Self-Censorship of Hard Information

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Abstract

Despite their potential to enhance decision-making, certain facts remain unspoken. In the model, an agent receives verifiable information about an unknown state and decides whether to share such information before the principal makes her decision. The agent is either biased and has different preferences than the principal or unbiased and has the same preferences. Further, all agents aim to build a reputation for being unbiased. When the agent cannot commit to a disclosure policy, self-censorship occurs and the principal may not obtain her first-best payoff for any reputational weight by the agent. In contrast, when the agent commits to a disclosure policy, the principal's payoff increases with the reputational weight, and equals her first-best payoff when reputation is sufficiently valuable. Finally, I connect these results to academic publishing practices.

1 Introduction

In various contexts, certain facts remain unspoken or carry significant reputational consequences when spoken. For example, when deciding whether to publish data about a lack of racial disparities in police use of high-level force, economist Roland Fryer alleges that Harvard faculty advised, "Don't publish this. You'll ruin your career" (Weiss, 2024). This self-censorship is pervasive in academic publishing. In recent surveys, nearly two-thirds of psychology professors reported that "some empirically supported conclusions cannot be mentioned without punishment" and "91 percent reported being at least somewhat likely to self-censor in publications" (Clark

et al., 2023). Even though this information is verifiable (i.e., it is empirically supported rather than mere opinion), sharing it often raises the question: "What kind of individual would share this?"

The model developed in this paper seeks to examine the forces that influence individuals' decisions to self-censor hard information when advising a principal in a setting where individuals have reputational considerations. While sharing such information always results in a more efficient decision for an unbiased agent, doing so may tarnish the agent's reputation.

I will frame this question in the political-correctness paradigm introduced in Morris (2001). Here, a social scientist (he, agent) decides whether to share information about affirmative action with a university dean (she, principal). The social scientist may be biased, preferring a different affirmative action policy than the dean, or unbiased, sharing the dean's goals. Further, both types of social scientists have a preference for being perceived as unbiased. Each type of social scientist conducts an experiment or collects data, resulting in information about the relative benefits of affirmative action. Importantly, I assume that this information need note be generated with equal probabilities by the different types of social scientists. Finally, in contrast to Morris (2001), I assume that this information is verifiable (cf. Milgrom, 1981; Grossman, 1981), implying the social scientist cannot fabricate information.

I consider two environments: absent commitment and with commitment. Absent commitment, the agent first observes the data and then decides whether to disclose the information. With commitment, the agent pre-registers his study with the dean and chooses a disclosure policy before observing, or even obtaining, the data. The ability to commit to a disclosure policy is common in various areas of academia. For instance, one-third of economists conducting randomized control trials submit Pre-Analysis Plans (PAPs) detailing which outcomes will appear in the publication (Banerjee et al., 2020).[1] Further, various journals, such as the Journal of Political Economy Microeconomics, allow editors to commit to publication outcomes based on PAPs alone.

To understand this tradeoff, I first analyze the case absent commitment. The agent, regardless of his type, must self-censor his information if two conditions are met:

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[1]The primary motivation behind PAPs is to prevent p-hacking, as opposed to combating self-censorship. In contrast, I focus squarely on information disclosure and treat information generation as exogenous.

(i) he sufficiently values his reputation, and (ii) the biased agent, absent reputational considerations, is more likely to disclose such information. If (ii) holds, the agent receives a better reputational payoff following self-censorship. Further, given that (i) holds, he prefers to self-censor and preserve his reputation. Finally, I show that there are environments where in any equilibrium and for any reputational weight, the principal never obtains the payoff she would obtain had the information been available to her directly, defined as her first-best payoff (Proposition 1).

In contrast, if the agent commits to a disclosure rule, then the principal obtains her first-best payoff in her preferred equilibrium whenever reputation is sufficiently valuable to the agent (Proposition 2). In this equilibrium, both the biased and unbiased agent are conjectured to commit to fully revealing their information. Further, the principal assumes that any off-path disclosure policy is chosen by the biased agent. When the agent values his reputation, these off-path beliefs ensure that the agent chooses the fully-revealing policy.

The unifying intuition is that whenever reputation is sufficiently valuable, the two types of agent must pool (or choose sufficiently similar strategies) when evaluated with respect to the principal's information. In the case of soft information, this pooling implies that the agents must make the same action recommendation independent of the state (c.f. Morris, 2001). For hard information absent commitment, because whether the agent acquired information is not observed by the principal, it may be necessary for both types of agents to pool on not providing information to the principal. However, for hard information with commitment, both agents can pool on full revelation.

