? For the model to offer a theory of leadership and culture, it should be able to explain why followers could benefit from voluntarily follower the leader and accepting the culture.

To address this question, I consider whether the followers are ex-ante better off in the presence of the leader. Let $U(\beta) = \mathbb{E}[u_i; \beta]$ be the followers' ex-ante expected payoff, where I drop the subscript i from the symmetricity. I compare the followers' ex-ante payoffs of the neutral culture ($\beta = 0$) and the optimal level of conformity (β^*). I consider the case of an unbiased leader ($b = 0$) and assume that the FRE is played when $\beta = 0$. This assumption is to make the information environment constant across different cultures–for both $\beta = 0$ and $\beta = \beta^*$, the followers learn the leader's signal in such a case. Therefore, if the followers are ex-ante better off by accepting a nonzero level of conformity culture, then it is not because of the additional information that the leader provides.

The following result characterizes the conditions under which the followers are better off by accepting the leadership and the optimal level of conformity culture.

Proposition 4. *The followers are ex-ante better off with the optimal level of conformity culture if and only if*

1. $\alpha < 0$ *or;*

[18] Because of the bias term b, the equilibrium fundamentals do not reach the optimal value in the problem (4). Since the equilibrium efficiency loss from the bias term b is independent of the followers' strategies, the definition of the efficient degree of coordination in (4) is intact in the presence of the leader's bias.

2. $\alpha \in (1/2,1)$ *and* $0 \le \gamma_F \le \bar{\gamma}_F(\alpha)$*, where*

$$\gamma_F := \frac{\tau_F}{\tau_F + \tau_L}$$

and $\bar{\gamma}_F$ *is the upper bound that depends on* α*. Moreover,* $\bar{\gamma}_F$ *is increasing in* α, $\lim_{\alpha\to 0} \bar{\gamma}_F(\alpha) = 0$*, and* $\lim_{\alpha\to 1} \bar{\gamma}_F(\alpha) = 1$

To understand this result, observe that

$$U(\beta^*) \ge U(0) \iff \mathbb{E}\left[(k_i - A)^2; 0\right] - \mathbb{E}\left[(k_i - A)^2; \beta^*\right] \ge \beta^* \mathbb{E}\left[(k_i - k_L)^2; \beta^*\right] \tag{13}$$

That is, for the followers to benefit from the leadership and the optimal culture, the expected pecuniary payoff $\pi_i = -\mathbb{E}[(k_i - A)^2]$ improved by the optimal culture β^* should be larger than the cost of conformity (the right-hand side of (13)).

From this observation, the first part of Proposition 4 is trivial; when there is strategic substitutability, the optimal culture is an anticonformity culture ($\beta^* < 0$). Thus, the follower's nonpecuniary utility from the culture is always positive. Since the optimal level of culture always improves the pecuniary payoffs (the left-hand side of (13)) is always positive, the followers are better off with β^*.

What is interesting is the second part. Under strategic complementarity, the optimal level of conformity culture imposes a cost to the followers, as the followers' actions are not always the same as the leader's actions. The proposition shows that the benefit of the optimal culture outweighs such costs when the degree of strategic complementarity is high and the followers' signal is not too precise compared to the leader's information. Intuitively, when α is high, the need for coordination is high, so the benefit of a conformity culture is also high. If the followers are endowed with precise information in the first place, however, the benefit of additional coordination due to the optimal culture is limited. As α becomes higher, the value of the optimal culture becomes higher for a fixed information environment, so the upper bound $\bar{\gamma}_F$ is increasing in α.

Focusing on the voluntary nature of leadership, Komai, Stegeman and Hermalin (2007) ask a following related question: If the leader is privately informed, then she can motivate the followers to exert more effort (Hermalin, 1998); but, what justifies a leader having exclusive access to the information? They compare the case of allowing the leader to have exclusive access to information with the case where such information is public. They show that providing less information to the followers can be beneficial for the organization. In my analysis above, the information environment is kept constant: the followers learn the leader's signal regardless of the culture. The benefit of conformity culture comes from the improved coordination. Thus, my result complements the findings of Komai, Stegeman and Hermalin (2007) by showing that coordination motive can explain why followers voluntary conform to the leader.

The implication of Proposition 4 is that the organization under the optimal conformity culture is fragile if the conditions in the proposition are not satisfied. Even though I do not formally model the process of electing a leader and establishing a culture, the proposition suggests that the followers would not want to stay in the organization with a positive level of conformity culture under certain circumstances. In particular, followers would accept a positive level of optimal conformity culture only when the need for coordination is high enough and when they do not have enough information compared to the leader.

4 Uncertain Environment, Robust Culture, and the Value of Information

The optimal level of conformity culture is determined by the organization's environment characterized by (α, τ_F, τ_L). However, it is natural to think that organizations face uncertain environments, where the exact environment is unknown. For example, the quality of the information that the leader and the followers receive may change period-by-period. The formula for the optimal level of conformity (11) is not valid under such uncertainty. Only assurance is that the prediction regarding the direction of conformity culture–complementarity (substitutability) necessitates conformity (anticonformity)–does not depend on such details.

In this section, I explore the optimal level of conformity culture when the organization faces uncertain environments. To highlight the interesting aspects of the optimal culture under uncertainty, I focus on the uncertainty about the information structure.[19] Exploring such scenarios requires an understanding of the value of information within the organization and its interaction with corporate culture.

Specifically, I extend the baseline model to the case in which the information environment parameters, (τ_F, τ_L), are drawn from a set of possible values. In particular, I assume that each parameter is drawn from an interval of possible values: $\tau_F \in [\underline{\tau}_F, \overline{\tau}_F]$ and $\tau_L \in [\underline{\tau}_L, \overline{\tau}_L]$,

[19]The analysis in this section easily extends to the case where the organization faces uncertainty about the strategic nature of the tasks, as long as the sign of α is known.

where $\overline{\tau}_F \geq \underline{\tau}_F > 0$ and $\overline{\tau}_L \geq \underline{\tau}_L > 0$. To simplify the discussion, I focus on the case of strategic complementarity ($\alpha > 0$).

I assume that the leader and the followers publicly observe the realization of the environment. Thus, the equilibrium given β is the same as before. However, β cannot be tailored to the realization of the environment; I consider the conformity culture that is "robust" to uncertain environments.

