Policy Vagueness and Reputational Concern

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Abstract

We present a game-theoretic model to analyze how a leader or manager's concern for reputation may influence the vagueness of their policy instructions to subordinates. The leader can be one of two types: congruent or non-congruent. A congruent leader's ideal policy aligns with that of the citizens, while a non-congruent leader benefits from implementing their own ideal policy. The leader is driven by two concerns: reputation and policy concerns. Both the leader and citizens are symmetrically uncertain about the leader's type, and there is also ex ante uncertainty regarding the leader's ideal policy. Vague instructions provide subordinates with greater discretion to pursue personal agendas, facilitating experimentation.

Our findings suggest that while both reputation and policy concerns individually favor a preference for vagueness, the trade-off between these concerns can create an incentive for clarity. In other words, policy vagueness varies non-monotonically with the level of reputational concern. We further explore the interaction between ex ante congruency and ex post flexibility, as well as how the leader's competence influences these dynamics and their welfare implications. Our analysis is applicable to various settings. For example, our theory predicts that a CEO or manager who is either early or late in their tenure (with either strong or weak concerns for reputation) tends to grant more discretion to subordinates compared to a manager in the middle of their career.

Crossing the river by feeling for the stones.

– Xiaoping Deng

Brexit means Brexit.

– Theresa May

Will no one rid me of this meddlesome priest?

– Henry II

I'd like you to reflect a bit further on your proposal.

– a Japanese manager, from "Zen and the Art of Management" by Richard T. Pascale

1 Introduction

Policy vagueness is pervasive in political landscape. From ancient emperors to modern politicians, from autocracy to democracy, the political arena is replete with examples of policy ambiguity.[1] Outside of politics, vagueness is also prevalent in CEO speeches and even parent-child conversations.[2] When policies are vague, they offer flexibility for adaptation and adjustment to new information. However, this vagueness also provides politicians with a shield of plausible deniability, allowing them to evade accountability. While the former motive aligns with the interests of voters, the latter serves as a manipulative tool for politicians.

Despite these differing implications, either the adaptation concern or reputational concern tends to drive politicians toward vagueness rather than clarity. Both arguments, when considered individually, received some attention in the literature (see Kartik, Van Weelden and Wolton (2017) for the former, and Frenkel (2014) and Li (2010) for the latter). We introduce a model in which the leader faces a *tradeoff* between the adaptation concern and reputation concern. Most surprisingly, our analysis finds that while both concerns individually suggest a dominant preference for vagueness, an incentive for clarity can arise from the trade-off between the two. In other words, policy vagueness changes non-monotonically with reputational concern.

Model Setup. More specifically, we consider a model in which a central leader provides policy guidance to local agents, creating an opportunity for policy vagueness. Local agents value the leader's endorsement but also have their own policy preferences, influencing their choice of which policies to pilot. Based on the

[1] For example, during 2020 presidential campaign, Joe Biden often deflected the question on court-packing and said that "You'll know my position on court packing when the election is over." (https://www.foxnews.com/opinion/biden-court-packing-democrats-socialists-mercedes-schlapp.) Donald Trump is also known for taking ambiguous positions on various issues, stating "I don't want to be in a position where I've said I would or I wouldn't. (https://time.com/4273054/donald-trump-specific-foreign-policy/) In directives issued from central to local authorities in China, there are also many grey directives that are ambiguous about what can or cannot be done (Ang (2024)).

[2] For instance, Facebook CEO Mark Zuckerberg often takes ambivalent positions on data privacy and security (https://www.cnbc.com/2018/03/21/facebook-ceo-mark-zuckerbergs-statements-on-privacy-2003-2018.html). More examples of strategic ambiguity in organizations can be found in Eisenberg (1984). Vague language is also abundant in daily conversations, as discussed by Camp (2018).

outcomes of these pilots, the leader selects the final policy to implement, either endorsing or vetoing the piloted policies.

The leader can be of two types: congruent or non-congruent. A congruent leader's interests align with those of the representative voter, whereas a non-congruent leader has their own policy preferences that differ from the voters. There is ex ante symmetric uncertainty regarding the leader's type. That is, none of the players know the leader's type at the policy recommendation stage.

The leader has two concerns: reputational concern and policy concern. On one hand, they care about their image of being congruent among voters; on the other hand, they have their own preferences towards policies, which may or may not coincide with those of the voters. The leader, ex ante, is not sure what their ideal policies are, and this uncertainty gives the leader adaptation incentives when choosing what policy guidance to give to local agents. They also wish to manipulate voters' beliefs through the policy choices of local agents.

Timeline. The timeline of the game is as follows: Nature determines the state of the world and the leader's type, both of which are unknown to the players. The leader receives a private signal about their ideal policy and, based on this signal, sends a policy recommendation to two local agents with commonly known biases.

The local agents then select policy pilots for their respective districts, and the outcomes of these policies are revealed. Policies can be either popular or unpopular among voters, and the outcomes are observed by all. Subsequently, the central leader learns their ideal policy and decides whether to endorse or veto the policy pilots chosen by the local agents.

Voters observe the policies chosen by the local agents as well as the leader's endorsement or veto decisions. Based on these observations, voters update their beliefs about the leader. Finally, payoffs are realized, and the game concludes.

Policy Vagueness and Pilot Decisions. Agents' pilot decisions can fall into two categories: uniform pilots, where both agents choose the same policy, and diverse pilots, or experimentation, where the agents select different policies. Intuitively, since agents value both the leader's endorsement and their personal biases, clearer policy guidance tends to drive uniform pilots, while vaguer messages are more likely to encourage agents to pilot in different directions. [3]

Main Finding: Non-monotonic Impact of Reputational Concern. Given the above, to understand the optimal policy vagueness for the leader, it essentially boils down to understanding the leader's preference for uniform versus diverse pilots. Recall that leaders are driven by two concerns: reputational concern and policy concern. Since leaders do not know what their ideal policies are ex ante, a policy-driven leader would choose experimentation over uniform policies, resulting in a preference for vague policies over clear ones. On the other hand, since leaders can hide behind vague policies when pilot policies turn out to be unpopular, a reputation-driven leader also prefers vagueness over clarity due to plausible deniability. In

[3] Although previous literature focuses on the effect of vague policy directly on voters, the gist here is the same: to unite aligned voters while not losing appeal to misaligned voters. While voter preference uncertainty is needed in Glazer (1990), we show that when a policy announcement is non-committal, policy vagueness can occur even when there is no uncertainty regarding receivers' preferences, and we can view local agents as voters in this context. The motivational effect can also follow from the logic of Prendergast (1993). Since agents tend to agree with the principal, to motivate information acquisition, a left unsaid message in that paper is that it is best to keep the principal's signal private and unknown to the agent.

other words, policy vagueness prevails when the leader is either very or minimally concerned about their reputation.

Most surprisingly, when vagueness is the dominant choice for leaders highly concerned with either reputation or policy, an incentive for clarity can emerge due to a tradeoff between the two. This occurs because there is a conflict when the leader attempts to advance both goals simultaneously. Therefore, as reputational concern increases from minimal to moderate to dominant, the reputational constraint on the leader to advance their policy goal becomes increasingly stringent, until eventually the policy goal is superseded by reputational concern.

But how does a uniform policy help slacken the leader's reputational constraint? This is because, in situations where policy pilots turn out to be unpopular, voters' beliefs about a leader being congruent are lower under a uniform policy than under experimentation. In other words, mistakes are more transparent under a uniform policy. However, this also means the reputational loss for pursuing the leader's ideal policy is lower. Thus, voters' adversarial beliefs become a blessing for incongruent leaders in such situations, allowing them to extract policy rent at a lower cost.

To summarize, while experimentation (and thus vague policy) provides leaders with more flexibility, it also places a tighter reputational constraint on non-congruent leaders to extract rent when reputational concern is moderate. As a result, an incentive for a uniform policy (and thus a clear message) can arise in this situation. Given the above, it is also intuitive to see that clear messages are more likely to dominate vague ones when the priors for a leader being a non-congruent type are high, when the leaders are less uncertain about their ideal policies, and when the payoff from extracting policy rent is relatively high.

Social Welfare. We show that social welfare may decrease as reputational concern increases. Within each regime—uniform policy or experimentation—social welfare rises as reputational concern grows. However, an increase in reputational concern may lead to a shift from experimentation to uniform policies. Since social welfare is lower under uniform policies than under experimentation, ceteris paribus, this shift results in a decline in social welfare.

Furthermore, our analysis highlights that policy vagueness has markedly different welfare implications depending on the leader's level of reputational concern. When reputational concern is either very high or very low, policy vagueness tends to dominate. However, social welfare is higher when reputational concern is high rather than low.

Ex Ante Accountability and Ex Post Flexibility. In addition to examining the impact of reputational concerns, our paper explores how ex ante congruency (the prior belief that a leader is congruent) affects ex post flexibility, as measured by policy vagueness. Ex ante congruency can be interpreted as representing the level of ex ante accountability, representativeness, or democracy, while policy vagueness reflects ex post flexibility. Before any formal analysis, one might argue that less democratic countries tend to adopt vaguer policies, though the opposite conjecture could also be made.

Our findings suggest that the impact of ex ante congruency is mediated by reputational concerns. When reputational concern is strong, leaders who are more accountable ex ante grant themselves greater ex post flexibility. In contrast, when reputational concern is weak, increasing ex ante accountability heightens the appeal of reputation in the reputation-versus-rent tradeoff, potentially making uniform policies—i.e., reduced ex post flexibility—more attractive.

Policy Rigidity. In addition to policy vagueness, our framework also sheds light on how reputational concerns and ex ante congruency affect policy rigidity. We define policy rigidity as the probability that the final policy matches the initial policy guidance. Policies are more rigid under the uniform-pilot regime than under the diverse-pilot regime. When pilots are diverse, higher reputational concerns decrease policy rigidity. In general, increasing reputational concerns can initially lead to an increase in policy rigidity due to a shift in the pilot regime, followed by a decline.

The impact of ex ante congruency again depends on reputational concerns. When a change in α causes a shift in the equilibrium level of policy vagueness, policy rigidity may move in either direction. Moreover, under uniform pilots, a local increase in α lowers policy rigidity.

The Role of Leader's Competence. In our previous analysis, the role of the leader's competence remained in the background and was not explicitly discussed. The non-monotonic impact of reputational concern persists when the leader's competence is neither too high nor too low. This is intuitive: when a leader is highly competent, there is little need for experimentation, and clarity becomes the dominant strategy. Conversely, when the leader is highly incompetent, they face significant uncertainty regarding their ideal policy, making vagueness the dominant choice.

We also explore the effects of the leader's competence on social welfare and find that increasing the leader's competence may negatively affect social welfare when ex-ante congruence is low.

Loyalty Concern. We also extend our model in several dimensions. In one of our extensions, we discuss a situation in which policy vagueness can arise due to loyalty concerns. In such cases, agents' policy positions or loyalty to the leaders are uncertain. Vague policies can help screen loyal agents from disloyal ones, but the leader suffers from delayed implementation. The equilibrium choice of policy vagueness strikes a balance between the two.

Message Observability. Another extension that we examine is about message observability. In our baseline model, we assume that voters cannot observe the messages that leaders send to agents, but only the policy choices of agents. In one extension, we find that when leaders' messages are directly observable to voters, the leader can signify their intentions (i.e., the signal that they receive) even under experimentation, which was hidden behind diverse policies when messages are not directly observable to voters. This increases the incentives for experimentation. Ceteris paribus, policies tend to be vaguer compared to the case when messages are not directly observable to voters. We also discuss the case in which voters only observe their regional policy, but not that of the other region. We show that in this case, vague policies always dominate because the leader can no longer manipulate voters' beliefs using the diversity of policies.

Testable Hypotheses. Our theory provides insights into policy vagueness across various settings. For instance, in organizational contexts, a CEO or manager's years in their tenure can serve as a proxy for their reputational concern (as in Gibbons and Murphy (1992)), and the level of discretion given to subordinates as a proxy for policy vagueness. A testable hypothesis from our model is that managers in the early or late stages of their careers tend to grant more discretion to subordinates, while those in the middle of their careers are more likely to provide clear directions.