1.1 Literature

These results broadly speak to three literatures: political correctness, disclosure, and scientific-publishing policies. The political-correctness literature typically focuses on soft information, such as Morris (2001). Qualitatively, political-correctness concerns are exacerbated in models of soft information, because, in equilibrium, an agent's message is necessarily a function of both his type and his information about the state of the world. One might think that hard information should eliminate these concerns since revealing that the state of the world takes a certain value need not conflate preferences and information about the state of the world. However, in line

with empirical evidence, my results show that political-correctness concerns remain with hard information.

Within this literature, my results comparing commitment and non-commitment bare qualitative resemblance to the literature designing decision-making environments for players with political-correctness concerns. For instance, Prat (2005) shows that transparency exacerbates political-correctness concerns, ultimately harming the principal's payoff. Further, McClellan and Rappoport (2024) shows that the agent benefits from "taking stands," which help disambiguate preferences and information.[2] Finally, Bénabou et al. (2020) empirically test similar qualitative forces to those in my model by varying whether public donations are elicited via direct elicitation or a multiple-price list. Reassuredly, both analyses produce similar results: for low image concerns, the principal prefers decisions made after the realization of nature (direct elicitation, respectively no commitment) and for high image concerns the principal prefers decisions made before the realization of nature (multiple price lists, respectively with commitment).

The literature on verifiable information disclosure typically assumes that the agent always prefers a higher decision by the principal (cf. Milgrom, 1981; Grossman, 1981; Dye, 1985). Further, in the disclosure literature studying reputation (cf. Bar-Isaac, 2003; Board and Meyer-ter Vehn, 2013; Shadmehr and Bernhardt, 2015; Zhang, 2024), an agent's (respectively, firm's) reputation is useful insofar as it encourages the principal (respectively, consumer) to take a higher decision (respectively, purchase more). In contrast, I focus on an environment, similar to Morris (2001), where the unbiased agent does not have directional preferences and is instead perfectly aligned with the principal over which decision should be taken.

Finally, the descriptive literature on scientific publishing policies has also discussed the importance of commitment, see Banerjee et al. (2020) for a review. Here, the primary tradeoff considered is that such pre-commitment may discourage p-hacking, but incurs a large up-front burden for the researchers to think through all possible contingencies. Similarly, Coffman and Niederle (2015) argue that these costs associated with PAPs are unwarranted if replications can find flaws in the original studies. My results are complementary to this intuition, because I show that PAPs have a strong benefit when the original studies would have been self-censored (and thus unable to

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[2]Kasy and Spiess (2024), focusing on pre-analysis plans, but not reputation, shows a similar result in a purely statistical setting.

be replicated) absent the PAPs.

2 Model

There exist two players: a principal (she) and an agent (he). The principal has a continuous utility function $u^p(a, \omega)$ that depends on her action $a \in A$, and the state of the world $\omega \in \Omega$, where A, Ω are compact subsets of the real line. The agent and principal share a common prior belief that ω has cumulative distribution function F_ω. There are two types of agent: biased and unbiased, where an agent is unbiased with probability $p \in (0, 1)$. An agent's payoff is the sum of a non-image payoff and a reputational payoff. An unbiased agent's non-image payoff is identical to that of the principal. Meanwhile, a biased agent's non-image payoff is a continuous function $v^b(a, \omega)$, which need not equal $u^p(a, \omega)$. The relative weight on each agent's image payoff, denoted by $\lambda \geq 0$, will be referred to as the strength of reputational incentives. The utilities of the biased and unbiased agents are:

$$u^u(\pi) = \mathbf{E}\Big(u^p\big(a(\pi(\omega))\big) + \lambda \cdot \phi\big(\pi(\omega)\big)\Big) \tag{1}$$

$$u^b(\pi) = \mathbf{E}\Big(v^b\big(a(\pi(\omega))\big) + \lambda \cdot \phi\big(\pi(\omega)\big)\Big), \tag{2}$$

where $\pi(\cdot)$ and $\phi(\cdot)$ correspond to the disclosure rule chosen by the agent and the reputational update by the principal about the agent's type, respectively, as discussed further below.

Information: I allow the biased and unbiased agents to, potentially, utilize different data-generating processes. Here, I assume that an unbiased (respectively, biased) agent observes the realization of ω with probability $q^u \in (0, 1)$ (respectively, q^b) and observes n with probability $1 - q^u$ (respectively, $1 - q^b$), where n denotes that the agent observed no information.[3] Finally, let $\Omega^c := \Omega \cup n$.

Disclosure: Let a disclosure policy be a map $\pi : \Omega^c \to \Omega^c$, where (i) for all ω, $\pi(\omega) \in \{\omega, n\}$ and (ii) $\pi(n) = n$. These restrictions imply that fabrication by the agent is impossible (i.e., the information is "hard").