Definition 2. The *robust conformity culture*, denoted by β^R is β that solves the following program:

$$\max_{\beta \geq 0} \min_{(\tau_F, \tau_L) \in [\underline{\tau}_F, \overline{\tau}_F] \times [\underline{\tau}_L, \overline{\tau}_L]} \Pi(\alpha, \beta, \tau_F, \tau_L). \tag{14}$$

The problem (14) derives the optimal level of conformity culture for the worst-case environment. Since I focus on the case of strategic complementarity, I restrict β to be nonnegative without loss. One interpretation of the situation is where the organization performs the task repeatedly independently with changing environments. The robust culture is the level of conformity that takes into account every possible environment. The formulation (14) is consistent with the idea that corporate culture is a way to deal unforeseen contingencies (Kreps, 1990).

The following result characterizes the robust level of conformity culture.

Proposition 5 (Robust Culture). *The robust conformity culture β^R is given by*

$$\beta^R = \frac{\alpha}{1-\alpha} \frac{\underline{\tau}_L}{\underline{\tau}_F + \underline{\tau}_L}. \tag{15}$$

The formula (15) shows that the robust conformity culture treats the environment as if the lower bounds of the information precisions are realized. Therefore, in a sense, the robust culture is *conservative.* From a normative perspective, this result offers a managerial implication for designing conformity culture in uncertain corporate environments: it is optimal to prepare for the lowest possible level of information precision.

Below, I unpack this result in detail. A key step is analyzing the *value of information*, i.e., the effect of signal precision on the fundamentals. I show how (anti)conformity culture changes the value of information in the organization in equilibrium.

Value of information To solve the problem (14), one needs to understand how τ_F and τ_L affect the fundamentals in equilibrium for a given β. The case of neutral culture ($\beta = 0$) is well understood (Morris and Shin, 2002; Angeletos and Pavan, 2004, 2007). In particular, because followers under-coordinate in equilibrium, increasing the precision of the leader's signal always benefits the organization. In contrast, increasing the precision of the followers' signal may harm the fundamentals by exacerbating the under-coordination problem. The following result shows the results extend to the case with a positive level conformity culture.

Lemma 3.

1. *The leader's information is always beneficial for the organization:*

$$\frac{\partial \Pi}{\partial \tau_L}(\alpha, \beta, \tau_F, \tau_L) \geq 0, \quad \forall (\alpha, \beta, \tau_F, \tau_L)$$

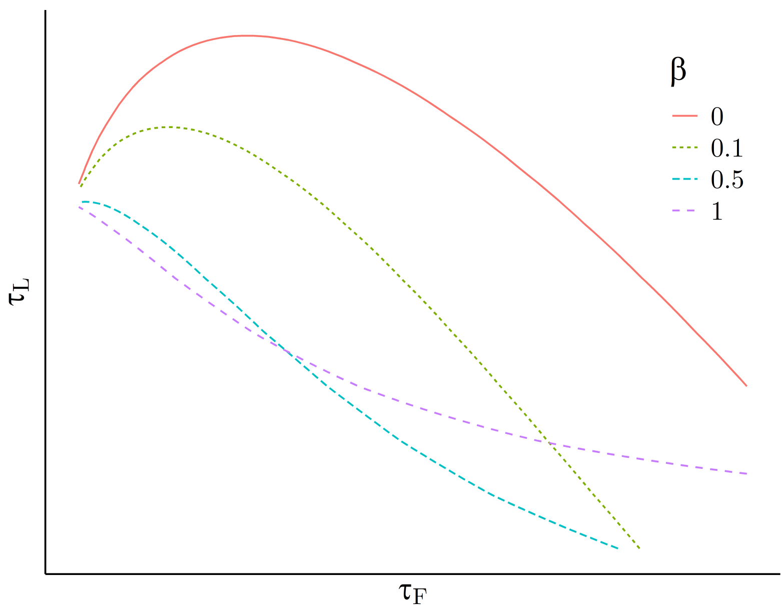
2. *The followers' information is not necessarily beneficial for the organization:*

$$\frac{\partial \Pi}{\partial \tau_F}(\alpha, \beta, \tau_F, \tau_L) \geq 0 \iff \tau_F \geq \left[\frac{\alpha - \psi}{2\alpha(1-\psi)\psi - (\alpha - \psi)}\right]\tau_L, \quad \psi := \frac{1+2\beta}{2(1+\beta)}$$

The first part of the lemma says that the leader's information is always valuable regardless of β. This may be somewhat counter-intuitive; if the degree of conformity is too high, the followers may be over-coordinating, in which case public information may be harmful. What this argument misses is the negative effect of conformity on the followers' *strategic* reaction. When β becomes higher, the followers react to the leader just because of the conformity motive, so the role of higher-order beliefs (the modified expectation term in (7)) is less important. In other words, the followers become "less strategic" as the conformity rises. This implies that, the behavior of the organization is approximated by the leader's behavior when β is high. Since the leader's problem comes down to predicting the state in a Bayesian manner (i.e., only the first-order expectation matters), the leader's information is always beneficial.

The second part identifies the condition under which the precision of the private information is valuable to the organization. One can see this condition from two perspective. First, in terms of the degree of strategic complementarity, if $\alpha \leq \psi$, then the condition is always satisfied. Since ψ is increasing in β and ranges over $[1/2, 1)$, as β increases, the condition is satisfied for a wider range of α when β is higher. Second, in terms of precisions of the signals, the condition says that the ratio of the precisions τ_F/τ_L should be sufficiently large if $\alpha > \psi$. Since $\frac{\alpha-\psi}{2\alpha(1-\psi)\psi-(\alpha-\psi)}$ is decreasing in ψ, the conditions is satisfied for a wider range of precisions when β is higher. In any case, the condition implies that the organization can mitigate the detrimental effect of the followers' information by increasing the degree of conformity. Figure 1 shows the contour plot of Π in (τ_F, τ_L)-space to illustrate this point. If the contours are upward sloping at some point, then increasing the precision of the followers' signal has a negative effect on the fundamentals at that point. When $\beta = 0$, there is such area when τ_F is small. As the degree of conformity rises, the area where the followers' information is harmful shrinks.

Figure 1: Contour Plot of Π



Note: The figure shows the contour plot of the fundamentals Π with respect to the precisions of the signals τ_F and τ_L. That is, each line represents the set $\{(\tau_F, \tau_L) \mid \Pi(\alpha, \beta, \tau_F, \tau_L) = \text{constant}\}$. The parameter α is fixed at 0.7.