The rest of the paper is organized as follows: We review the literature in the next section. Section 2 introduces the model, and Section 3 analyzes it. Section 4 examines social welfare. Sections 5.1 and 5.2 explore the effects of parameters beyond reputational concern, such as ex ante congruence and the leader's competence. Section 5.4 provides a detailed analysis of the agents' incentive constraints, while Section 5.5 generalizes and extends the model. Finally, Section 6 concludes the paper.

1.1 Literature review

Political Economics of Policy Vagueness. Ever since Downs (1957) (and later Shepsle (1972), Page (1976)), policy vagueness has invited extensive attention in the political economics literature. Policies can be vague because voters are risk-loving (Zeckhauser (1969)) or behavioral (Callander and Wilson (2008)); they can also be vague because politicians are uncertain of voters' preferences (Glazer (1990)), they want to induce favorable beliefs about their ex post policy choice (Aragones and Postlewaite (2002)), they face a tradeoff between re-election and implementing their preferred policy (Alesina and Cukierman (1990)), they want to obfuscate voters when their attention is limited (Dewan and Myatt (2008)), or when they can differentiate their policy positions and afford to be ambiguous (Aragones and Neeman (2000)). On the other hand, policy clarity can arise when the opposite of the above happens, when politicians want to signal commitment (Morelli, Nicolò and Roberti (2021)) or competence (Frenkel (2014)), or when they want to attract sympathetic voters (Basu and Knowles (2017)). Others focus on how candidates' partisanship (Bräuninger and Giger (2018)) or party position (Galindo-Silva (2024)) may affect policy ambiguity. Last but not least, there are also empirical and experimental works on policy vagueness (e.g., Feltovich and Giovannoni (2024), Cahill and Stone (2018), Ang (2024)). Since our paper is mainly theoretical, we refer readers to Lefevere (2024) for a recent survey on related empirical work.

Our paper examines how the tradeoff between adaptation to new information and reputation concerns influences policy vagueness. **Most relatedly**, Kartik, Van Weelden and Wolton (2017) analyzes adaptation concerns, while Frenkel (2014) and Li (2010) examine reputational concerns. Specifically, Kartik, Van Weelden and Wolton (2017) investigates policy vagueness in a delegation model where state-relevant information becomes available at a later stage, allowing for ex post adaptation. In this context, politicians may have their own ideal policies, leading voters to face a tradeoff between adaptation and accountability when designing the policy set available to politicians. In their model, politicians are disciplined by adhering to the platform stipulated by voters, whereas in ours, they are disciplined through reputational concerns.

Frenkel (2014) explores the impact of reputation with a focus on competence concerns, whereas our study emphasizes congruency concerns. Li (2010) examines how the motive for blame-sharing drives politicians to influence policy through intermediaries. To the best of our knowledge, our paper is the first to identify the non-monotonic impact of reputational concerns: while vagueness is typically the dominant choice when either adaptation or reputational concerns are considered in isolation, the tradeoff between the two can create an incentive for clarity.

Vague Communication in Other Fields. Vague communication, or communication more broadly, has also garnered significant attention in disciplines beyond political economy. In *organizational economics*, Arrow (1974) explores how language helps delineate the limits of organizations. Cremer, Garicano and Prat (2007) examines how the tradeoff between coordination and specialization influences the use of "codes" within organizations and its implications for organizational design. Eisenberg (1984) investigates the reasons for vague language in corporate settings, while Williams (1975) analyzes how a leader's traits can shape the adoption of ambiguous communication in organizations.

Another relevant body of work is the *cheap talk* literature. For example, Morris (2001) and Ottaviani and Sørensen (2006) extend the framework of Crawford and Sobel (1982), showing that the introduction of reputation does not necessarily lead to truth-telling. Morris (2001) finds that when the sender places significant weight on reputation, no information may be conveyed. In contrast, our study focuses on the tradeoff between reputational concerns and policy objectives, revealing a non-monotonic effect of reputation. While Ottaviani and Sørensen (2006) centers on the role of information structure, our analysis emphasizes the interplay between reputational and policy concerns.

In the *economic modeling of language*, Lipman (2009) demonstrated that vagueness is Pareto dominated by precise language when agents share common interests, are fully rational, and when messaging is costless. Blume and Board (2013) explored the role of speaker competence in influencing language vagueness, while Mialon and Mialon (2013) examined the analytical conditions under which speech becomes figurative and derived comparative statics results. Lim and Wu (2023) investigated literal vagueness (defined differently from Lipman (2009)) and provided experimental evidence showing how context dependency can lead to vagueness.[4]

Our paper is also inspired by the *linguistic and philosophy literature*, particularly their analyses of language vagueness and the concept of plausible deniability (e.g., Pinker (2007); Pinker, Nowak and Lee (2008); Camp (2018), among others). However, our work differs in its modeling approach, focus, and the message it delivers. For an introductory review of the linguistics literature, we refer readers to sources such as Kennedy (2011) and Van Rooij (2011).

Reputation and Experimentation. Our paper is also related to studies that discuss the impact of reputational concerns on experimentation. Cheng and Li (2019) examine how reputational concerns lead to different policy choices (uniform versus diverse) under centralization and decentralization.[5] The comparative statics in that paper focus on political regimes (centralization versus decentralization), whereas ours focus on the degree of reputational concern. Additionally, the channels that lead to experimentation and uniform policy are quite different in these two papers.

Summary of Contribution. Our paper contributes to the existing literature by highlighting how the trade-off between adaptation concerns and reputational concerns can result in clarity, despite vagueness being the dominant choice when each concern is considered in isolation. Specifically, our analysis reveals a non-monotonic impact of reputational concerns when a leader faces a trade-off between adaptation or policy concerns and reputational considerations. Furthermore, our findings may provide insights into the dynamics of policy vagueness within organizations, particularly in relation to CEOs at different stages of their careers.

[4] Other pioneering works in the economics of language, such as Marschak (1965) and Rubinstein (2000), address topics beyond vagueness and are therefore not discussed in detail here. Similarly, studies on vagueness in legal disputes and law, including Waldron (2013) and Keil and Poscher (2016), are omitted, and we refer interested readers to these sources for further exploration.

[5] We refer readers to the references therein for other papers on reputational concerns and experimentation that are less related to our analysis here.

2 Model

Setup. The economy comprises a central leader, two local agents ($i = L, R$), and a continuum of citizens.[6] The state of the world, $\theta \in \{-1, 1\}$, represents, for example, the presence or absence of global warming, and each state occurs with equal probability. The central leader decides on an economic policy, $x_c \in \{-1, 1\}$, which impacts the final payoffs for everyone. The details of the policy-making process will be provided when we discuss timeline below. Each player has an ideal policy: the citizens prefer the final policy to align with the true state of the world. Each local agent, however, has their own preferred policy or personal agenda, denoted by θ_L and θ_R. It is common knowledge that $\theta_L = -1$ and $\theta_R = 1$. The central leader's ideal policy is denoted by $\theta_c \in \{-1, 1\}$. The leader can belong to one of two types: they are considered *congruent* if their preferred policy aligns with the citizens' preference, i.e., $\theta_c = \theta$, and *non-congruent* otherwise. All agents hold a common prior with $P(\theta_c = \theta) = \alpha \in [\frac{1}{2}, 1]$. The parameter α represents the leader's ex ante congruency.

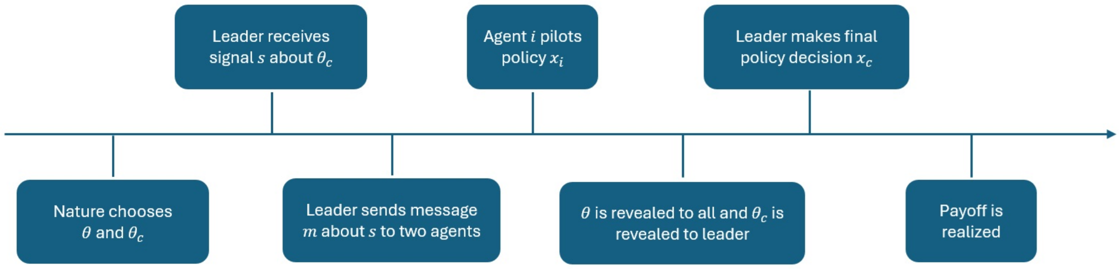

Figure 1: The Timeline

Timeline. The policy-making process is illustrated in Figure 1. The game begins with nature's move, which determines the state of the world θ with $P(\theta = 1) = 1/2$ and the leader's type θ_c with $P(\theta_c = \theta) = \alpha$. The leader then receives a private signal $s \in \{-1, 1\}$ about their type, with $P(s = \theta_c) = \gamma \in [\frac{1}{2}, 1]$. The signal precision γ measures the extent to which the leader knows their type ex-ante and can be interpreted as the leader's competence.

After receiving the signal, the leader sends policy guidance (a message) $m \in \{-1, 1\}$ to the agents, with $P(m = s) = 1 - v$. The leader's choice variable $v \in [0, 1/2]$ captures the degree of *vagueness* in the message. A larger v corresponds to a vaguer message. When $v = 1/2$, the message is completely uninformative about the leader's private signal s, whereas when $v = 0$, the message perfectly reveals the signal.[7] The policy guidance m and its vagueness v are observable to both agents but not to voters.[8]

Upon receiving the policy guidance, each local agent chooses a policy to pilot. Denote agent i's policy pilot by $x_i \in \{-1, 1\}$, where $i \in \{L, R\}$.[9] If both agents pilot the same policy, the scenario is referred to as *uniform* pilots. If the agents pilot different policies, the scenario is referred to as *diverse* pilots or experimentation.

[6]We use "citizens" and "voters" interchangeably throughout the paper.
[7]Our modeling approach to policy vagueness and its connection to the literature will be discussed in Section 2.1.
[8]The observability of messages and vagueness to voters is discussed in Section **??**.
[9]In the baseline model, we assume that agents can pilot costlessly and that policy pilots succeed with probability one. Both assumptions can be relaxed without affecting the results; we refer readers to the online appendix for a detailed analysis.

Policy pilots in both districts are observable to all players. After the policy pilots are implemented, the state of the world θ is fully revealed to all players.[10] A policy is said to be *popular* if it aligns with the state θ, and *unpopular* otherwise. Additionally, the leader privately learns their type θ_c.

Upon learning θ and θ_c, the leader makes the final policy decision $x_c \in \{x_L, x_R, 0\}$, where x_L and x_R denote the policy pilots chosen by agents L and R, respectively, and 0 represents the default policy.[11] The leader can choose to *endorse* one of the policy pilots or *veto* one or both of them. Specifically: If pilots are diverse, the leader can endorse either policy x_L or x_R, or veto both policies and adopt the default policy. If pilots are uniform, say $x_L = x_R = 1$, the leader can either endorse the policy 1 or veto it and adopt the default policy.

After the final policy decision, payoffs are realized.

Payoffs. The leader has two primary concerns: policy (or rent) concern and reputational concern. Specifically, their ex-post payoff π_c is given by:

$$\pi_c = r + \beta\eta,$$

where the rent $r = 1$ if the final policy matches the leader's ideal policy, i.e., $x_c = \theta_c$, $r = -1$ if $x_c = -\theta_c$, and $r = 0$ otherwise. The term η captures reputation and is defined as the citizens' posterior belief about the leader being congruent, i.e., $\eta = \text{Posterior}(\theta_c = \theta)$. The parameter $\beta \in (0, \infty)$ measures the degree of reputational concern and plays a central role in our analysis.