Commitment: In the analysis, I vary the commitment power of the agent. I

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[3]I discuss this assumption in depth after detailing the model in the discussion portion. Further, I note that given the generality of the payoffs, this model is equivalent to one with a latent state θ, for which ω is a signal, and the agent observes ω.

say the agent has commitment, if his choice of π is observable. In contrast, I say the agent lacks commitment if his choice of π is private. This definition is equivalent to saying the agent lacks commitment if his choice of π is made after observing ω. In the discussion section below, I discuss when the commitment assumption is reasonable.

Reputation and Preferences: Denote the principal's posterior beliefs that the agent is unbiased by $\phi : \Omega^c \to [0,1]$. The preferences in Equations (1) and (2) state that both types of agent have a reputational payoff based on their perceived type and a non-image payoff based on the decision chosen. Importantly the equilibrium inference $\phi(\cdot)$ will condition on the agent's choice of $\pi(\cdot)$ for all ω when the agent has commitment, whereas without commitment it conditions on the realized value of $\pi(\omega)$ alone. Throughout, I place no restrictions on off-path beliefs for $\phi(\cdot)$.

Assumptions: Throughout, to simplify the exposition and focus on the case of interest, I impose two assumptions on the preferences.

1. $a^*(\omega) := \arg\max_{a \in A} u^p(a, \omega)$ is unique and $a^*(\omega) \neq a^*(\omega')$ if $\omega \neq \omega'$.

2. If $\lambda = 0$, the agent lacks commitment, and the unbiased agent fully reveals, then there exists a positive measure of realizations of ω that the biased agent strictly prefers to conceal.

The first assumption removes the need to discuss tie-breaking and ensures that the principal receives her first-best payoff if and only if both players fully disclose with probability one. The latter assumption introduces conflict between the players by stating that absent reputational considerations, the biased agent chooses a different disclosure policy than what is optimal for the principal. Without these assumptions, there is no conflict between the biased agent and the principal, resulting in a trivial analysis. I note that these assumptions are met in many settings (c.f. Dye, 1985; Morris, 2001; Kamenica and Gentzkow, 2011), such as if $u^p(a, \omega)$ is single-peaked at ω and $v^b(a, \omega)$ is strictly monotone in a.

I analyze Perfect Bayesian Equilibria (PBE) of this game, henceforth *equilibria*.

2.1 Discussion:

This framework asks how political-correctness concerns affect the disclosure of hard information with and without commitment. I first comment on the information generation assumption then the commitment assumption.

Information generation: I assume the biased and unbiased agents have exogenous and potentially different data-generating processes. The exogeneity assumption is standard in models of hard information (c.f. Dye, 1985). Further, this paper focuses on censorship for given information realizations, as opposed to endogenous data generation, which would require modeling data fabrication, p-hacking, and influence activities. Upon endogenizing the information acquisition stage, this would naturally lead to differential data-generating processes for the two types of agents. For instance, one micro-foundation would endogenize q^u, q^b by allowing the unbiased (respectively, biased) agent to choose q^u (respectively q^b) at a cost $c^u(q^u)$ (respectively, $c^b(q^b)$).[4] Further, differential data-generating processes is observed in qualitative discussions of self-censorship. For instance, Loury (1994) notes, "people genuinely committed to justice did not become entangled in arcane technical arguments about the effects of economic boycotts (of South Africa)." Returning to the motivating example of Professor Roland Fryer, one might think that biased social scientists have a greater interest to show that there are no racial disparities in policing, resulting in differential information acquisition.

Commitment: I assume that the agent can commit to a disclosure policy. In reality, a researcher is hardly ever bound to a disclosure policy on their own. In contrast, a third-party who received access to the data (such as the research sponsor, journal, or professional organization) may be needed to invoke such commitment. For example, if this third party can (i) forbid publications of results which are not included in the PAP and (ii) require all results stated in the PAP to be included in the analysis, then the PAP can be viewed as commitment to a disclosure policy.[5]

A different interpretation of the model is that the agent is an academic journal. The journal wants to influence a decision by the public or government (e.g., the principal) and further wants to maintain a reputation for being unbiased. Here, the realization of the state ω is determined by the research submitted to a journal, which

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[4]This form of information acquisition has been used extensively, such as in Aghion and Tirole (1997). Additional micro-foundations could result from noting that different types of individuals may consume different news sources (c.f. Gentzkow and Shapiro, 2010) and retain different information (c.f. Angelucci and Prat, 2024), potentially resulting in differential information discovery.