Deriving the robust culture How does Lemma 3 help derive the robust culture? Since the fundamentals are increasing in τ_L for any parameters, in choosing β^R, one can treat as if $\tau_L = \underline{\tau}_L$. In other words, since the fundamentals is always increasing in the leader's signal, the robust culture treats the leader's signal precision as if the lower bound is realized.

Deriving the robust culture for the uncertainty about the followers' signal precision is less trivial. For given β, there is a unique $\tau_F = \tau_F^*(\beta)$, which is possibly strictly positive and minimizes the fundamentals. As the intuition of Lemma 3 suggests, such $\tau_F^*(\beta)$ is decreasing in β.[20] Since the value of a conformity culture is higher when τ_F is smaller, the degree of conformity, β, that maximizes the fundamentals given $\tau_F^*(\beta)$ tend to be higher. This in turn suggests that $\tau_F^*(\beta^R)$ is small. It turns out that $\tau_F^*(\beta^R) = \underline{\tau}_F$. That is, even though Π is not

[20]Note that the followers' signal precision is not beneficial for the organization for $\tau_F \leq \tau_F^*(\beta)$.

necessarily monotone in τ_F, at the solution to the problem (14), it happens to be the case that τ_F is at the lower bound. Hence the result (15).

5 Extensions

5.1 Coordination only has Private Value

In the main model, the degree of coordination matters for the performance of organizations. This is in consistent with the interpretation that α represents the strategic nature of the tasks that the organization performs. An alternative case is where the organization does not care about the degree of coordination: the organization's objective is to minimize the distance between each follower's actions and the unknown state.[21]

What is the optimal degree of conformity culture when the coordination only has private value and does not contribute to the fundamentals? To address this question, I modify the model as follows. First, the organization's objective is to maximize

$$\Pi^P := -\int (k_i - \theta)^2.$$

Second, the leader with bias $b \geq 0$ maximizes

$$u_L^P := -\mathbb{E}[(k_i - \theta - b)^2].$$

The followers' payoff and the remaining elements of the model are the same as the main model. I denote the optimal degree of conformity under the modified objective as β^P:

$$\beta^P = \arg\max_{\beta} \Pi^P(\alpha, \beta).$$

The key tension in this model is that, in general, followers over-coordinate (under-coordinate) when there is strategic complementarity (substitutability) in the absence of conformity (anticonformity) culture.[22] This is because the followers try to predict and adjust

[21] In such scenario, the parameter α may also be interpreted as corporate culture. When α is positive, the organization's culture is that the followers would like to behave similarly.
[22] See Section 3.1 for comparison.

according to other followers' actions, even though such activity is wasteful for the organization. Therefore, in light of the intuition for Theorem 1, it is natural to expect that the optimal level of conformity culture is negative (positive) when there is strategic complementarity (substitutability). The following proposition confirms this intuition.

Proposition 6. *The optimal level of conformity culture β^P exists and is given by*

$$\beta^P = -\alpha \frac{\tau_L}{\tau_F + \tau_L}. \tag{16}$$

Combined with the main result (Theorem 1), this result shows that the optimal level of conformity culture is determined to solve the coordination problem that the organization is facing. Consider the case of strategic complementarity ($\alpha > 0$). In the baseline model, the organization suffers from the under-coordination problem. The optimal culture is a conformity culture that helps the followers coordinate more effectively. In the present model, the organization does not care about the degree of coordination. The optimal culture is an anticonformity culture that helps the followers avoid over-coordination.

The following comparative statics are immediate from (16).

Corollary 3. *The optimal level of conformity culture β^P is*

1. *decreasing in α;*
2. *decreasing (increasing) in the leader's signal precision τ_L and increasing (decreasing) in the followers' signal precision τ_F when $\alpha > 0$ ($\alpha < 0$).*

To discuss this result, suppose that there is strategic complementarity ($\alpha > 0$). The case of strategic substitutability ($\alpha < 0$) is analogous. The first part of the comparative statics is straightforward. Since the followers over-coordinate in the absence of β, anticonformity is optimal. When $\alpha > 0$ becomes higher, the inefficiency due to the over-coordination becomes larger. To curtail this over-coordination, the optimal degree of anticonformity (negative of β^P) increases. The second part is also intuitive. Suppose that the leader's signal become more precise. Then, the followers place more weight on the leader's signal, exacerbating the over-coordination problem. Thus, the optimal level of anticonformity should be higher.

5.2 Leader's Bias: Alternative Specification

Now, I go back to the main model where the degree of coordination matters for the organization. In the main model, the leader's objective (2) is modeled in the simplest way to capture a possible bias. Because of this specification, I have obtained a rather surprising result that the leader's bias does not affect the optimal level of conformity culture (see (11)). However, this is not true in general. In this section, I explore an alternative specification of the leader's bias and discuss how the bias and conformity interact. For simplicity, I assume that there is strategic complementarity ($\alpha > 0$).

In particular, I extend (2) so that the leader's payoff directly depends on her own action as well: let the leader's objective be

$$\hat{u}_L = -(1-\lambda)\int (k_i - A - b_F)^2 - \lambda(k_L - A - b_L)^2. \tag{17}$$

The leader would like to minimize the distance between her action and the preferred action A as well. The parameters $b_F \geq 0$ and $b_L \geq 0$ capture the leader's degree of bias for the followers' actions and the leader's action, respectively. The weight $\lambda \in [0,1]$ determines the relative importance of aligning with followers' actions versus her own action towards the preferred actions. When $\lambda = 0$, the expression reduces to the baseline one (2).

With this specification, it can be shown that the followers' actions are biased more as the biases increase (the details are in Appendix). In other words, the leader's incentive to bias her action is stronger as the followers put more weight on the leader's action. To see this, consider the extreme case, $\lambda = 1$, where the leader cares only about her action being close to $A + b_L$. In that case, the leader's action is $k_L = \mathbb{E}[A \mid s_L] + b_L$.[23] When the degree of conformity is higher, the followers actions are biased at the order of b_L (the details are in Appendix). Therefore, increasing the degree of conformity is more costly when the biases are higher. As a result, the degree of optimal conformity is decreasing in the biases. This observation is summarized in the following.