Local agent i's payoff π_i consists of two components: endorsement from the central leader and their local bias. Specifically, if the policy piloted by agent i is endorsed by the leader, the agent derives a return of B. Additionally, if the endorsed policy x_c aligns with the agent's preferred policy θ_i, the agent receives an extra return of b. Conversely, if the agent's pilot is not endorsed, their payoff is 0. Agent i's payoff can be summarized as follows:

$$\pi_i = B\mathbb{I}\{x_c = x_i\} + b\mathbb{I}\{x_c = x_i = \theta_i\},$$

for $i \in \{L, R\}$, where $\mathbb{I}\{\cdot\}$ denotes the indicator function.

The parameters B and b can be interpreted in several ways. For example, B may represent career benefits, as the leader's endorsement could enhance the agent's prospects for career advancement. Alternatively, B can reflect financial support derived from the central leader's endorsement. The bias b can be viewed as subjective utility gains, stemming from ideological differences or locality-specific preferences.

The citizens' payoff, which also represents social welfare (denoted by W), is defined as follows: $W = 1$ if the final policy matches the state of the world, i.e., $x_c = \theta$; $W = -1$ if the final policy opposes the state of the world, i.e., $x_c = -\theta$; and $W = 0$ if the leader adopts the default policy ($x_c = 0$).

Equilibrium definition. Agent i's strategy is a function $x_i : \{-1, 1\} \times [0, 1/2] \to \{-1, 1\}$, where $x_i(m, v)$ specifies the agent's chosen policy based on the policy guidance $m \in \{-1, 1\}$ and the level of vagueness $v \in [0, 1/2]$.

[10] The possibility that policy pilots may not perfectly reveal the true state is considered in Section 5.

[11] This approach incorporates several considerations. First, because the districts in our model are homogeneous, allowing the leader to choose a single policy for both districts entails no loss of generality. Second, including a default policy reflects real-world practices and adds flexibility when accounting for the failure probability of policy pilots. Finally, letting the leader choose from piloted policies (in addition to the default policy) embodies the idea that local agents possess unique information or expertise in experimenting with and implementing specific policies.

The leader's strategy is described by a triplet (m, v, x_c):

- The policy guidance m is a function of nature's signal $s \in \{-1, 1\}$, given by $m : \{-1, 1\} \to \{-1, 1\}$.

- The level of vagueness v is also a function of s, defined as $v : \{-1, 1\} \to [0, 1/2]$.

- The final policy decision x_c is a function of v, m, x_L, x_R, θ, and θ_c, expressed as $x_c : [0, 1/2] \times \{-1, 1\}^5 \to \{0, x_L(m, v), x_R(m, v)\}$.

A perfect Bayesian equilibrium of this model is defined as a strategy profile $\{m, v, x_c, x_L, x_R\}$ satisfying the following conditions:

(i) Given $(m, v, x_L, x_R, \theta, \theta_c)$, the leader chooses x_c to maximize π_c, and selects m and v to maximize $\mathbb{E}[\pi_c]$.

(ii) Given m, v, and the leader's policy decision $x_c(\cdot)$, each agent $i \in \{L, R\}$ chooses x_i to maximize π_i.

(iii) The posterior belief η is updated according to Bayes' rule.

In our equilibrium characterization, we allow the leader to adopt a mixed strategy when making the final policy decision. For simplicity, we refer to a perfect Bayesian equilibrium as an *equilibrium* in the remainder of the discussion.

2.1 Discussion on the Modeling of Vagueness

Our approach to modeling vagueness aligns with established traditions in the literature and is designed to accommodate multiple interpretations. Methodologically, we allow leaders to select a distribution or lottery over policy guidance, a framework consistent with extensive political economy literature that views policy vagueness through this lens (see Zeckhauser (1969); Shepsle (1972); Page (1976); Aragones and Postlewaite (2002); Asako (2019); Callander and Wilson (2008), among others).[12]

Our approach also resonates with studies that conceptualize policy vagueness as a non-singleton set of policies chosen by the leader (see Glazer (1990); Aragones and Neeman (2000); Cremer, Garicano and Prat (2007); Kartik, Van Weelden and Wolton (2017)). Relatedly, in Chappell Jr (1994), Meirowitz (2005), Berliant and Konishi (2005), and Zhang (2020), vagueness arises when candidates refrain from making explicit policy announcements during their campaigns.

Additionally, Frenkel (2014) models vagueness as the level of commitment. In our framework, clearer policies are more likely to be implemented, making our approach interpretable as leaders choosing their level of commitment.

Furthermore, our method is equivalent to approaches that allow leaders to vary the level of variance in their messages (e.g., Alesina and Cukierman (1990); Bräuninger and Giger (2018); Dewan and Myatt (2008)). For a comprehensive review of how ambiguity in public policy is modeled, readers may consult Lefevere (2024).

In our model, the vaguer the policies are, the less informative the leader's policy guidance becomes about the leader's ideal policy (or true intentions). Accordingly, our definition of vagueness aligns with insights from linguistic literature, where vagueness is commonly defined as *interpretative uncertainty* (see Kennedy (2011) and Van Rooij (2011)). This interpretation of vagueness is also mirrored in many economic models, where vagueness reflects the degree of uncertainty a receiver has about the speaker's intentions or

[12] For further justification and interpretation of this approach, see Aragones and Postlewaite (2002) and Asako (2019).

preferences (see Eisenberg (1984); Lipman (2009); Mialon and Mialon (2013); Blume and Board (2013)).

3 Equilibrium Characterization

The primary goal of our analysis is to examine the leader's optimal choice of policy vagueness. Before delving into the equilibrium analysis, it is important to understand the implications of this choice. The leader chooses the degree of vagueness to maximize their expected payoff, which influences the agents' pilot decisions in the subsequent stage. These pilot decisions, in turn, shape the final policy choice as the leader trades off between reputation and rent extraction.

We begin this section by exploring how policy vagueness affects the agents' pilot decisions. We then introduce a lemma showing that, despite the complexity of the final policy decisions—which depends on whether policies are uniform or diverse, popular or unpopular—the expected payoff takes a surprisingly simple form. This insight helps clarify the intuition behind our main result. Finally, we present our main result on the non-monotonic impact of reputational concerns and discuss the intuition behind these findings.

Throughout this section, we assume the leader is sufficiently congruent ex ante, i.e., $\alpha > 2/3$, to avoid technical complications arising from the agents' incentive compatibility constraints. Additionally, we assume the leader is adequately competent, setting $1 > \gamma > 1/(2-\alpha)$.[13] Lastly, we set the local bias, b, and the benefit from endorsement, B, to satisfy $b = B/3$, allowing us to present the results in the sharpest manner. Our main results remain robust as long as the ratio b/B is neither too small nor too large. These parametric assumptions will be discussed and also revisited in Section 5.

3.1 Agents' Pilot Decisions

Recall that each agent's policy pilot choice depends on the probability of a pilot being endorsed by the leader (yielding a return B) and whether the pilot aligns with the agent's preferred policy (yielding an additional return b). A larger endorsement benefit B incentivizes the agents to follow policy guidance, making uniform pilots more likely. Conversely, a stronger local bias b raises the likelihood of diverse pilots. When the local bias b and endorsement benefit B are comparable, which is the case as we set $b = B/3$, the agents' policy pilots depend on the vagueness of the leader's policy guidance.

How would the policy vagueness affect agents' pilot decisions? Intuitively, when the policy guidance is vague, it reveals little information about the leader's preferences, leading agents to pilot their own preferred policies. As a result, diverse pilot choices become more prevalent. Conversely, when the policy guidance is clear, agents tend to follow the guidance, anticipating that their pilots are more likely to be endorsed. Therefore, a clearer message leads agents to align their actions with the policy guidance, thereby yielding uniform pilots. The following lemma summarizes the effect of policy vagueness on pilot decisions.[14]

[13]This assumption is needed only to rule out uninteresting cases, such as when vague policy guidance always dominates clear policy guidance, and to ensure that uniform pilots can be a potential equilibrium outcome.

[14]All the proofs are relegated to the Appendix.

Lemma 1 *If the leader sends vague policy guidance with $v = 1/2$, agent i pilots their preferred policy ($x_i = \theta_i$), resulting in diverse pilots. If the leader sends clear policy guidance with $v = 0$, both agents follow the leader's guidance ($x_L = x_R = m$), resulting in uniform pilots.*

3.2 Leader's Expected Payoff

We now turn to equilibrium characterization. The game consists of three stages involving strategic decisions. In the final stage, the leader makes the policy decision x_c, trading off rent against reputation. In the second stage, after observing the message m and the degree of vagueness v, each agent makes a policy pilot decision in anticipation of x_c. In the first stage, the leader chooses the degree of vagueness v to maximize their expected payoff. From backward induction, the leader's final policy choice involves various scenarios, such as whether pilots are diverse or uniform, but our next lemma demonstrates that the expected payoff, given the chosen degree of vagueness v, takes a surprisingly simple form.

Lemma 2 *The leader's expected payoff, conditional on vagueness v, is given by $E(r|v) + \beta\alpha$.*

Since reputation is defined as the citizens' posterior belief about the leader's congruency, however complex such a posterior can be at the stage of final policy making, the expected reputation ex ante is simply the leader's ex ante congruency α by Bayes' rule. This lemma implies that policy vagueness affects the leader's expected payoff *only* through the leader's expected rent, which our analysis turns to next.

Leader's Expected Rent Since the leader obtains a positive rent only when the final policy aligns with their ideal policy, we can express the leader's expected rent as

$$E[r|v] = P(x_c = \theta_c|v) = \alpha P(\exists x_i = \theta|v) + (1-\alpha)\Delta P(\exists x_i \neq \theta|v), \tag{1}$$

where $P(\exists x_i = \theta|v)$ denotes the probability that the congruent leader's ideal policy exists ($\theta_c = \theta$); $P(\exists x_i \neq \theta|v)$ denotes the probability that the non-congruent leader's ideal policy exists ($\theta_c \neq \theta$); Δ denotes the probability that the non-congruent leader endorses an unpopular policy, which we will discuss in details in what follows. Note the congruent leader always endorses the popular policy.

According to (1), policy vagueness affects the leader's expected rent through two distinct channels: the likelihood of the leader's ideal policy being discovered and, conditional on this discovery, the probability that the non-congruent leader opts to extract rent. We refer to the first channel as *policy discovery*, and the second as *rent extraction*. From Lemma 1, vaguer policy guidance encourages experimentation, enhancing policy discovery. However, the effect of policy vagueness on the likelihood of rent extraction is less straightforward. In particular, we can show that likelihood of rent extraction tends to be higher when the leader's policy guidance is clear (which induces uniform pilots) than when it is vague (which induces diverse pilots). To establish this result, we turn to the analysis of the stage of the final policy decision.

Final Policy Decision In the stage of the final policy decision, the leader trades off reputation against rent. We analyze two possible cases in turn: diverse pilots and uniform pilots.

Diverse pilots. It is straightforward to show that the congruent leader's dominant strategy is $x_c = \theta$, whereas the non-congruent leader faces a tradeoff between rent and reputation. If the non-congruent leader chooses their preferred policy $x_c = \theta_c\,(\neq \theta)$, the citizens' posterior belief about them being congruent is zero, so their payoff is given by $\pi_c = 1$. If the non-congruent leader chooses the citizens' preferred policy $x_c = \theta$, then rent is forgone for reputation, so their payoff is given by $\pi_c = \beta\eta_d$, where η_d is the equilibrium reputation conditional on a popular policy being chosen in the case of diverse pilots. We note inaction is never optimal for the non-congruent leader under diverse pilots.