[5]Within the framework of Morris (2001), a researcher studying the effects of admission to an elite college may wish to disaggregate the effects by race. However, if admission overwhelmingly favors a certain race, the researcher may prefer to self-censor this finding. In this context, the commitment assumption is equivalent to stating that the researcher can include the effect disaggregated by race if and only if they stated as such in the PAP.

would naturally differ for biased and unbiased journals. In this interpretation of the model, commitment can be viewed as the recent policy enacted by the Journal of Political Economy Microeconomics, where "authors can submit their prospective empirical projects and have approved for publication before the data is collected and the results are known."

3   Results

This section analyzes how political-correctness concerns impact disclosure policies. In Section 3.1, I conduct the analysis of the disclosure game without commitment power. In Section 3.2, I consider the analysis when the agent can commit to a disclosure policy.

3.1   Disclosure:

This subsection considers the environment when the agent lacks commitment power. I first consider two examples which showcase how political-correctness concerns can stifle informative communication. I next characterize when the principal obtains her first-best payoff in equilibrium.

Example 1:   Let $\omega \in \{0, 1\}$, where $\mathbf{E}(\omega) = \mu < 1/2$. The biased agent's non-image payoff is $v^b(a, \omega) = 2a$ and the principal's utility is $\mathbf{1}_{a=\omega}$, where $a \in \{0, 1\}$. Finally, recall, p denotes the probability an agent is unbiased.

Lemma 1. *In the environment described above, for any (μ, p), there exists a positive Lebesgue-measure set of (q^u, q^b) and a finite cutoff $\lambda^1(q^u, q^b)$ such that: if $\lambda > \lambda^1(q^u, q^b)$, then $a = 0$ with probability one in any equilibrium.*

The implication of this lemma is that the principal receives no information which alters her decision away from her prior. This result may be surprising because when the agent receives information that $\omega = 1$, the biased agent, unbiased agent, and principal all prefer $a = 1$, yet this information is self-censored resulting in $a = 0$.

Let us now build intuition behind the result. When $\omega = 1$, the biased agent has a strictly larger non-image incentive to share $\omega = 1$ than the unbiased agent. If, sharing $\omega = 1$ was on path, then because $q^u < q^b$, the reputation from revelation

must be strictly worse than the prior. However, for high enough reputational weights the agents will self-censor to avoid this reputational loss. □

I now consider a continuous variant of the setting considered in Example 1 and showcase that the principal never obtains her first-best payoff, but there always exists an equilibrium with partial communication.

Example 2: Suppose ω admits a probability density function, f_ω. The biased agent's non-image payoff is $v^b(a, \omega) = 2a$, whereas the principal's utility is $u^p(a, \omega) = -(a - \omega)^2$. Finally, p remains the probability that the agent is unbiased.

Lemma 2. *Fix f_ω and recall $a(n)$ corresponds to the decision the principal takes absent any information. There exists a positive Lebesgue-measure set of (q^u, q^b, p), and a cutoff $\lambda^2(q^u, q^b, p)$ such that: if $\lambda > \lambda^2(q^u, q^b, p)$, then in any equilibrium any $\omega > a(n)$ is self-censored. Further, $\omega > a(n)$ with strictly positive probability. Finally, for any (q^u, q^b, p, λ), there exists an equilibrium where the unbiased agent fully reveals ω if $\omega \leq a(n)$.*

This lemma states that there exist information structures such that any information which would result in a higher decision taken than $a(n)$ (i.e., the decision taken following censorship) is self-censored. The intuition is identical to Lemma 1: the biased agent has a strictly greater incentive to share such information, implying a strict reputational gain from self-censorship, resulting in self-censorship for high reputational weights.

However, this proposition also states that in the continuous environment, self-censorship does not occur for all realizations. Here, for any $a(n)$, there exist realizations $\omega < a(n)$ which would motivate the principal to take a lower decision. For these states, the unbiased agent has a strictly greater incentive to share ω. As a result, the unbiased agents will truthfully reveal such information and the biased agent will either (i) not value reputation highly enough and conceal the information to get a higher decision or (ii) mix between revelation and concealment.

I now present a characterization of when the principal obtains her first-best payoff. To juxtapose with the reputational communication literature (c.f. Morris, 2001), I also discuss when communication is informative: defined as when there exists an equilibrium where the principal's payoff strictly exceeds her payoff when $\pi^u(\omega) = \pi^b(\omega) = n \ \forall \ \omega$.