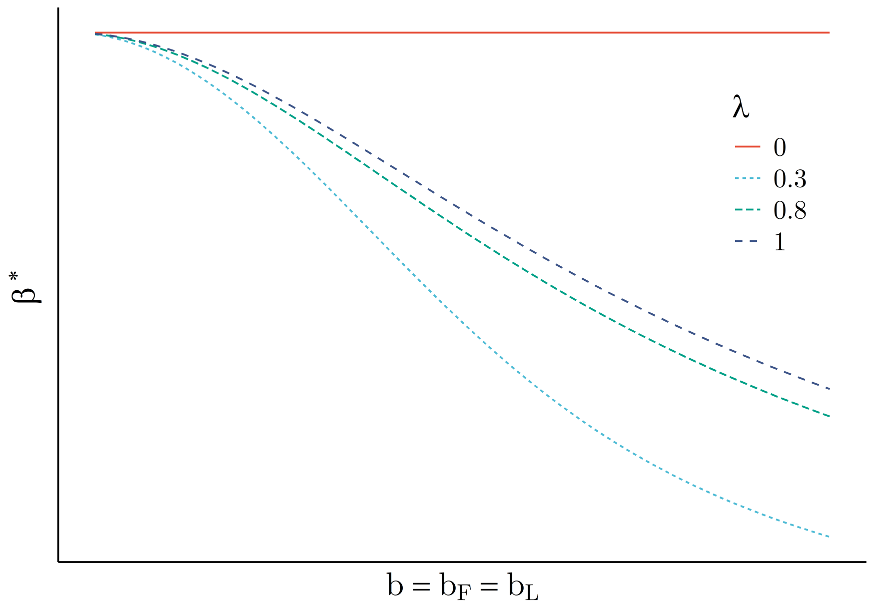
Corollary 4. *Suppose that the leader's payoff is given by* (17). *The optimal level of conformity culture β^* is decreasing in b_F and b_L. Compared to the baseline model, the optimal degree of conformity is lower with the alternative leader's objective* (17).

Figure 2 illustrates this result. It plots the optimal degree of β^* as a function of bias b, where $b = b_F = b_L$. When $\lambda = 0$, the model is the same as the baseline case. As I have shown, the optimal degree of conformity does not depend on the bias. However, when λ is

[23] Note that, since A depends on the aggregate action K, which in turn depends on k_L, this expression does not represent an equilibrium.

nonzero, β^* is decreasing in the bias. This figure also suggests that β^* is not monotone in λ, as λ enters the leader's strategy in a nonlinear and nonmonotone way.

Figure 2: Optimal β with Alternative Leader's Objective



Note: The figure shows the optimal degree of conformity under the alternative leader's objective (17) as a function of the leader's bias $b = b_F = b_L$. Each line corresponds to a different value of λ as indicated in the legend. The other parameters are set to $\alpha = 0.6$, $\tau_F = \tau_L = 1$.

6 Conclusion

The paper studies the optimal level of conformity culture in organizations. In a stylized coordination game, I show that the optimal level of conformity culture is determined by the strategic nature of the tasks that the organization performs. When the tasks are strategic substitutes, the optimal culture is an anticonformity culture. When the tasks are strategic complements, the optimal culture is a conformity culture. My model predicts that the optimal level of conformity culture depends on the informational structure within the organization. In particular, when there is strategic complementarity, the optimal level of conformity culture is higher when the followers have less precise information compared to the leader. The model provides a new insight into how corporate culture creates value. However, conformity is only an aspect of corporate culture. In practice, corporate culture is more complex and a variety of forces are at play. Future research could explore other aspects of corporate culture and their interaction with conformity culture.

References

Aghion, Philippe, and Jean Tirole. 1997. "Formal and Real Authority in Organizations." *Journal of Political Economy*, 105(1): 1–29.

Akerlof, George A., and Rachel E. Kranton. 2000. "Economics and Identity." *The Quarterly Journal of Economics*, 115(3): 715–753.

Akerlof, George A., and Rachel E. Kranton. 2005. "Identity and the Economics of Organizations." *Journal of Economic Perspectives*, 19(1): 9–32.

Alonso, Ricardo, Wouter Dessein, and Niko Matouschek. 2008. "When Does Coordination Require Centralization?" *American Economic Review*, 98(1): 145–179.

Angeletos, George-Marios, and Alessandro Pavan. 2004. "Transparency of Information and Coordination in Economies with Investment Complementarities." *American Economic Review*, 94(2): 91–98.

Angeletos, George-Marios, and Alessandro Pavan. 2007. "Efficient Use of Information and Social Value of Information." *Econometrica*, 75(4): 1103–1142.

Bass, Bernard M., and Ronald E. Riggio. 2005. *Transformational Leadership.* . 2 ed., New York:Psychology Press.

Benmelech, Efraim, and Carola Frydman. 2015. "Military CEOs." *Journal of Financial Economics*, 117(1): 43–59.

Bernheim, B. Douglas. 1994. "A Theory of Conformity." *Journal of Political Economy*, 102(5): 841–877.

Bhandari, Avishek, Babak Mammadov, Maya Thevenot, and Hamid Vakilzadeh. 2022. "Corporate Culture and Financial Reporting Quality." *Accounting Horizons*, 36(1): 1–24.

Bolton, Patrick, Markus K. Brunnermeier, and Laura Veldkamp. 2010. "Economists' Perspectives on Leadership." *Handbook of leadership theory and practice*, 239–264.

Bolton, Patrick, Markus K. Brunnermeier, and Laura Veldkamp. 2013. "Leadership, Coordination, and Corporate Culture." *Review of Economic Studies*, 80(2): 512–537.

Burns, James MacGregor. 1978. *Leadership.* New York : Harper & Row.

Cai, Wei. 2023. "Formalizing the Informal: Adopting a Formal Culture-Fit Measurement System in the Employee-Selection Process." *The Accounting Review*, 98(3): 47–70.

Campbell, Dennis. 2012. "Employee Selection as a Control System." *Journal of Accounting Research*, 50(4): 931–966.

Cho, In-Koo, and David M. Kreps. 1987. "Signaling Games and Stable Equilibria." *The Quarterly Journal of Economics*, 102(2): 179–221.

Davidson, Robert, Aiyesha Dey, and Abbie Smith. 2015. "Executives'"off-the-Job" Behavior, Corporate Culture, and Financial Reporting Risk." *Journal of Financial Economics*, 117(1): 5–28.