To characterize the equilibrium reputation η_d, we consider three cases. If $\beta\eta_d < 1$, then the equilibrium reputation is so low that the non-congruent leader always picks their preferred policy. In this case, the leader's final policy choice fully reveals their type, implying $\eta_d = 1$. Let Δ_d denote the probability that the non-congruent leader endorses an unpopular pilot under diverse pilots. In this case, $\Delta_d = 1$. If $\beta\eta_d > 1$, then the equilibrium reputation is sufficiently high such that the non-congruent leader mimics the congruent leader by always picking the popular policy. The leader's policy choice thus reveals no information about their type. Since in the case of diverse pilots, the agents' policy pilots also reveal no information about the leader's type, the equilibrium reputation η_d is the same as the prior belief α. In this case, $\Delta_d = 0$. Last, if $\beta\eta_d = 1$, the leader is indifferent and plays a mixed strategy. By Bayes' rule, we have

$$\eta_d = \frac{\alpha}{\alpha + (1-\alpha)(1-\Delta_d)}. \tag{2}$$

To summarize, under diverse pilots, the non-congruent leader endorses an unpopular pilot with probability

$$\Delta_d = \begin{cases} 1, & \text{if } \beta < 1, \\ 1 - \frac{\alpha}{1-\alpha}(\beta - 1), & \text{if } 1 \leq \beta \leq \frac{1}{\alpha}, \\ 0, & \text{if } \beta > \frac{1}{\alpha}. \end{cases} \tag{3}$$

Uniform pilots. When the piloted policy turns out to be popular, both types of the leader would pick that policy because the preferred policy for the non-congruent leader is not available. We therefore focus on the case when the piloted policy turns out to be unpopular. In this case, the congruent leader vetoes that policy whereas the non-congruent leader faces a tradeoff between reputation and rent. Denote by η_u the equilibrium reputation conditional on an unpopular policy being vetoed and by Δ_u the probability for the non-congruent type to endorse the unpopular policy in the case of uniform pilots.

Importantly, when the citizens observe that both agents pilot the same policy, they can infer in the equilibrium that the leader's message is the same as the piloted policy ($m = x_L = x_R$), in sharp contrast with the case of diverse pilots where the policy pilots do not reveal the leader's message.[15] In particular, if $\beta\eta_u = 1$ such that the non-congruent leader plays a mixed strategy, the equilibrium reputation is given by

$$\eta_u = \frac{\alpha(1-q_v)}{\alpha(1-q_v) + (1-\alpha)q_v(1-\Delta_u)}, \tag{4}$$

[15] As shown in Lemma 1, both agents follow the leader's message in the case of uniform pilots but pursue their own preferred policy in the case of diverse pilots.

where q_v is the probability that the leader's message m reveals their true type θ_c, given by

$$q_v \equiv \gamma(1-v) + (1-\gamma)v, \tag{5}$$

where $q_v \in [1/2, \gamma]$ follows from $v \in [0, 1/2]$. Similar to the analysis of the diverse pilots, we can establish that, when the policy turns out to be unpopular under uniform pilots, the non-congruent leader endorses the unpopular policy with probability

$$\Delta_u = \begin{cases} 1, & \text{if } \beta < 1, \\ 1 - \frac{\alpha(1-q_v)}{(1-\alpha)q_v}(\beta - 1), & \text{if } 1 \le \beta \le \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)}, \\ 0, & \text{if } \beta > \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)}. \end{cases} \tag{6}$$

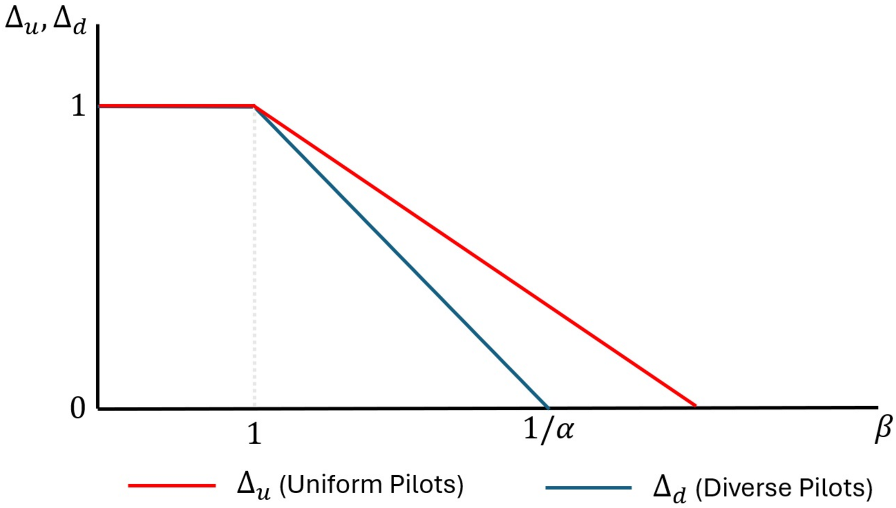

Figure 2: Reputation Concern and Probability of Endorsing Unpopular Policy

Figure 2 illustrates the probability for the non-congruent leader to endorse the unpopular policy in the case of uniform versus diverse pilots. Intuitively, this endorsement probability is (weakly) decreasing with the degree of reputational concern, as stronger reputational concern would incentivize the non-congruent type to mimic the congruent type by vetoing the unpopular policy. For β at intermediate level, $\Delta_u > \Delta_d$. The non-congruent type has stronger incentives to endorse the unpopular policy under uniform pilots, because for any $v < 1/2$, the piloted policy reveals some information about the leader's type, yielding a loss in reputation to the non-congruent type even before the leader makes the final policy decision. On the other hand, when reputational concern is sufficiently weak (β small), the non-congruent leader disregards reputation and always picks their preferred policy, implying $\Delta_u = \Delta_d = 1$. Similarly, when reputational concern is sufficiently strong (β large), the non-congruent leader always vetoes the unpopular policy, with $\Delta_u = \Delta_d = 1$. The discussions are summarized in the following lemma.

Lemma 3 *$\Delta_u \ge \Delta_d$, with the inequality being strict for $\beta \in (1, \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)})$.*

3.3 Policy Vagueness

Finally, we turn to the first stage of the game to study the optimal policy vagueness for the leader. Lemma 2 implies a simple optimality principle for policy vagueness: the optimal v for the leader maximizes the probability of rent extraction. Policy vagueness affects rent extraction through two competing forces: vaguer policy guidance facilitates policy discovery, whereas clearer guidance enhances rent extraction – the second force is present only when reputational concern is at its intermediate level. Define two cutoffs for reputational concern

$$\underline{\beta} = \frac{1-\gamma}{\gamma\alpha} + 1 \quad \text{and} \quad \bar{\beta} = \frac{\gamma(1-\alpha)}{(1-\gamma)\alpha}. \tag{7}$$

We now state the principal result of our paper: the optimal policy vagueness v^* changes non-monotonically with reputational concern β.

Theorem 1 *The leader chooses to send vague policy guidance (with $v^* = 1/2$) when their reputational concern β is below $\underline{\beta}$ or above $\bar{\beta}$, and to send clear policy guidance (with $v^* = 0$) when their reputational concern β is in $(\underline{\beta}, \bar{\beta})$.*

To understand the core intuition behind this result, it is instructive to present the main proof idea. Under diverse pilots, the leader's expected payoff, which follows Lemma 2 and Equation (1), is given by $E\pi_c = \alpha + (1-\alpha)\Delta_d + \beta\alpha$, where Δ_d has been solved as in (3). Then, we have

$$E\pi_c = \begin{cases} 1 + \beta\alpha, & \text{if } \beta < 1, \\ 1 + \alpha, & \text{if } 1 \leq \beta \leq \frac{1}{\alpha}, \\ \alpha + \beta\alpha, & \text{if } \beta > \frac{1}{\alpha}. \end{cases} \tag{8}$$

Notably, $E\pi_c$ is independent of v in the case of diverse pilots. This is because Δ_d, the probability of the non-congruent leader endorsing their preferred policy in diverse pilots, does not depend on v. Since, from Lemma 1, vague policy guidance with $v = 1/2$ induces diverse pilots, we simply let the leader pick $v = 1/2$ for diverse pilots. Moreover, we note that $E\pi_c$ is constant with respect to β when $\beta \in [1, 1/\alpha]$. This is because, when β is at intermediate level, the leader is indifferent between rent (1) and reputation ($\beta\eta_d$) in the final policy decision, which yields $\beta\alpha = \alpha + (1-\alpha)(1-\Delta_d)$ (from (2)). This means the expected reputation equals the probability of adopting the popular policy. Since the expected rent is simply the probability of rent extraction, summing the terms cancels out the influence of reputational concern.

Under uniform pilots, the leader's expected payoff is given by $E\pi_c = q_v[\alpha + (1-\alpha)\Delta_u] + \beta\alpha$, where Δ_u has been solved as in (6) and q_v, as defined in 5, is the probability that the leader's message m is the same as their type. We have

$$E\pi_c = \begin{cases} q_v + \beta\alpha, & \text{if } \beta < 1, \\ \alpha + q_v(1-\alpha+\beta\alpha), & \text{if } 1 \leq \beta \leq \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)}, \\ q_v\alpha + \beta\alpha, & \text{if } \beta > \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)}. \end{cases} \tag{9}$$

As q_v decreases with v, it is straightforward to show that $E\pi_c$ decreases with v in the case of uniform pilots. Since, from Lemma 1, clear policy guidance with $v = 0$ induces uniform pilots, the leader chooses

$v = 0$ to maximize their expected payoff under uniform pilots. When $v = 0$, the leader's expected payoff is simply given by (9) with $q_v = \gamma$.

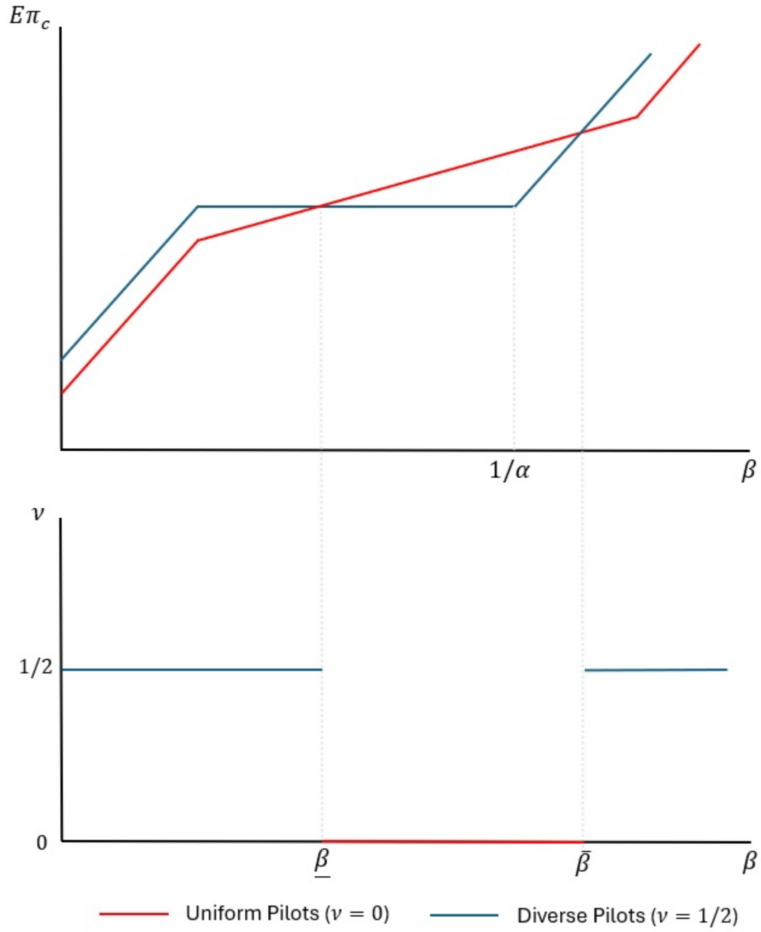

Figure 3: The Leader's Expected Payoff and Optimal Vagueness

The upper panel of Figure 3 illustrates the leader's expected payoff under uniform versus diverse pilots. At an intermediate level of reputational concern, the leader's expected payoff is higher under uniform pilots than under diverse pilots, whereas when reputational concern is either low or high, the expected payoff under diverse pilots dominates. The lower panel of Figure 3 depicts the corresponding optimal vagueness for the leader.

Intuition Behind Principal Result As we have shown, policy vagueness affects the leader's expected payoff through policy discovery, and when reputational concern is at intermediate level, also through rent extraction. When reputational concern is either low or high, vague policy guidance enhances policy discovery without affecting rent extraction, so vagueness triumphs over clarity for the leader. For an intermediate level of reputational concern, the rent extraction channel is activated and this channel can dominate when the leader is adequately competent ($\gamma > 1/(2 - \alpha)$).