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Proposition 1. *The following are true:*

1. *The principal obtains her first-best payoff in her preferred equilibrium if and only if $q^u > q^b$ and λ exceeds a finite threshold $\lambda^*(q^u, q^b)$.*

2. *Communication is informative if $q^u \geq q^b$ for any $\lambda \geq 0$. Specifically, there always exists an equilibrium where $\pi^u(\omega) = \omega$. In contrast, when $q^u < q^b$, there exist preferences and a finite cutoff $\lambda^{**}(q^u, q^b)$, where communication is uninformative if $\lambda > \lambda^{**}(q^u, q^b)$.*

To gain intuition behind the first result, note that if λ is not sufficiently high, then by Assumption 2, the biased agent does not fully disclose. Hence, assume that the reputational weight is high. If $q^u > q^b$, then in the conjectured equilibrium where all parties truthfully disclose, censorship has a strict reputational cost. As a result, both types will indeed fully disclose. However, if $q^u \leq q^b$, the principal cannot obtain her first-best payoff. If she did, then both types must fully disclose, implying self-censorship has a (weak) reputational benefit. As a result, Assumption 2 ensures that the biased type does not fully disclose, deriving a contradiction.

To gain intuition behind the second result, if $q^u \geq q^b$ and the unbiased agent is conjectured to fully disclose, then disclosure has a weak reputational benefit. This benefit combined with being unbiased implies the unbiased agent indeed fully discloses. Given that the unbiased agent full discloses independently of the strategy of the biased agent, one can use a fixed-point argument to prove the existence of a strategy for the biased agent which will be consistent with an equilibrium. Finally, if $q^u < q^b$, then as seen in Lemma 1 and Lemma 2 whether communication is informative or not for high values of λ depends on the shape of preferences.[6]

These results show that the presence of hard information alone does not mitigate political correctness incentives. Further, these concerns can be sufficiently large to result in no information transmission in equilibrium (Lemma 1). Finally, whether or not information is transmitted depends on which type of agent is more likely to be informed (Proposition 1). With soft information (c.f. Morris, 2001), the analysis is qualitatively unchanged if the agents are informed with differential probabilities because each party can falsely claim to be informed.

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[6]When λ is low, then the unbiased agent will fully disclose implying communication is informative.

3.2 Commitment:

In this subsection, I assume that the agent commits to a disclosure policy.[7] With commitment, the principal's beliefs about an agent's type are a function of both the disclosure policy and the realization of the information shared with the principal. As a result, there always exists an equilibrium where the principal conjectures that the unbiased agent fully discloses his information and that any other disclosure policy only belongs to the biased agent. This intuition is formalized in the following lemma.

Lemma 3. *For any preferences and information distributions, there always exists an equilibrium where the unbiased agent commits to fully revealing his information.*

This lemma is in contrast to (i) the results in the previous section absent commitment and (ii) the analysis with soft information, such as Morris (2001), where if reputation is sufficiently valuable communication is uninformative. Further, this lemma places a lower bound on the principal's payoff in her preferred equilibrium. The subsequent proposition further clarifies the equilibrium behavior in the principal's preferred equilibrium.

Proposition 2. *The principal's payoff in her preferred equilibrium is weakly increasing in λ. Further, there exist two thresholds $0 < \underline{\lambda}^c < \bar{\lambda}^c$ such that:*

1. *For $\lambda \leq \underline{\lambda}^c$ the unbiased agent fully discloses his information and the biased agent chooses his privately optimal disclosure policy with commitment.*

2. *For $\lambda \in \left(\underline{\lambda}^c, \bar{\lambda}^c\right)$, the principal's payoff is strictly greater than the payoff she receives when $\lambda \leq \underline{\lambda}^c$, but is strictly less than her payoff when $\lambda \geq \bar{\lambda}^c$.*

3. *For $\lambda \geq \bar{\lambda}^c$, the principal obtains her first-best payoff.*

The intuition for this proposition is that the principal's first-best payoff is obtained if and only if the biased agent would prefer to fully disclose his information and maintain a positive reputation as opposed to deviating and selectively disclosing, resulting in the worst possible reputation. The inequality corresponding to this deviation results in the cutoff $\bar{\lambda}^c$. When λ is slightly below $\bar{\lambda}^c$, the following is an equilibrium: the unbiased agent continues to fully disclose with probability one, whereas the biased

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[7]The proofs of the results are qualitatively identical if instead the agent could commit to any experiment, instead of simply a disclosure policy, such as in Kamenica and Gentzkow (2011).

agent utilizes a mixed strategy. Here, with probability p he chooses full disclosure and with probability $1 - p$ he chooses his preferred policy when $\lambda = 0$. A lower value of p increases the reputation following full disclosure, therefore for λ close enough to $\bar{\lambda}^c$, there exists a unique p that makes the biased agent indifferent between full disclosure and the optimal disclosure-policy absent reputation.[8] Finally, when the reputational incentives get sufficiently small, each type of agent must choose his privately-optimal policy. For the unbiased agent, this is full disclosure and Assumption 2 ensures that the biased agent chooses a partial-disclosure policy.

This subsection proves that when there is commitment in the disclosure policy, political-correctness concerns by the agents helps the principal. Further, if political-correctness concerns are high enough, then all information is fully revealed.