Dessein, Wouter, and Tano Santos. 2006. "Adaptive Organizations." *Journal of Political Economy*, 114(5): 956–995.

Dessein, Wouter, Desmond (Ho-Fu) Lo, and Chieko Minami. 2022. "Coordination and Organization Design: Theory and Micro-Evidence." *American Economic Journal: Microeconomics*, 14(4): 804–843.

Deutsch, Morton, and Harold B. Gerard. 1955. "A Study of Normative and Informational

Social Influences upon Individual Judgment." *The Journal of Abnormal and Social Psychology*, 51(3): 629.

Dewan, Torun, and David P. Myatt. 2008. "The Qualities of Leadership: Direction, Communication, and Obfuscation." *American Political Science Review*, 102(3): 351–368.

Edmans, Alex. 2011. "Does the Stock Market Fully Value Intangibles? Employee Satisfaction and Equity Prices." *Journal of Financial Economics*, 101(3): 621–640.

Fischer, Paul, and Steven Huddart. 2008. "Optimal Contracting with Endogenous Social Norms." *American Economic Review*, 98(4): 1459–1475.

Garicano, Luis. 2000. "Hierarchies and the Organization of Knowledge in Production." *Journal of Political Economy*, 108(5): 874–904.

Gibbons, Robert, and Rebecca Henderson. 2012. "Relational Contracts and Organizational Capabilities." *Organization Science*, 23(5): 1350–1364.

Gilboa, Itzhak, and David Schmeidler. 1989. "Maxmin Expected Utility with Non-Unique Prior." *Journal of Mathematical Economics*, 18(2): 141–153.

Gorton, Gary B., Jillian Grennan, and Alexander K. Zentefis. 2022. "Corporate Culture." *Annual Review of Financial Economics*, 14(Volume 14, 2022): 535–561.

Graham, John R., Jillian Grennan, Campbell R. Harvey, and Shivaram Rajgopal. 2022. "Corporate Culture: Evidence from the Field." *Journal of Financial Economics*, 146(2): 552–593.

Grennan, Jillian, and Kai Li. 2023. "Chapter 5: Corporate Culture: A Review and Directions for Future Research." In . Chapter Handbook of Financial Decision Making.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2015. "The Value of Corporate Culture." *Journal of Financial Economics*, 117(1): 60–76.

Hart, Oliver, and John Moore. 2005. "On the Design of Hierarchies: Coordination versus Specialization." *Journal of Political Economy*, 113(4): 675–702.

Hellwig, Christian, and Laura Veldkamp. 2009. "Knowing What Others Know: Coordination Motives in Information Acquisition." *The Review of Economic Studies*, 76(1): 223–251.

Hermalin, Benjamin E. 1998. "Toward an Economic Theory of Leadership: Leading by Example." *American Economic Review*, 1188–1206.

Hermalin, Benjamin E. 2012. "Leadership and Corporate Culture." *Handbook of organizational economics*, 432–78.

Huck, Steffen, and Pedro Rey-Biel. 2006. "Endogenous Leadership in Teams." *Journal of Institutional and Theoretical Economics*, 253–261.

Huo, Zhen, and Marcelo Pedroni. 2020. "A Single-Judge Solution to Beauty Contests." *American Economic Review*, 110(2): 526–568.

Judd, Kenneth L. 1985. "The Law of Large Numbers with a Continuum of Iid Random Variables." *Journal of Economic Theory*, 35(1): 19–25.

Kandel, Eugene, and Edward P. Lazear. 1992. "Peer Pressure and Partnerships." *Journal of Political Economy*, 100(4): 801–817.

Komai, Mana, Mark Stegeman, and Benjamin E. Hermalin. 2007. "Leadership and Information." *American Economic Review*, 97(3): 944–947.

Kreps, David M. 1990. "Corporate Culture and Economic Theory." *Perspectives on Positive Political Economy*, 90(109-110): 8.

Kreps, David M. 1997. "Intrinsic Motivation and Extrinsic Incentives." *American Economic Review*, 87(2): 359–364.

Landa, Dimitri, and Scott A. Tyson. 2017. "Coercive Leadership." *American Journal of Political Science*, 61(3): 559–574.

Levine, John, and Michael Hogg. 2010. "Anticonformity." In *Encyclopedia of Group Processes & Intergroup Relations.* 20–22. Thousand Oaks:SAGE Publications, Inc.

Liu, Xiaoding. 2016. "Corruption Culture and Corporate Misconduct." *Journal of Financial Economics*, 122(2): 307–327.

Milgrom, Paul, and John Roberts. 1990. "The Economics of Modern Manufacturing: Technology, Strategy, and Organization." *The American Economic Review*, 511–528.

Morris, Stephen, and Hyun Song Shin. 2002. "Social Value of Public Information." *American Economic Review*, 92(5): 1521–1534.

Myers, David G. 2009. *Social Psychology.* McGraw-Hill.

Prendergast, Canice. 1993. "A Theory of "Yes Men"." *American Economic Review*, 83(4): 757–770.

Prendergast, Canice. 2008. "Intrinsic Motivation and Incentives." *American Economic Review*, 98(2): 201–205.

Schein, Edgar H. 2016. *Organizational Culture and Leadership.* . 5th ed., Hoboken, New Jersey:Wiley.

Schwartz, Howard, and Stanley M. Davis. 1981. "Matching Corporate Culture and Business Strategy." *Organizational Dynamics*, 10(1): 30–48.

Sherif, Muzafer. 1935. "A Study of Some Social Factors in Perception." *Archives of Psychology (Columbia University).*

Sun, Yeneng. 2006. "The Exact Law of Large Numbers via Fubini Extension and Characterization of Insurable Risks." *Journal of Economic Theory*, 126(1): 31–69.

Uhlig, Harald. 1996. "A Law of Large Numbers for Large Economies." *Economic Theory*, 8(1): 41–50.

Van den Steen, Eric. 2009. "Authority versus Persuasion." *American Economic Review*, 99(2): 448–453.

Van den Steen, Eric. 2010*a*. "Culture Clash: The Costs and Benefits of Homogeneity." *Management Science*, 56(10): 1718–1738.

Van den Steen, Eric. 2010*b*. "Interpersonal Authority in a Theory of the Firm." *American Economic Review*, 100(1): 466–490.