According to Theorem 1, rent or reputational concern alone (β small or large) yields vague policy guidance in equilibrium, whereas clarity arises from a tradeoff between the two (β intermediate). The root cause for clarity to emerge as an equilibrium outcome is that the piloted policy under uniform pilots is informative about the leader's type. When such a policy turns out to be unpopular, it would lower the citizens' belief about the leader being congruent and consequently, also the reputation loss for the non-congruent leader to endorse the unpopular policy. In this sense, clear policy guidance in the first stage helps relax the reputational constraint for rent extraction in the final stage. This tradeoff between reputational loss and rent seeking is behind the leader's policy clarity.

4 Welfare Analysis

4.1 Planner's Solution

We set the benchmark for our welfare analysis by first considering the planner's solution. The social planner (benevolent leader) can be viewed as a leader with full ex ante congruency ($\alpha = 1$) or infinitely strong reputation concern ($\beta = \infty$). In such a case, the planner always endorses the popular policy and vetoes the unpopular policy, so the probability of endorsing the unpopular policy in the planner's solution $\hat{\Delta} = 0$. The social planner maximizes policy discovery by choosing the degree of vagueness $\hat{v} = 1/2$ so that each agent, whose incentive compatibility constraint is straightforward to check in this case, pilots their own preferred policy.[16] Social welfare, measured by the citizens' payoff, attains its maximize, $\hat{W} = 1$. The following lemma summarizes this first best outcome.

Lemma 4 *The social planner sends vague policy guidance with $\hat{v} = 1/2$ and always vetoes the unpopular policy with $\hat{\Delta} = 0$, thus achieving the social optimum with $\hat{W} = 1$.*

4.2 Reputational Concern and Social Welfare

In equilibrium, (expected) social welfare hinges on the leader's reputational concern. Conditional on a given policy pilot scheme (uniform or diverse), the leader with stronger reputational concern is less likely to endorse the unpopular policy, implying that social welfare is (weakly) increasing with reputational concern. However, the effect of reputational concern on welfare is no longer monotonic when an increase in β triggers a change in pilot scheme. In particular, diverse pilots, driven by vague policy guidance, facilitate policy discovery while creating stronger incentives for the leader to veto the unpopular policy ex post. Denote by W_d (W_u) expected social welfare under diverse (uniform) pilots. Our next result summarizes the properties of W_d and W_u.

Proposition 1 *For a given pilot scheme (diverse or uniform), social welfare (W_d or W_u) weakly increases with the reputational concern β. For any $\beta > 0$, social welfare under diverse pilots is higher than that under uniform pilots: $W_d > W_u$.*

[16] We note that the socially optimal policy vagueness $\hat{v} = 1/2$ hinges on the implicit assumption that policy pilots always yield viable policy options for the leader to endorse. If, alternatively, we assume the probability of a pilot turning into a viable policy option for the leader depends on the number of agents who pilot in a given direction, then the leader would face a tradeoff between experimentation and increasing the viability of a certain policy (by induce uniform pilots). In such a case, $v = 1/2$ may not be socially optimal.

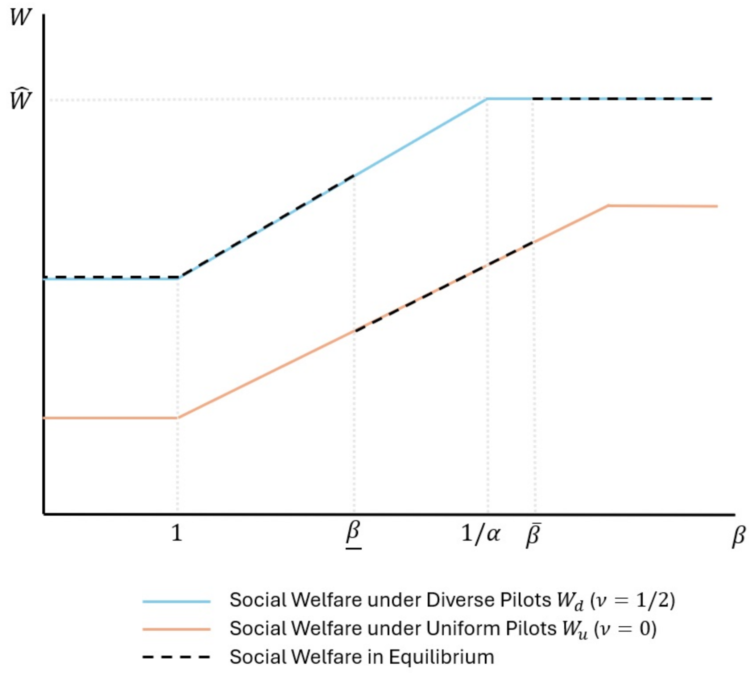

Figure 4: Reputational Concern and Social Welfare

Figure 4 illustrates how social welfare changes with reputational concern. The blue line corresponds to social welfare under diverse pilots whereas the red line corresponds to social welfare under uniform pilots. As in Proposition 1, both W_d and W_u are weakly increasing with β, with $W_d > W_u$ for any β. Moreover, we illustrate social welfare in equilibrium by the dashed line in the figure. When reputational concern is sufficiently strong ($\beta \geq \bar{\beta}$), the equilibrium outcome achieves the social optimum, $W = W_p$, with $\nu = 1/2$ and the leader always endorsing the popular policy under diverse pilots.

Importantly, social welfare in equilibrium is neither continuous nor monotonic, stemming from the non-monotonic effect of β on policy vagueness which in turns affects the pilot scheme and social welfare. Specifically, when a leader with stronger reputational concern (a local increase of β near $\underline{\beta}$) chooses clear instead of vague policy guidance (from Theorem 1), there is less policy discovery and more rent extraction, unambiguously lowering social welfare. This observation highlights that the leader's reputational concern may not always benefit social welfare in equilibrium, which state as an corollary to Proposition 1 and Theorem 1.

Corollary 1 *The leader with stronger reputational concern may achieve lower social welfare in equilibrium.*

This finding has implications on leadership in organizations: Leaders with mixed motivations—balancing rent-seeking and reputation concerns—may inadvertently produce worse outcomes than those driven solely by rent-seeking or reputation. It suggests that leaders who try to "have it all" may, paradoxically, be the most detrimental to their organizations.

5 Discussions

In this section, we present additional comparative statics results, conduct a more detailed analysis of agents' incentive constraints, and discuss several important extensions of our model.

5.1 Leader's Competence

Our discussion so far has held the leader's competence level γ fixed. We now discuss the effect of γ on the leader's choice of policy vagueness. Our next proposition shows this effect depends on the degree of reputational concern.

Proposition 2 *With strong reputational concern ($\beta > 1$), the leader sends clear policy guidance to induce uniform pilots if and only if γ is sufficiently large. With weak reputational concern ($\beta \leq 1$), the leader sends vague policy guidance to induce diverse pilots for any γ.*

With strong reputational concern ($\beta > 1$), the leader prefers uniform pilots when she is sufficiently competent, knowing her type ex ante with a high probability (γ is high). The intuition here is straightforward: The leader's expected payoff increases with γ under uniform pilots (from (9)) but does not vary with γ under diverse pilots (from (8)). When γ is sufficiently high, the leader, being relatively certain about her type, sends clear policy guidance to maximize the probability of rent extraction. With weak reputational concern ($\beta \leq 1$), however, the leader always forgoes reputation for rent and prefers vague policy guidance to maximize policy discovery.

Corollary 2 *With strong reputational concern ($\beta > 1$), the more competent leader may achieve lower social welfare in equilibrium. With weak reputational concern ($\beta \leq 1$), social welfare is constant with respect to the leader's competence.*

This corollary, which follows from Proposition 2, shows the nuanced effect of the leader's competence γ on social welfare. With strong reputation concern ($\beta > 1$), an increase in the leader's competence is *not* necessarily welfare-improving. In particular, for $\beta > 1$, when an increase in γ leads to a shift in the leader's choice of policy vagueness from $v = 1/2$ (inducing diverse pilots) to $v = 0$ (inducing uniform pilots), it would cause a discrete drop in social welfare. This underlying mechanism is similar to what is behind the potentially negative effect of reputational concern on social welfare as in Corollary 1.

5.2 Leader's ex ante Congruency

In this subsection, we discuss the role of ex ante congruency α. The parameter α is amenable to alternative interpretations. In a modern democracy, α can be interpreted as the leader's accountability or to what extent the politicians' preferences are aligned with the voters'. In a non-democracy, α measures the leader's benevolence. From the perspective of comparative politics, α may also be viewed as a proxy for democracy.

The effect of α on policy vagueness is indirect and mediated through reputational concern. From Theorem 1, the leader sends clear policy guidance if and only if $\beta \in (\underline{\beta}, \bar{\beta})$. From (7), both cutoffs strictly decrease with α.

Proposition 3 *An increase in ex ante congruency α lowers both $\underline{\beta}$ and $\bar{\beta}$.*

Proposition 3 implies that the effect of α on policy vagueness is generally ambiguous. There are two interesting cases. When reputational concern β is initially below $\underline{\beta}$, a local increase in α may lower $\underline{\beta}$ such that β now falls in the interval $(\underline{\beta}, \bar{\beta})$. In this case, the leader with higher ex ante congruency makes clear instead of vague policy guidance, suppressing experimentation. On the other hand, when reputational concern is initially above $\bar{\beta}$, an increase in α may bring $\bar{\beta}$ below β, which gives rise to vague policy guidance in equilibrium and enhances policy discovery. The next corollary summarizes those possibilities.

Corollary 3 *When reputational concern is relatively weak, an increase in ex ante congruency may cause the leader to switch from vague to clear policy guidance. When reputational concern is relatively strong, an increase in ex ante congruency may cuase the leader to switch from clear to vague policy guidance.*

As vague policy guidance grants the leader more discretion and flexibility ex post, the corollary underscores the relationship between ex ante congruency and ex post flexibility depends critically on the leader's reputational concern. If we interpret α as accountability, when the leader's reputational concern is relatively weak, an improvement in accountability incentivizes the leader to make clear policy guidance and counter-productively discourages policy discovery.

With a higher α, the leader is more likely to be congruent and under a given pilot scheme, the non-congruent leader is less likely to endorse the unpopular policy (from (3) and (6)), so both W_d and W_u increase with α. However, from Proposition 1, when an increase in α triggers the leader to switch from vague to clear policy guidance, the positive effects of α can be dominated by the absence of experimentation, rendering an overall negative effect on social welfare.

5.3 Policy Rigidity

In many real world scenarios, leaders (or political regimes at large) may find themselves reluctant to reserve their policies when their initial policy guidance turns to be unpopular. Our model provides a natural setting to shed light on such scenarios. In particular, we define *policy rigidity* as the probability that the final policy the leader endorses (x_c) is the same as their policy guidance (m), denoted by ϕ. We now provide the closed-form solution to policy rigidity R in equilibrium.