4   Conclusion

This paper presents a model in which a possibly biased agent decides whether to disclose information about an unknown state of the world, aiming to both maintain a reputation for being unbiased and to influence a decision. Further, I contrast the equilibrium disclosure polices when the disclosure decision is made before observing the information (agent has commitment) to when this decision is made after observing the information (agent lacks commitment). If the agents did not value reputation, commitment has no effect on the incentives of the unbiased agent, because he always prefers to truthfully reveal his information. However, commitment allows the biased agent to more selectively reveal his information (c.f. Kamenica and Gentzkow, 2011). These results suggest that commitment hurts the principal when reputational incentives are low.

When reputational incentives are high, the paper shows that commitment may benefit the principal. When the agent can commit, the principal can conjecture that the unbiased agent fully discloses and that any other disclosure policy is chosen by only the biased agent. As a result, when the reputational weight is high, both agents will choose full disclosure. Crucial to this argument, is that selective disclosure is both verifiable by the principal and off path, ensuring that such deviations are met

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[8]This equilibrium is a lower bound for the principal's payoffs. There may there may exist a fully-pooling equilibrium such that (i) neither agent would prefer to deviate from this policy and (ii) the principal prefers this policy to the one outlined in the text.

with pessimistic reputational beliefs. In contrast, without commitment, selective disclosure can not be verified and is met with the same reputation as an agent who did not discover information. Further, if the unbiased agent is less likely (respectively, more likely) to discover information than the biased agent, failure to disclose increases (respectively, decreases) the agent's reputational payoff. In this case, the principal's payoff remains bounded away from her first-best payoff for any reputational weight if and only if the biased agent is more likely to obtain information. Taken together, these results imply that commitment by the agent weakly improves the principal's payoff when reputation is valuable and strictly so if the information is more likely to be generated by a biased agent.

This analysis suggests revisiting seminal papers with reputational preferences is valuable. For instance, in this paper, informational discovery was fixed and exogenous. However, these reputational preferences may discourage information discovery, which generates new insights on the optimality of delegation for information discovery (cf. Aghion and Tirole, 1997). Additionally, one could consider how these reputational preferences will lead to different optimal delegation sets (cf. Szalay, 2005; Alonso and Matouschek, 2008). Finally, one can consider the effects of reputation on other forms of communication such as costly communication (cf. Dewatripont and Tirole, 2005) or hierarchical communication (cf. Garicano, 2000).

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Appendix

Denote $\tilde{\pi}^u(\omega) = P(\pi^u(\omega) = \omega)$, $\tilde{\pi}^b(\omega) = P(\pi^b(\omega) = \omega)$. Further, denote $\delta(\omega) = \mathbf{1}_{\tilde{\pi}^u(\omega)+\tilde{\pi}^b(\omega)>0}$, namely whether ω is disclosed on path.

Proof of Lemma 1. Note that if q^u and q^b are sufficiently low, then given that $\mu < 1/2$, $a(n) = 0$. Further $a(0) = 0$. Hence, it suffices to show that if $\delta(1) = 1$, then $\phi(1) < \phi(n) - \epsilon$, for $\epsilon > 0$, which would derive a contradiction for $\lambda > 2/\epsilon$.

If $q^u < q^b$, then in any equilibrium,

$$\phi(1) \le \frac{pq^u}{pq^u + (1-p)q^b} < p - \epsilon, \tag{3}$$

for $\epsilon > 0$ because, as argued in the text, $\delta(1) = 1 \implies \tilde{\pi}^b(1) = 1$.

Therefore it suffices to show that $\phi(n) \geq p$. Suppose by contradiction $\phi(n) < p$. By Bayes rule, then $\delta(0) = 1$ and $\phi(0) > p$. Therefore, $\phi(0) > \phi(n)$ and $a(0) = a(n)$, implying $\tilde{\pi}^u(0) = \tilde{\pi}^b(0) = 1$. As $q^u < q^b$ then $\phi(0) < p$, deriving a contradiction. $\square$

Proof of Lemma 2. Fix (q^u, q^b, p) where $q^u < q^b$; I first show that $\omega > a(n)$ are self-censored for sufficiently high λ. As in Lemma 1, it suffices to show (i) $\phi(\omega) < p - \epsilon$ for $\epsilon > 0$ and (ii) $\phi(n) \geq p$. (i) holds because $q^u < q^b$ and the biased agent has a strictly larger incentive to share $\omega > a(n)$.