Appendix

This section provides the proofs of the results described in the main text. Following the convention of the literature, I assume that a law of large numbers for a continuum of independent random variables holds: $\int s_i = \theta$. See Judd (1985), Uhlig (1996), and Sun (2006) for the discussion of this assumption. I omit the proofs for the results that are derived in the main text or straightforward to prove.

A Proofs

Proof of Proposition 1

First, I show that the followers' equilibrium strategy is uniquely expressed as (6). For any fixed K and k_L, follower i' objective is globally concave in k_i. The first order condition gives

$$k_i = \frac{1}{1+\beta}\left[(1-\alpha)\mathbb{E}_i[\theta] + \alpha\mathbb{E}_i[K]\right] + \frac{\beta}{1+\beta}k_L, \tag{A1}$$

which expresses follower i's best response using his first-order belief $\mathbb{E}_i[\theta]$. Integrating this expression over the set of followers implies that

$$K = \frac{1}{1+\beta}\left[(1-\alpha)\bar{\mathbb{E}}^1[\theta] + \alpha\int \mathbb{E}_j[K]\right] + \frac{\beta}{1+\beta}k_L. \tag{A2}$$

Substituting (A2) back to (A1) gives

$$k_i = \frac{1}{1+\beta}\left[(1-\alpha)\mathbb{E}_i[\theta] + \frac{\alpha}{1+\beta}\left[(1-\alpha)\mathbb{E}_i\bar{\mathbb{E}}^1[\theta] + \alpha\mathbb{E}_i\int \mathbb{E}_j[K]\right]\right] + \frac{\beta}{1+\beta}\left[1+\frac{\alpha}{1+\beta}\right]k_L,$$

which now expresses follower i's best response using his second-order belief $\bar{\mathbb{E}}^1[\theta]$. Successively applying this procedure gives the following:

$$\begin{aligned} k_i = &\frac{1}{1+\beta}\left[(1-\alpha)\sum_{n=0}^{\infty}\left(\frac{\alpha}{1+\beta}\right)^n \mathbb{E}_i[\bar{\mathbb{E}}^n[\theta]] + \alpha\lim_{n\to\infty}\left(\frac{\alpha}{1+\beta}\right)^n \mathbb{E}_i[\bar{\mathbb{E}}^n[K]]\right] \\ &+ \frac{\beta}{1+\beta}\sum_{n=0}^{\infty}\left(\frac{\alpha}{1+\beta}\right)^n k_L. \end{aligned}$$

Together with the assumption $|\alpha/(1+\beta)| < 1$ and the non-explosive higher-order belief condition, the expression reduces to (6).

Now, consider a fully revealing strategy κ. In this case, the first-order expectation is

$$\begin{aligned}\mathbb{E}_i[\theta] &= \mathbb{E}[\theta \mid s_i, k_L] \\ &= \frac{\tau_F}{\tau_F+\tau_L} s_i + \frac{\tau_L}{\tau_F+\tau_L}\kappa^{-1}(k_L)\end{aligned}$$

and thus $\int \mathbb{E}_i[\theta] = \frac{\tau_F}{\tau_F+\tau_L}\theta + \frac{\tau_L}{\tau_F+\tau_L}\kappa^{-1}(k_L)$. Iteratively computing the higher-order beliefs gives (7). Alternatively, consider a pooling strategy κ. Then, $\mathbb{E}_i[\theta] = \mathbb{E}[\theta \mid s_i] = s_i$, which implies (8). In any case, the follower's best response is linear in s_L and k_L.

Remark A.1 (Nonlinear Equilibrium). In the main text, I restrict my attention to linear equilibria. The above proof implies that given full separation and the non-explosive higher-order belief condition, this is without loss–since the signals follow the normal distribution, $\mathbb{E}_i\bar{\mathbb{E}}^n[\theta]$ is linear in s_i and k_L for all $n \geq 0$.

However, if the leader's signaling strategy is not fully revealing, then the followers' best responses are in general nonlinear in s_i and k_L. To see this, note that the leader's strategies are in general written by specifying values for each partition of the signal space. In particular, for an index set Λ that is either finite, countable, or uncountable, let $\mathbb{R} = \biguplus_{\ell\in\Lambda} S_\ell$, where S_ℓ is a Lebesgue-measurable set for each $\ell \in \Lambda$. The leader's strategy is given by

$$\kappa(s_L) = \kappa_\ell \quad \text{if } s_L \in S_\ell,$$

where $k_\ell \neq k_{\ell'}$ if $\ell \neq \ell'$. A fully separating strategy corresponds to the case where each S_ℓ is a singleton, and a full pooling strategy corresponds to $\Lambda = \{\ell\}$ and $S_0 = \mathbb{R}$.

Now, suppose that $\Lambda = \{0,1\}$ and $S_0 = (-\infty, c)$ and $S_1 = [c, \infty)$ for some $c \in \mathbb{R}$. If the leader observes $s_L < c$, then the leader chooses κ_0, while if the leader observes $s_L > c$, she chooses $\kappa_1 \neq \kappa_0$. Under this strategy, the follower's first-order expectation of the state is

$$\mathbb{E}_i[\theta] = \mathbb{E}[\theta \mid s_i, s_L \in S_l].$$

This expression is not linear in s_i nor c. In particular, for $l = 0$,

$$\mathbb{E}[\theta \mid s_i, s_L \in S_0] = \frac{\int \theta \exp\left\{\tau_F \frac{-(s_i-\theta)^2}{2}\right\} \Phi\left(\tau_F^{1/2}(c-\theta)\right) d\theta}{\int \exp\left\{\tau_F \frac{-(s_i-\theta)^2}{2}\right\} \Phi\left(\tau_F^{1/2}(c-\theta)\right) d\theta},$$

which is nonlinear in s_i and c (the case of $\ell = 1$ is similar). Hence, the n^{th}-order belief is most likely to be nonlinear as well. The analyses of such cases are beyond the scope of this paper. I focus on the linear equilibrium to illustrate the economic intuition in a tractable manner.