Proposition 4 *In equilibrium, policy rigidity ϕ is $1/2$ when the leader's reputational concern β is below $\underline{\beta}$ or above $\bar{\beta}$, and ϕ is $1 - \alpha(1-\gamma)\beta$, which is strictly above $1/2$, when the leader's reputational concern β is in $(\underline{\beta}, \bar{\beta})$.*

Figure 5 illustrates the relationship between reputational concern and policy rigidity. With strong or weak reputational concern, the leader sends completely uninformative policy guidance with $v = 1/2$, which yields diverse pilots. In this case, the leader always endorses their initial policy guidance with probability $1/2$ and therefore $\phi = 1/2$. On the other hand, with an intermediate level of reputational concern, the leader sends clear policy guidance to induce uniform pilots. From Lemma 3, the non-congruent leader has stronger incentives to endorse the unpopular policy under uniform pilots than under diverse pilots, so there is an upward jump in policy rigidity for $\beta \in (\underline{\beta}, \bar{\beta})$. Under uniform pilots with $v = 0$, an increase in reputational

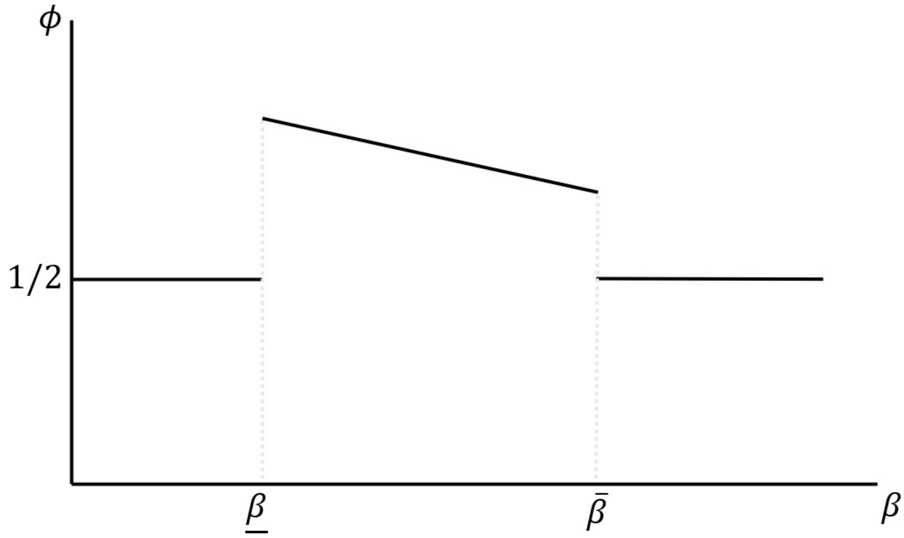

Figure 5: Reputational Concern and Policy Rigidity

concern lowers policy rigidity by incentivizing the non-congruent leader to veto the unpopular policy with a higher likelihood.

We observe that, similar to the relationship between the leader's optimal choice of vagueness and their reputation concerns, policy rigidity is also non-monotonic with respect to reputation concerns. The underlying intuition is straightforward: as the leader's reputation concerns increase, the level of policy rigidity aligns with changes in their preference for vagueness. When the leader opts for vague policies under either weak or strong reputation concerns, policy remains entirely flexible within the vague policy scenario. However, under intermediate reputation concerns, where the leader prefers clarified policies, policy rigidity is significantly higher. In this case, a non-congruent leader is more likely to rigidly adhere to an unpopular but profitable policy under clarified policies than under vague ones (see Lemma 3). Furthermore, in equilibrium, when the leader selects clarified policy disclosure, policy rigidity decreases as reputation concerns intensify, since stronger reputation concerns incentivize the non-congruent leader to maintain flexibility and veto unpopular policies.

The effect of the leader's competence γ on policy rigidity follows closely from Proposition 2. With strong reputational concern ($\beta > 1$), the more competent leader is likely to deviate from their policy guidance. More specifically, the leader sends vague policy guidance with $\phi = 1/2$ when γ is below some threshold; when γ exceeds that threshold, the leader sends clear policy guidance with an upward jump in policy rigidity, and an increase in γ would further increase policy rigidity. With weak reputational concern, since the leader always sends vague policy guidance, policy rigidity stays constant at R and does not vary with the leader's competence.

Thus, the effect of the leader's competence on policy rigidity is also influenced by their level of reputational concern. When the leader's reputational concern is weak and vague policy is always the dominant choice, policy remains fully flexible and unaffected by the leader's competence. However, when the leader's reputational concern is sufficiently strong and their choice of policy vagueness depends on their competence, the relationship changes. A leader with low competence tends to favor vague policies, while a leader with high competence prefers clarified policies. Based on the analysis above, given the same level of reputational concern, policy rigidity is significantly higher under clarified policies. Therefore, when reputational concern is strong, an increase in the leader's competence leads to a corresponding increase in policy rigidity.

The effect of the leader's ex ante congruency α on policy rigidity follows from Proposition 3 and is again mediated through reputational concern. When a change in α causes a shift in the equilibrium level of policy vagueness, policy rigidity may move in either direction. Moreover, from Proposition 4, under uniform pilots ($\beta \in (\underline{\beta}, \bar{\beta})$), a local increase in α would lower policy rigidity.

This follows from the intuition that when clear policy guidance has been provided, the leader faces a stronger reputation constraint in the final policy endorsement stage under a larger α (as shown in Figure 2, where both Δ_u and Δ_d shift downward and leftward as α increases). Consequently, a leader in a more accountable institution (high α) is more likely to veto their initial guidance when it turns out to be unpopular, thereby increasing policy flexibility.

5.4 The Agents' Incentive Compatibility Constraints

In our baseline setting, we abstract from a detailed discussion of the agents' incentive compatibility (IC) constraints concerning the pilot decision, by assuming $b = B/3$. This subsection provides a comprehensive characterization of the agents' IC, without imposing assumptions on the agents' payoff parameters b and B.

Each agent receives an endorsement return B when their pilot is endorsed by the leader and an extra return b when the final policy matches matches the individual preference. The agents' IC constraints hinge on the ratio of the extra return b to the endorsement return B. Intuitively, when b/B is sufficiently high, then both agents would pilot the policy that they prefer, which yields diverse pilots; when b/B is sufficiently low, then both agents are more likely to follow the leader's policy guidance to maximize the probability for their pilot to be endorsed by the leader, which yields uniform pilots.

Since an agent's preferred policy may not coincide with the policy that the leader is likely to endorse, the incentive for an agent to follow the leader's policy guidance depends also on policy vagueness. For the IC constraints under diverse pilots, we can show that if they hold for $v = 1/2$, then they would hold for any v. This is because when the leader's policy guidance is completely uninformative with $v = 1/2$, the agents have strong incentives to pilot their own preferred policies. Since the leader's expected payoff is independent of vagueness v under diverse pilots (from (8)), we focus on $v = 1/2$ when considering the IC constraints under diverse pilots. For the IC constraints under uniform pilots, they are easier to satisfy for smaller v, as clearer policy guidance incentivizes agents to follow. Since the leader's expected payoff strictly decreases with v (from (9)), we focus on $v = 0$ when considering the IC constraints under uniform pilots. The following proposition characterizes the IC constraints for both diverse and uniform pilots.

Proposition 5 *The IC constraints for diverse pilots with $v = 1/2$ are satisfied if*

$$\frac{b}{B} > \begin{cases} 1-\alpha, & \text{if } \beta \le 1, \\ 1-\alpha\beta, & \text{if } 1 < \beta < \frac{1}{\alpha}, \\ 0, & \text{if } \beta \ge \frac{1}{\alpha}. \end{cases} \tag{10}$$

The IC constraints for uniform pilots with $v = 0$ are satisfied if

$$\frac{b}{B} < \begin{cases} \frac{\alpha\gamma+\gamma-\alpha}{1-\gamma}, & \text{if } \beta \le 1, \\ \frac{\alpha\gamma+\gamma-\alpha-\alpha\gamma(\beta-1)}{1-\gamma+\alpha(2\gamma-1)(\beta-1)}, & \text{if } 1 < \beta < \frac{1}{\alpha}, \\ \frac{3\alpha\gamma+1-\gamma-2\alpha-\alpha(1-\gamma)(\beta-1)}{1-\gamma+(1-\alpha)(2\gamma-1)}, & \text{if } \frac{1}{\alpha} \le \beta < \frac{\alpha(1-\gamma)+(1-\alpha)\gamma}{\alpha(1-\gamma)}, \\ \frac{(2\alpha-1)(2\gamma-1)}{1-\gamma+(1-\alpha)(2\gamma-1)}, & \text{if } \beta \ge \frac{\alpha(1-\gamma)+(1-\alpha)\gamma}{\alpha(1-\gamma)}. \end{cases} \tag{11}$$

Proposition 5 echoes our discussion above: The IC constraints for diverse pilots hold if and and only if b/B is sufficiently large, whereas the IC constraint for uniform pilots hold if and only if b/B is sufficiently small. It should be noted that the IC constraints for diverse pilots hold for any $b > 0$ when the reputational concern is strong enough ($\beta > 1/\alpha$) for the non-congruent leader to always veto unpopular policies. In such a case, since only the popular policy is implemented and the leader is completely vague about their type ($v = 1/2$), agents expect an equal probability for either policy to be endorsed and would therefore pursue their preferred policies for any $b > 0$. Moreover, given the ratio b/B, the IC constraints for uniform pilots are harder to satisfy for stronger reputational concern. This is because when the leader with stronger reputational concern is more likely to veto the unpopular policy, thus making it less attractive for the agent to follow the leader's policy guidance when their preferred policy differs from the guidance.

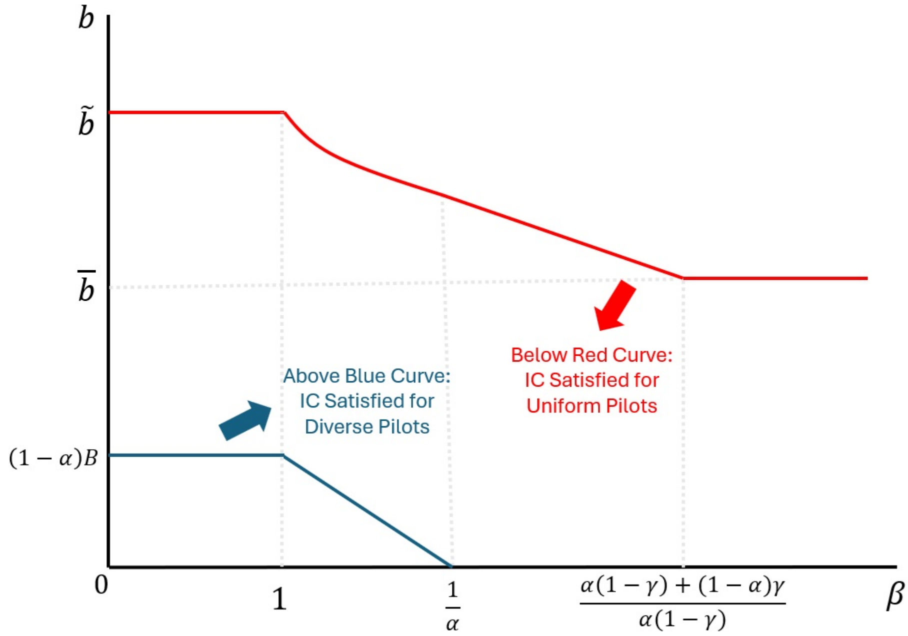

Figure 6: IC Constraints for Diverse and Uniform Pilots

Figure 6 illustrates the admissible parameter range for the IC constraints to hold for uniform pilots with $v = 0$ and diverse pilots with $v = 1/2$, in which we define

$$\bar{b} \equiv \frac{(2\alpha - 1)(2\gamma - 1)}{1 - \gamma + (1 - \alpha)(2\gamma - 1)} B, \quad \tilde{b} \equiv \frac{\alpha\gamma + \gamma - \alpha}{1 - \gamma} B. \tag{12}$$

We note that $\tilde{b} > \bar{b}$ and $\tilde{b} > (1 - \alpha)B$. From Figure 6, when $b \in ((1 - \alpha)B, \bar{b})$, which is indeed the case in our baseline setting with $b = B/3$ (from Lemma 1), both IC constraints hold for any β. However, when the agents' extra return b is sufficiently large, the IC constraints for uniform pilots would not hold for some (or all) β, as the agents have strong incentives to pursue their preferred policy. Similarly, for $\beta < 1/\alpha$, when b is sufficiently small, the IC constraints for diverse pilots would not hold because the extra incentive to pursue one's own preferred policy is dominated by the motive to seek the leader's endorsement (by following the leader's policy guidance). In sum, the equilibrium outcome in our baseline setup holds for b at some intermediate level. When b is either very large or small, the equilibrium outcome can change accordingly when the IC constraints for diverse or uniform pilots fail to hold.