Now it suffices to show (ii) holds for a sufficiently large λ. To see why this occurs, note that for any $\omega < a(n)$, if $\delta(\omega) = 1$, then $|\phi(\omega) - \phi(n)| \leq \frac{c}{\lambda}$, where c is an exogenous constant determined by the maximum loss between two decisions for any two states. Therefore, by Bayes' rule $\phi(n) > p$ for λ sufficiently high. As a result, there must exist a cutoff above which these states must be self-censored.

I now show that there always exists an equilibrium where $\pi^u(\omega) = \omega$ if $\omega < a(n)$. I claim that given two values $a(n), \phi(n)$ there exists a best-reply determining behavior at any given ω which will constitute an equilibrium if the resulting $a(n), \phi(n)$ from this best-reply is equal to the conjecture. Note that, in general, this best-reply need not be unique, and the construction below will select a best-reply that results in an equilibrium with the desired properties.

If $\omega \leq a(n)$, then $\tilde{\pi}^u(\omega) = 1$ and $\tilde{\pi}^b(\omega)$ is uniquely determined by $a(n), \phi(n)$. $\tilde{\pi}^b(\omega)$ is unique because an increase in $\tilde{\pi}^b(\omega)$ results in a strictly lower incentive to reveal as $\phi(\omega)$ would decrease.

If $\omega > a(n)$ and $a(n), \phi(n)$ are fixed, then the best reply is chosen as follows. If neither party prefers to deviate when $\tilde{\pi}^u(\omega) = \tilde{\pi}^b(\omega) = 1$, then $\tilde{\pi}^u(\omega) = \tilde{\pi}^b(\omega) = 1$ is chosen. If there exists a profitable deviation, note that this deviation must come from the unbiased agent. In this case we construct a best-reply as follows. $\tilde{\pi}^u(\omega) = 0$ and $\tilde{\pi}^b(\omega) \in [0, 1]$. Given $\tilde{\pi}^u(\omega) = 0$, as argued in the paragraph above, $\tilde{\pi}^b(\omega)$ is uniquely determined. It suffices to check that the unbiased agent indeed prefers to self-censor. However, the unbiased agent preferred to self-censor when $\tilde{\pi}^u(\omega) = \tilde{\pi}^b(\omega) = 1$ (i.e., $\phi(\omega) > 0$), implying they would also prefer to self-censor when $\tilde{\pi}^u(\omega) = 0$ (i.e., $\phi(\omega) = 0$).

These best-replies determine an equilibrium if and only if the resulting $a(n), \phi(n)$ are consistent conjectures in equilibrium. Hence, an equilibrium exists if and only if there exists a fixed-point of the function mapping conjectures of $a(n), \phi(n)$ into

resulting actions and beliefs given these conjectures. As this mapping is smooth (given the continuous state space and continuous utility functions), then there exists a fixed-point and hence an equilibrium exists with the desired properties. □

Proof of Proposition 1. I begin by proving that if $q^u \leq q^b$ the principal never obtains her first-best payoff. Suppose not, implying for all ω, $\tilde{\pi}^u(\omega) = \tilde{\pi}^b(\omega) = 1$. Here, $q^u \leq q^b \implies \phi(\omega) \leq \phi(n)\forall\omega$. Further, Assumption 2 implies that when $\lambda = 0$, the biased agent has a strict incentive to conceal. Finally, the weak reputational benefit from concealment implies the biased agent has a profitable deviation, resulting in a contradiction.

Next, I show the existence of an equilibrium where $\tilde{\pi}^u(\omega) = 1\forall\omega$ if $q^u = q^b$. In this equilibrium, $\phi(\omega) \geq \phi(n)\forall\omega$, implying the unbiased agent indeed reveals. Further, using an identical fixed-point argument to Lemma 2, there exists a strategy for the biased agent that is consistent with an equilibrium. Finally, this fixed point argument need not rely on a continuous state space as the strategy of the biased agent is continuous with respect to the conjectures given that the unbiased agent always reveals.

I now prove statement 2. Note the principal obtains her first best payoff if and only if neither agent has a deviation when $\tilde{\pi}^u(\omega) = \tilde{\pi}^b(\omega) = 1\forall\omega$. As $q^u > q^b$, $\phi(n) < \phi(\omega)\forall\omega$, implying that the unbiased agent indeed reveals. Let us now consider the incentives of the biased agent. In this conjectured equilibrium, $a(n), a(\omega), \phi(n), \phi(\omega)$ are independent of λ and $\phi(\omega)$ is also independent of ω. Therefore, this conjectured equilibrium is an equilibrium if and only if

$$\max_{\omega}\{v^b(a(n),\omega) - v^b(a(\omega),\omega)\} \leq \lambda\big(\phi(\omega) - \phi(n)\big), \tag{4}$$

resulting in the cutoff described in the proposition. □

Proof of Lemma 3. Suppose the unbiased agent chooses to fully reveal and conjecture that any other disclosure policy leads to the principal assigning probability one to the biased agent. Given such beliefs, the unbiased agent, irrespective of the strategy of the biased agent, has a strict incentive to fully disclose.