Proof of Proposition 3

From Proposition 1, the followers' equilibrium strategy is given by $k_i = \frac{1-\alpha}{1-\alpha+\beta}\mathbb{E}[\theta \mid s_i] + \frac{\beta}{1-\alpha+\beta}k_L$, where $k_L = \kappa(s_L), \quad \forall s_L \in \mathbb{R}$ is the leader's pooling action. If $\beta = 0$, then the follower does not respond to the leader's action, so any k_L can be supported as an equilibrium. Conversely, if $\beta \neq 0$, then the first-order derivative of the leader's expected payoff with respect to k_L is

$$\frac{\partial \mathbb{E}[u_L \mid s_L]}{\partial k_L} = -\left[(1-\alpha)\frac{\beta}{1-\alpha+\beta}(k_L - \mathbb{E}[\theta \mid s_L]) - b\right].$$

Therefore, for any fixed k_L, any types $s_L \neq k_L - \frac{1-\alpha+\beta}{(1-\alpha)\beta}b$ wishes to deviate from k_L. Notice that I did not have to specify off-path beliefs for the leader's deviation from the pooling level–the followers adjust their actions by $\beta/(1-\alpha+\beta)$ for a unit change in k_L *regardless of the beliefs about the leader's signal*. Hence, a pooling strategy does not constitute an equilibrium when $\beta \neq 0$.

Proof of Lemma 2

Suppose that a pooling equilibrium is played when $\beta = 0$. Then,

$$k_i - A = (1-\alpha)\left[(s_i - \theta) + \frac{b}{1-\alpha}\right] + \alpha(s_i - \theta)$$

and thus the fundamentals under the neutral culture is

$$\Pi(\alpha, 0) = -\tau_F^{-1} - b^2.$$

Alternatively, for any $\beta \neq 0$, fundamentals are

$$\Pi(\alpha,\beta) = -\left(\frac{1-\alpha}{1-\alpha+\beta}w_F^{\beta}\right)^2 \tau_F^{-1} - (1-\alpha)^2\left(1 - \frac{1-\alpha}{1-\alpha+\beta}w_F^{\beta}\right)^2 \tau_L^{-1} - b^2. \tag{A3}$$

Since the FRE is supported for any $\beta \neq 0$,

$$\lim_{\beta \to 0} \Pi(\alpha, \beta) = -(w_F^0)^2 \tau_F^{-1} - (1-\alpha)^2 (1 - w_F^0)^2 \tau_L^{-1} - b^2.$$

After some algebra, I obtain that

$$\lim_{\beta \to 0} \Pi(\alpha, \beta) - \Pi(\alpha, 0) = \frac{(1-\alpha^2)\tau_F + \tau_L}{\tau_F \{(1-\alpha)\tau_F + \tau_L\}} > 0.$$

Next, let $b = 0$ and suppose that a pooling equilibrium is played at $\beta = 0$. Then, $\lim_{\beta \to 0} \Pi(\alpha, \beta) = \Pi(\alpha, 0)$. The proof of Theorem 1 shows that the optimal level of β is nonzero.

Proof of Theorem 1

From (A3), I can set $b = 0$ without loss to solve $\max_\beta \Pi(\alpha, \beta)$. The proof of Lemma 2 reveals that $\beta = 0$ is never optimal under the pooling equilibrium. Hence, I can assume that an FRE is played when $\beta = 0$ to derive the optimal β.

By differentiating Π with respect to β, we obtain

$$\frac{\partial \Pi}{\partial \beta} = C(\alpha \tau_L - (1-\alpha)(\tau_F + \tau_L)\beta),$$

where

$$C = \frac{2(1-\alpha)^2 \tau_F (\tau_F + \tau_L)}{\tau_L \{(1-\alpha+\beta)\tau_F + (1+\beta)\tau_L\}^3}$$

This expression shows that Π is quasi-concave in β and $\beta^* = \frac{\alpha}{1-\alpha} \frac{\tau_L}{\tau_F + \tau_L}$ uniquely achieves the optimal.

Proof of Proposition 4

The first part of the statement is obvious, so I suppose that $\alpha > 0$. I compute each term of the expression (13). When $\beta = 0$, the expected return is

$$\mathbb{E}[-(k_i - A)^2; 0] = -\frac{(1-\alpha)^2 (\tau_F + \tau_L)}{((1-\alpha)\tau_F + \tau_L)^2}.$$

Similarly, when $\beta = \beta^*$,

$$\mathbb{E}[-(k_i - A)^2;\beta^*] = -\frac{(1-\alpha)^2}{(1-\alpha)^2\tau_F + \tau_L}.$$

The cost of uniformity is

$$\begin{aligned}\beta^*\mathbb{E}[-(k_i - k_L)^2;\beta^*] &= \beta^*\left(\frac{1-\alpha}{1-\alpha+\beta}w_F^\beta\right)^2(\tau_F^{-1}+\tau_L^{-1})\\ &= -\frac{(1-\alpha)^3\alpha\tau_F}{((1-\alpha)^2\tau_F+\tau_L)^2}.\end{aligned}$$

Using these expressions,

$$\begin{aligned}&\mathbb{E}\left[(k_i - A)^2;0\right] - \mathbb{E}\left[(k_i - A)^2;\beta^*\right] - \beta^*\mathbb{E}\left[(k_i - k_L)^2;\beta^*\right]\\ &= \frac{(1-\alpha)^2\alpha\tau_F}{((1-\alpha)^2\tau_F+\tau_L)^2}\left[\frac{\alpha\tau_L((1-\alpha)^2\tau_F+\tau_L)}{((1-\alpha)\tau_F+\tau_L)^2} - (1-\alpha)\right].\end{aligned}$$

Solving for the inequality (13) using the above expression gives the desired result.

Proof of Proposition 5 and Lemma 3

In the main text, I claim that the robust culture with respect to the uncertainty on τ_F is chosen so that the problem treats as if τ_F is the lowest realization. More precisely, consider the case where only τ_F is uncertain and let $\tau_F^*(\beta) = \arg\max_{\tau_F}\Pi(\beta,\tau_F)$, where I omit α and τ_L from Π as they are irrelevant. The robust culture in this case is defined by $\beta^R = \arg\max_{\beta}\Pi(\beta,\tau_F^*(\beta))$.

Lemma A.1. $\tau_F^*(\beta^R) = \underline{\tau}_F$.

Proof. First, observe that

$$\frac{\partial\Pi}{\partial\tau_F} = \frac{(1-\alpha)^2 g_F(\tau_F,\beta)}{((1-\alpha+\beta)\tau_F + (1+\beta)\tau_L)^3},$$

where

$$g_F(\tau_F,\beta) = \tau_L(1+\beta)\left\{1-2\alpha+2\beta(1-\alpha)\right\} + \tau_F\left\{-\alpha(1+2\beta(1+\beta)) + (1+\beta)(1+2\beta)\right\}.$$

Since g_F is linear in τ_F the coefficient on τ_F in g is always positive,[24] it follows that

$$\tau_F^*(\beta) = \max\left\{\frac{\tau_L(1+\beta)(1-2\alpha+2\beta(1-\alpha))}{\alpha(1+2\beta(1+\beta))-(1+\beta)(1+2\beta)}, \underline{\tau}_F\right\} \tag{A4}$$

uniquely minimizes $\Pi(\beta,\tau_F)$.