5.5 Other Extensions

Policy Guidance Observable to the Public In our baseline setting, we assume the leader's policy guidance m to be communicated exclusively within the bureaucratic organ, thus not observable to the citizens. However, in institutions with high transparency, policy guidance is usually communicated directly to the public. We now consider the implication of policy guidance being observable to the citizens.

Under uniform pilots when both agents pursue the leader's policy guidance, since the piloted policy is publicly observable, the leader's policy guidance can be easily deduced by the citizens, and as a result, the observability of policy guidance would not affect the leader's expected payoff under uniform pilots. Under diverse pilots with $\nu = 1/2$, since policy guidance m is totally uninformative about the leader's type, the citizens' belief would not change even when they observe policy guidance m. In short, if we focus on the leader's policy vagueness decision between $v = 0$ and $v = 1/2$, it does not matter whether m is observable or not.[17]

6 Conclusion

This paper offers a novel perspective on how reputational concern influences a leader's choice of policy vagueness. By examining the interplay between reputational concern and rent-seeking motive, we uncover an interesting non-monotonic relationship between reputational concern and policy vagueness. We find that while both reputational and rent concerns push leaders toward sending vague messages, an incentive for clarity can emerge from the tradeoff between the two.

Furthermore, we emphasize that a leader's policy vagueness can serve as an informal commitment mechanism for their *ex post* decisions. Specifically, a vague *ex ante* policy provides the leader with greater

[17] It should be noted that the leader's expected payoff under diverse pilots varies with v when policy guidance is observable to the public. See the discussion in the Appendix for further details.

flexibility to navigate potential conflicts between *ex post* rent-seeking and reputational concern. In contrast, a clear *ex ante* policy signals a stronger likelihood that the leader will adhere to their privately preferred policy in *ex post*, even at the expense of social welfare considerations.

Our analysis sheds light on policy vagueness in the political arena as well as vague communications in other organizations, such as in the corporate environment. For instance, one testable hypothesis from our model is that CEOs or managers at the early or late stages of their careers, when their career concerns are either very strong or weak, tend to communicate vaguely, whereas those in the middle of their careers may prefer clearer communication.

A Proofs

Proof of Lemma 1: A more detailed discussion about agents' incentive compatibility constraints (for policy pilots) is covered in Section 5.4. From Proposition 5, we just need to show that $\bar{b} > b > (1-\alpha)B$ in the baseline setting, with $\bar{b}$ defined in (12). By definition, $\bar{b}$ is increasing with γ. For $\gamma = 1/(2-\alpha)$,

$$\bar{b} = \frac{(2\alpha-1)\left(\frac{2}{2-\alpha}-1\right)}{1-\frac{1}{2-\alpha}+(1-\alpha)\left(\frac{2}{2-\alpha}-1\right)}B = \frac{(2\alpha-1)\alpha}{1-\alpha^2}B > B/3 = b,$$

where the inequality follows from $\alpha > 2/3$. Since $\bar{b}$ increases with γ, for any $\gamma > 1/(2-\alpha)$, we also have $\bar{b} > b$. For $\alpha > 2/3$, $b = B/3 > (1-\alpha)B$. Then, we have obtained the desired conclusion. ■

Proof of Lemma 2: The leader's payoff is given by $\pi_c = r + \beta\text{Posterior}(\theta_c = \theta)$. By Bayes' rule, the expected payoff, given the degree of vagueness v, is then given by $E\pi_c = E(r|v) + \beta\text{Prior}(\theta_c = \theta) = E(r|v) + \beta\alpha$, where the last equality follows from the definition of α. ■

Proof of Lemma 3: The comparison between Δ_d and Δ_u follows directly from (3) and (6). ■

Proof of Theorem 1: To establish the non-monotonic effect of reputational concern on policy vagueness, we just need to show that when $\beta = 1/\alpha$ (from Figure 3), the leader's expected payoff is lower for diverse pilots. From (8) and (9), this is equivalent to $1+\alpha < \alpha + \gamma(2-\alpha)$, where RHS follows from $q_v = \gamma$ and $\beta = 1/\alpha$. This inequality holds for $\gamma > 1/(2-\alpha)$. ■

Proof of Proposition 1: In the case of diverse pilots, the expected social welfare is given by

$$W_d = \alpha + (1-\alpha)[(1-\Delta_d) - \Delta_d].$$

Plugging in the expression of Δ_d from (3), we obtain

$$W_d = \begin{cases} 2\alpha - 1, & \text{if } \beta < 1, \\ 2\alpha\beta - 1, & \text{if } 1 \le \beta \le \frac{1}{\alpha}, \\ 1, & \text{if } \beta > \frac{1}{\alpha}. \end{cases} \tag{13}$$

In the case of uniform pilots with $v = 0$, the expected social welfare is given by

$$W_u = \alpha\gamma + (1-\alpha)\left[(1-\gamma) - \gamma\Delta_u\right].$$

Plugging in the expression of Δ_u from (6), we obtain

$$W_u = \begin{cases} \alpha\gamma + (1-\alpha)(1-\gamma) - (1-\alpha)\gamma, & \text{if } \beta < 1, \\ \alpha\gamma + (1-\alpha)(1-\gamma) - (1-\alpha)\gamma + \alpha(1-\gamma)(\beta-1), & \text{if } 1 \le \beta \le \frac{\alpha(1-\gamma)+(1-\alpha)\gamma}{\alpha(1-\gamma)}, \\ \alpha\gamma + (1-\alpha)(1-\gamma), & \text{if } \beta > \frac{\alpha(1-\gamma)+(1-\alpha)\gamma}{\alpha(1-\gamma)}. \end{cases} \tag{14}$$

From (13) and (14), it is straightforwoard to show that W_d and W_u are weakly increasing with β and $W_d > W_u$ for any β. Thus, we have obtained the desired conclusion. ∎

Proof of Proposition 2: Recall $q_v = \gamma$ for $v = 0$. When $\beta \le 1$, it follows directly from (8) and (9) that the leader prefers diverse pilots for any $\gamma < 1$, through clear policy guidance with $v = 1/2$. For a given $\beta > 1$, the comparison between uniform and diverse pilots for the leader depends on γ. From (8), the leader's expected payoff under diverse pilots is independent of γ, whereas from (9), the leader's expected payoff under uniform pilots (weakly) increases with γ. For $\beta \in (1, 1/\alpha]$, $1 + \alpha < \alpha + \gamma(1 - \alpha + \beta\alpha)$ if and only if $\gamma > 1/(1 - \alpha + \beta\alpha)$. Note $1/(2 - \alpha) \le 1/(1 - \alpha + \beta\alpha)$ for $\beta\alpha \le 1$. This implies that the leader prefers uniform pilots if and only if γ is sufficiently large, for $\beta \in (1, 1/\alpha]$. Last, we consider $\beta > 1/\alpha$. If $\gamma \le (\beta-1)/(1-\alpha)$, the leader's expected payoff under uniform pilots is given by $\gamma\alpha + \beta\alpha$, which is smaller than that under diverse pilots. If γ is sufficiently large such that $\gamma > (\beta-1)/(1-\alpha)$, then the leader's expected payoff is higher under uniform pilots when $\alpha + \gamma(1 - \alpha + \beta\alpha) > \alpha + \beta\alpha$, or equivalently, $\gamma > \beta\alpha/(1 - \alpha + \beta\alpha)$. Then, for $\beta > 1/\alpha$, the leader prefers uniform pilots if and only if $\gamma > \max\{(\beta - 1)/(1 - \alpha), \beta\alpha/(1 - \alpha + \beta\alpha\}$. Note, for $\beta > 1/\alpha$, we also have $\beta\alpha/(1 - \alpha + \beta\alpha) > 1/(2 - \alpha)$. Thus, we have obtained the desired conclusion. ∎

Proof of Corollary 2: For $\beta > 1$, when a local increase in γ causes the leader to induce uniform instead of diverse pilots (from Proposition 2), and since $W_u < W_d$ for any given β (and γ) (from Proposition 1), such a change leads to a discrete drop in welfare. For $\beta \le 1$, from Proposition 2 and (13) in the proof of Proposition 1, social welfare is simply given by $2\alpha - 1$, which does not depend on γ. Thus, we have obtained the desired conclusion. ∎

Proof of Proposition 4: From Theorem 1, for $\beta < \underline{\beta}$ or $\beta > \bar{\beta}$, $v = 1/2$ in equilibrium. When $v = 1/2$, the leader's policy guidance m is completely uninformative and induces diverse pilots. In this case, the leader chooses either policy with an equal probability, so policy rigidity ϕ is 1/2. For $\beta \in (\underline{\beta}, \bar{\beta})$, the leader chooses $v = 0$ to induce uniform pilots, with $P(m = s = \theta_c) = \gamma$, implying that $\phi = \alpha\gamma + (1 - \alpha)[\gamma\Delta_u + (1 - \gamma)]$. Evidently from Figure 3, $1 \le \underline{\beta} < \bar{\beta} \le \frac{\alpha(1-\gamma)+(1-\alpha)\gamma}{\alpha(1-\gamma)}$, so for $\beta \in (\underline{\beta}, \bar{\beta})$, from (6), $\Delta_u = 1 - \frac{\alpha(1-\gamma)}{(1-\alpha)\gamma}(\beta - 1)$. Then, we obtain

$$\phi = \alpha\gamma + (1-\alpha)\gamma[1 - \frac{\alpha(1-\gamma)}{(1-\alpha)\gamma}(\beta-1)] + (1-\alpha)(1-\gamma) = 1 - \alpha(1-\gamma)\beta,$$

for $v = 0$. Last, for $\beta \in (\underline{\beta}, \bar{\beta})$, $\phi > 1 - \alpha(1-\gamma)\bar{\beta} = 1 - \gamma(1-\alpha) > 1/2$, where the equality follows from (7) and the last inequality follows from $\gamma < 1$ and $\alpha > 2/3$. ∎

Proof of Proposition 5: We verify the agents' incentive compatibility (IC) constraints when they decide on which policy to pilot. In the case of diverse pilots, the agent with $\theta_i = m$ pilots their preferred policy if

$$\{q_v[\alpha + (1-\alpha)\Delta_d] + (1-q_v)(1-\alpha)(1-\Delta_d)\}(B+b) > \{(1-q_v)[\alpha + (1-\alpha)\Delta_u'] + q_v(1-\alpha)\}B, \tag{15}$$

where Δ_d is the probability for the non-congruent leader to endorse the unpopular policy in the case of diverse pilots, which is given by (3), and Δ_u' is the probability of the non-congruent leader to endorse the unpopular policy when both agents pilot the policy $(-m)$. It should be noted that Δ_u' is off the equilibrium path and to be specified. Next, the agent with $\theta_i = -m$ pilots his preferred policy if

$$\{(1-q_v)[\alpha + (1-\alpha)\Delta_d] + q_v(1-\alpha)(1-\Delta_d)\}(B+b) > \{q_v[\alpha + (1-\alpha)\Delta_u] + (1-q_v)(1-\alpha)\}B. \tag{16}$$

More explicitly, the IC constraints for diverse pilots can be written as

$$\frac{\gamma(1-v) + (1-\gamma)v - (1-\alpha)(2\gamma-1)(1-2v)(1-\Delta_d)}{\alpha[(1-\gamma)(1-v)+\gamma v] + (1-\alpha) - (1-\alpha)[(1-\gamma)(1-v)+\gamma v](1-\Delta_u')} > \frac{B}{B+b} \tag{17}$$

$$\frac{(1-\gamma)(1-v) + \gamma v + (1-\alpha)(2\gamma-1)(1-2v)(1-\Delta_d)}{\alpha[\gamma(1-v)+(1-\gamma)v] + (1-\alpha) - (1-\alpha)[\gamma(1-v)+(1-\gamma)v](1-\Delta_u)} > \frac{B}{B+b}, \tag{18}$$

In the case of uniform pilots, the agent with $\theta_i = m$ pilots his preferred policy if

$$\{q_v[\alpha + (1-\alpha)\Delta_u] + (1-q_v)(1-\alpha)\}(B+b) > \{(1-q_v)[\alpha + (1-\alpha)\Delta_d] + q_v(1-\alpha)(1-\Delta_d)\}B, \tag{19}$$

and the agent with $\theta_i = -m$ pilots policy m if

$$\{q_v[\alpha + (1-\alpha)\Delta_u] + (1-q_v)(1-\alpha)\}B > \{(1-q_v)[\alpha + (1-\alpha)\Delta_d] + q_v(1-\alpha)(1-\Delta_d)\}(B+b), \tag{20}$$

where Δ_u is the probability for the non-congruent leader to veto the unpopular policy in the case of uniform pilots, which is given by (6). The two constraints can be reduced to

$$\frac{\alpha[\gamma(1-v)+(1-\gamma)v] + (1-\alpha) - (1-\alpha)[\gamma(1-v)+(1-\gamma)v](1-\Delta_u)}{(1-\gamma)(1-v) + \gamma v + (1-\alpha)(2\gamma-1)(1-2v)(1-\Delta_d)} > \frac{B+b}{B}. \tag{21}$$

Note that (21) is (18) with the inequality reversed.