Given such beliefs, the biased agent's strategy must place positive probability on only (i) fully revealing or (ii) choosing his preferred revelation policy absent reputational forces. Denote the conjectured probability the biased agent fully reveals by

$\tilde{p}^b$. An equilibrium exists if and only if the best response to a given conjecture is equal to the conjecture itself. However, the best response is decreasing (due to the reputation considerations) in $\tilde{p}^b$. If neither 1 nor 0 are consistent conjectures, then the decreasing best response implies that an intermediate value must be a consistent conjecture, proving the existence of an equilibrium. □

Proof of Proposition 2. The principal obtains her first-best payoff if and only if $\tilde{\pi}^u(\omega) = \tilde{\pi}^b(\omega) = 1$ for all but a measure-zero set of ω. Further, this equilibrium is supported by off-path beliefs that any other disclosure rule is chosen by the biased agent. In this conjectured equilibrium, the unbiased agent has no gain from deviating. Additionally, the biased agent's optimal deviation is to his optimal revelation policy absent reputation. Therefore, the non-image gain from deviation is independent of λ, and the reputational loss is linear with respect to λ, resulting in the cutoff $\bar{\lambda}^c$.

Next, I prove monotonicity of the principal's payoff in her preferred equilibrium with respect to λ. As there are only two types of agent, it suffices to consider equilibria where at-most two disclosure policies are chosen on path. If for a fixed value λ, only one disclosure policy is chosen or both chosen policies result in identical payoffs for the principal, then this equilibrium will remain an equilibrium for higher values of λ. Thus, let us consider when two policies that result in different payoffs are chosen on path for a fixed λ. There are two cases:

Case 1: The unbiased agent mixes. Let policy 1 be the one that the principal prefers. There are three subcases. (i) The biased agent chooses policy 1 with probability 1. Then one can construct an alternative equilibrium where policy 1 is chosen by both agents with probability 1. That neither agent deviated when policy 1 had a worse reputation, implies neither party will deviate under the alternative equilibrium. (ii) The biased agent chooses policy 2 with probability 1. This cannot occur as the unbiased agent gets a better non-image payoff and reputation under policy 1. (iii) Both agents mix. As policy 1 confers a greater non-image utility to the unbiased agent, policy 2 must confer a better reputation. For the biased agent to mix, the biased agent must also prefer policy 1. As a result, both players choosing policy 1 with probability 1 is an equilibrium if and only if neither party prefers to deviate to a policy which was off path in the original equilibrium. However, now the reputation following policy 1 is larger, implying that such deviations are deterred in the new equilibrium.

Case 2: The unbiased agent selects policy 1 with probability 1. Again there are

two subcases, as we assumed that two policies are chosen on path. (a) If the biased agent chooses policy 2 with probability 1, then policy 1 must be full revelation and policy 2 the biased agent's preferred policy absent reputation. Now following an increase in λ, the biased agent will either continue selecting policy 2 or mix between the two, proving the result. (b) The biased agent mixes between policy 2 and policy 1. Therefore, policy 2 must be the policy the biased agent prefers absent reputational considerations. Note that policy 1 must be strictly preferred to policy 2 by the principal, else by Lemma 1, the principal could have the unbiased agent fully disclose. However, now following an increase in λ, there are two subcases. (i) If policy 1 is the principal's preferred policy (e.g., full disclosure) then the biased agent following an increase in λ chooses this policy more and the unbiased agent has no deviation temptation. (ii) If this policy is not the principal's preferred policy, then upon increasing λ one can maintain the probability that the biased agent chooses policy 2, by changing policy 1 to be the appropriate mix between the old policy 1 and fully disclosure. To check if this is an equilibrium, one must check the deviation temptation for the unbiased agent. However, that the unbiased agent did not deviate for the lower value of λ, implies he will not in this new candidate equilibrium because the reputational cost from doing so is strictly higher and the new on-path policy provides a strictly greater non-image payoff.

Finally, I must prove the existence of $\underline{\lambda}^c$. As the principal's payoff is monotone in λ, it suffices to show that there exists a threshold for which no pooling or partially pooling equilibrium exists. Suppose that both the biased and unbiased agent choose the same disclosure policy. For any such policy, one agent must have a different disclosure policy which provides a strict improvement in their non-image payoff (by Assumption 2) by a fixed constant ϵ. Thus, for $\lambda < \epsilon$, even for the maximal possible difference in reputation, one of the types of agents would prefer to deviate to their preferred disclosure policy absent reputation.

□