Second, I solve $\max_\beta \Pi(\beta,\tau_F^*(\beta))$. By substituting $\tau_F^*(\beta)$ into Π, I obtain

$$\Pi(\beta,\tau_F^*(\beta)) = -\frac{(1-\alpha)^2(1+2\beta)^2}{4\alpha(1+\beta)(1-\alpha+(2-\alpha)\beta)\tau_L}.$$

It is straightforward to show that this is uniquely minimized by $\beta^R = \max\left\{\frac{1}{2(1-\alpha)}-1, 0\right\}$. However, it is evident from (A4) that $\tau_F(\beta^R) = \underline{\tau}_F$. □

Furthermore, the effect of τ_L on Π is

$$\frac{\partial\Pi}{\partial\tau_L} = \frac{(1-\alpha)^2 g_L(\tau_L)}{\tau_L^2((1-\alpha+\beta)\tau_F+(1+\beta)\tau_L)^3},$$

where

$$g_L(\tau_L) = (1+\beta)^3\tau_L^3 + \beta^2(1-\alpha+\beta)\tau_F^3 + (1+\beta)\left\{3\beta^2\tau_F + (1+\alpha+(2+\alpha)\beta+3\beta^2)\tau_L\right\}\tau_F\tau_L.$$

The function g_L is clearly positive, so Π is increasing in τ_L. This completes the proof of Lemma 3. Proposition 5 then follows from the discussion in the main text.

Proof of Proposition 6

The proof is essentially the same as the proof of Theorem 1. The only difference is that the objective function in equilibrium is now written as

$$\Pi^P(\alpha,\beta) = -\left(\frac{1-\alpha}{1-\alpha+\beta}w_F^\beta\right)^2\tau_F^{-1} - \left(1-\frac{1-\alpha}{1-\alpha+\beta}w_F^\beta\right)^2\tau_L^{-1} - b^2.$$

[24] From $\beta \geq 0$ and $\alpha < 1$, the coefficient is $-\alpha(1+2\beta(1+\beta))+(1+\beta)(1+2\beta) > -(1+2\beta(1+\beta))+(1+\beta)(1+2\beta) = \beta$.

Therefore,

$$\frac{\partial \Pi^P}{\partial \beta} = C'(\alpha\tau_L + (\tau_F + \tau_L)\beta), \quad C' = \frac{2(1-\alpha)\tau_F(\tau_F+\tau_L)}{\tau_L\{(1-\alpha+\beta)\tau_F + (1+\beta)\tau_L\}^3},$$

which shows that $\beta^P = -\frac{\alpha\tau_L}{\tau_F+\tau_L}$ is the unique solution.

Proof of Corollary 4

Assuming that an FRE exists, the followers' best responses are described by (7). Write the followers' best responses as $k_i = c_1 s_i + c_2\mathbb{E}[s_L \mid k_L] + c_3 k_L$, where

$$\begin{aligned}
c_1 &= \frac{1-\alpha}{1-\alpha+\beta}\frac{(1-\alpha+\beta)\tau_F}{(1-\alpha+\beta)\tau_F + (1+\beta)\tau_L}, \\
c_2 &= \frac{1-\alpha}{1-\alpha+\beta}\frac{(1+\beta)\tau_L}{(1-\alpha+\beta)\tau_F + (1+\beta)\tau_L}, \\
c_3 &= \frac{\beta}{1-\alpha+\beta}.
\end{aligned}$$

Using this expression, the first-order condition of the leader's problem gives

$$\begin{aligned}
0 = (1-\lambda)]\mathbb{E}\left[\int \{(1-\alpha)(k_i-\theta) + \alpha(k_i - K) - b_F\} \mid \alpha_L, s_L\right](1-\alpha)\frac{\partial k_i}{\partial k_L} \\
+ \lambda\mathbb{E}\left[(1-\alpha)(k_L-\theta) + \alpha\{c_1(k_L-\theta) + c_2(k_L - \mathbb{E}[s_L \mid k_L])\} - b_L\right]\left\{(1-\alpha) + \alpha\left(1 - \frac{\partial k_i}{\partial k_L}\right)\right\}.
\end{aligned}$$

Solving this, the leader's optimal action is

$$k_L = s_L + B,$$

where

$$B = s_L + \frac{(1-\lambda)(1-\alpha)(1-c_1)b_F + \lambda\left\{(1-\alpha)+\alpha c_1\right\}b_L}{(1-\lambda)(1-\alpha)^2 c_3(1-c_1) + \lambda\left\{(1-\alpha)+\alpha c_1\right\}(1-\alpha c_3)}.$$

This expression also illustrates that an FRE exists even when $\beta = 0$ as long as $\lambda > 0$. Therefore, I focus on FRE in the following analysis.[25]

[25]As in the baseline model, one can show that $\beta = 0$ is never optimal regardless of the signaling equilibrium (FRE or pooling)

The equilibrium fundamentals are thus

$$\Pi = -\left(\frac{1-\alpha}{1-\alpha+\beta} w_F^{\beta}\right)^2 \tau_F^{-1} - (1-\alpha)^2 \left(1 - \frac{1-\alpha}{1-\alpha+\beta} w_F^{\beta}\right)^2 \tau_L^{-1} - \left(\frac{(1-\alpha)\beta}{1-\alpha+\beta}\right)^2 B^2.$$

Compared with the fundamentals in the baseline model (A3), the only difference is that the third term now depends on β. It is straightforward to show that the last term $\left(\frac{(1-\alpha)\beta}{1-\alpha+\beta}\right)^2 B^2$ is increasing in β as long as $\beta \geq 0$. Moreover, $\frac{\partial B}{\partial b_F}, \frac{\partial B}{\partial b_L} > 0$. Hence, the optimal β that maximizes (A3) is lower than the baseline model and is decreasing in b_F and b_L.[26]

[26]Even though I assume $\alpha > 0$, in this case it is possible to obtain a negative β as optimal solution.