The determination of Δ_u' is trickier, because it is off the equilibrium path. There are two polar cases: (i) $\Delta_u' = \Delta_u$, or (ii) Δ_u' is determined by the comparison between rent (1) and reputation $(\frac{\beta\alpha q_v}{\alpha q_v + (1-\alpha)(1-q_v)(1-\Delta_u')})$, as if this case were on an equilibrium path. For (ii), when $1 > \frac{\beta\alpha q_v}{\alpha q_v + (1-\alpha)(1-q_v)(1-\Delta_u')}$, $\Delta_u' = 1$; when $1 < \frac{\beta\alpha q_v}{\alpha q_v + (1-\alpha)(1-q_v)(1-\Delta_u')}$, $\Delta_u' = 0$, and otherwise,

$$\Delta_u' = 1 - \frac{\alpha q_v}{(1-\alpha)(1-q_v)}(\beta - 1).$$

It is straightforward to show that $\Delta_u' \leq \Delta_d \leq \Delta_u$. Since Δ_u' only enters the IC constraint (17) and this constraint is more difficult to satisfy for a larger Δ_u', we focus on (i) because if the IC is satisfied for (i), it would also be satisfied for (ii). Henceforth, we focus on the case of $\Delta'_u = \Delta_u$.

There are four cases concerning the degree of reputation: (a) $\beta \leq 1$; (b) $\beta \in (1, \frac{1}{\alpha})$; (c) $\beta \in [\frac{1}{\alpha}, \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)})$; (d) $\beta \geq \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)}$. We consider each of them in turn.

Case (a): For $\beta \leq 1$, $\Delta_u = \Delta_d = 1$. The IC constraints for the diverse pilots, (17) and (18), are reduced to

$$\frac{(1-\gamma)(1-v)+\gamma v}{\alpha[\gamma v+(1-\gamma)v]+(1-\alpha)} > \frac{B}{B+b},$$

which can be simplified as

$$q_v = \gamma(1-v)+(1-\gamma)v < \frac{\alpha B+b}{\alpha B+B+b}. \tag{22}$$

The IC constraint for the uniform pilots is simply the inequality above reversed.

Case (b): For $\beta \in (1, \frac{1}{\alpha})$, $1 > \Delta_u > \Delta_d > 0$. The IC constraints for the diverse pilots are given by

$$\frac{\gamma(1-v)+(1-\gamma)v-\alpha(2\gamma-1)(1-2v)(\beta-1)}{\alpha[(1-\gamma)(1-v)+\gamma v]+(1-\alpha)-\alpha\frac{[(1-\gamma)(1-v)+\gamma v]^2}{\gamma(1-v)+(1-\gamma)v}(\beta-1)} > \frac{B}{B+b} \tag{23}$$

$$\frac{(1-\gamma)(1-v)+\gamma v+\alpha(2\gamma-1)(1-2v)(\beta-1)}{\alpha[\gamma(1-v)+(1-\gamma)v]+(1-\alpha)-\alpha[(1-\gamma)(1-v)+\gamma v](\beta-1)} > \frac{B}{B+b}. \tag{24}$$

(24) can be simplified to

$$q_v = \gamma(1-v)+(1-\gamma)q_v < \frac{\alpha B+(1+\alpha)b-\alpha b\beta}{(1+2\alpha)(B+b)-\alpha(B+2b)\beta}, \tag{25}$$

where RHS can be shown to be strictly increasing with β. Because q_v attains its minimum when $v = 1/2$, (25) is satisfied if and only if it is satisfied for $v = 1/2$. A complete characterization of (23) is very involved, but we note that when $v = 1/2$, (23) and (24) coincide. The IC constraint for the uniform pilots is the inequality (25) reversed.

Case (c): For $\beta \in [\frac{1}{\alpha}, \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)})$, $1 > \Delta_u > \Delta_d = 0$. The IC constraints for the diverse pilots are given by

$$\frac{\gamma(1-v)+(1-\gamma)v-(1-\alpha)(2\gamma-1)(1-2v)}{\alpha[(1-\gamma)(1-v)+\gamma v]+(1-\alpha)-\alpha\frac{[(1-\gamma)(1-v)+\gamma v]^2}{\gamma(1-v)+(1-\gamma)v}(\beta-1)} > \frac{B}{B+b} \tag{26}$$

$$\frac{(1-\gamma)(1-v)+\gamma v+(1-\alpha)(2\gamma-1)(1-2v)}{\alpha[\gamma(1-v)+(1-\gamma)v]+(1-\alpha)-\alpha[(1-\gamma)(1-v)+\gamma v](\beta-1)} > \frac{B}{B+b}. \tag{27}$$

The inequality (27) can be simplified to

$$q_v = \gamma(1-v)+(1-\gamma)v < \frac{(\alpha-1)B+\alpha b+\alpha B\beta}{(2\alpha-1)(B+b)+\alpha B\beta},$$

where RHS strictly increases with β. The inequality above always holds for $v = 1/2$ because RHS $> 1/2$ when $\beta = 1/\alpha$.

LHS of (26), viewed as a function of β, strictly increases with β, so if the inequality holds for $\beta = 1/\alpha$, it holds for any $\beta \in [\frac{1}{\alpha}, \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)})$. Let $\beta = 1/\alpha$ and recall $q_v = \gamma(1-v)+(1-\gamma)v \geq 1/2$. Then, the first inequality can be written as

$$[q_v - (1-\alpha)(2q_v - 1)](B+b) > [\alpha(1-q_v) + 1 - \alpha - (1-\alpha)\frac{(1-q_v)^2}{q_v}]B,$$

which can be simplified as

$$f(q_v) \equiv [(2\alpha-1)(B+b)+B]q_v^2 + [(\alpha-2)B + (1-\alpha)b]q_v + B(1-\alpha) > 0,$$

where $f(\cdot)$ is a quadratic function and attains its minimum when $q_v^* = \frac{(2-\alpha)B-(1-\alpha)b}{2[(2\alpha-1)(B+b)+B]}$. We have $q_v^* \leq 1/2$ if and only if $(2-3\alpha)B \leq \alpha b$, which is guaranteed by $\alpha > 2/3$. Since $f(1/2) > 0$, if $q_v^* \leq 1/2$, $f(q_v) > 0$ for any $q_v \geq 1/2$, implying that (26) holds for any v. However, if $(2-3\alpha)B > \alpha b$, $q_v^* > 1/2$, and the sign of $f(q_v^*)$ is indeterminate. To see this, we rewrite $f(\cdot)$ as

$$f(q_v) = (2q_v - 1)(\alpha q_v - (1-\alpha))B + [(2\alpha-1)q_v^2 + (1-\alpha)q_v]b,$$

which is negative when $\alpha \in (\frac{1}{2}, \frac{2}{3})$, $q_v \in (\frac{1}{2}, \frac{1-\alpha}{\alpha})$, and b is small enough. Thus, if $(2-3\alpha)B > \alpha b$, there can be an interval in $(\frac{1}{2}, \frac{1-\alpha}{\alpha})$ for q_v in which the inequality no longer holds.

In short, the IC constraints for the diverse pilots for Case (c) always hold for $v = 1/2$, but a complete characterization is more involved. The IC constraint for the uniform pilots is the inequality (27) reversed, given by

$$q_v = \gamma(1-v) + (1-\gamma)v > \frac{(\alpha-1)B + \alpha b + \alpha B\beta}{(2\alpha-1)(B+b) + \alpha B\beta},$$

Case (d): For $\beta \geq \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)}$, $\Delta_u = \Delta_d = 0$. the IC constraints for the diverse pilots are written as

$$\frac{\gamma(1-v) + (1-\gamma)v - (1-\alpha)(2\gamma-1)(1-2v)}{\alpha[(1-\gamma)(1-v)+\gamma v] + (1-\alpha) - (1-\alpha)[\gamma v + (1-\gamma)(1-v)]} > \frac{B}{B+b} \tag{28}$$

$$\frac{(1-\gamma)(1-v) + \gamma v + (1-\alpha)(2\gamma-1)(1-2v)}{\alpha[\gamma(1-v)+(1-\gamma)v] + (1-\alpha) - (1-\alpha)[\gamma(1-v) + (1-\gamma)v]} > \frac{B}{B+b} \tag{29}$$

The conditions can be simplified as

$$\frac{\alpha(2B+b)-(B+b)}{(2\alpha-1)(2B+b)} < \gamma(1-v) + (1-\gamma)v < \frac{\alpha(2B+b)-B}{(2\alpha-1)(2B+b)},$$

where the first inequality follows from (28) and the second follows from (29). Note that $\frac{\alpha(2B+b)-(B+b)}{(2\alpha-1)(2B+b)} < \frac{1}{2}$, and $\gamma(1-v) + (1-\gamma)v \geq \frac{1}{2}$, so the IC constraints for the diverse pilots can be further simplified as

$$q_v = \gamma(1-v) + (1-\gamma)v < \frac{\alpha(2B+b)-B}{(2\alpha-1)(2B+b)}, \tag{30}$$

which always holds for $v = 1/2$ because RHS > 1/2. The IC constraint for the uniform pilots is the inequality (30) reversed.

We now take stock of the four cases. Since the leader's expected payoff, as we have shown, is independent of v in the case of diverse pilots, and if the IC constraints for the diverse pilots are satisfied, they have to be satisfied for $v = 1/2$, we thus consider $v = 1/2$ for the IC constraints for the diverse pilots, which can simplified as (10).

We collect the IC constraint for the uniform pilots:

$$\frac{B+b}{B} < \begin{cases} \frac{\alpha q_v+1-\alpha}{1-q_v}, & \text{if } \beta \leq 1 \\ \frac{\alpha q_v+1-\alpha-\alpha(1-q_v)(\beta-1)}{1-q_v+\alpha(2q_v-1)(\beta-1)}, & \text{if } 1 < \beta < \frac{1}{\alpha} \\ \frac{\alpha q_v+1-\alpha-\alpha(1-q_v)(\beta-1)}{1-q_v+(1-\alpha)(2q_v-1)}, & \text{if } \frac{1}{\alpha} \leq \beta < \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)} \\ \frac{\alpha q_v+(1-\alpha)(1-q_v)}{1-q_v+(1-\alpha)(2q_v-1)}, & \text{if } \beta \geq \frac{\alpha(1-q_v)+(1-\alpha)q_v}{\alpha(1-q_v)} \end{cases}, \tag{31}$$

where RHS can be shown to be strictly increasing with q_v and thus strictly decreases with v. Since the leader's expected payoff attains its maximum when $v = 0$ and the IC constraint is easiest to be satisfied also when $v = 0$ for the case of uniform pilots, we let $v = 0$ ($q_v = \gamma$) and the IC constraint for the uniform pilots is simplified as (11). Therefore, we have obtained the desired conclusion. ∎

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