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Credibility for Sale – the Effect of Disclosure on Information Acquisition and Transmission*

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Abstract

We study the effect of disclosure on information acquisition and transmission in a dynamic reputation model. In each period, to make a report to a client, an expert chooses between conducting a costly investigation or channeling a message from an interest group. We show that not disclosing the source of the expert's report may *increase* the frequency of investigation by the expert. Nevertheless, it *decreases* the quality of the clients' decisions We demonstrate that, however, when the importance of decisions vary across time, when the interest groups are long-lived, or when the expert's clientele is growing in her reputation, nondisclosure may improve the quality of the clients' decisions.

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> [O]ver the past decade, it's become clear that interactions between medical device companies and surgeons often involve substantial payments, taking the form of consultant fees, educational grants, royalties, funding for clinical trials, travel and gifts. ... It's not hard to see that these financial relationships create conflicts of interest, and can exert inappropriate influence over medical decisions. ... If these physicians are essentially putting their medical judgment up for sale, where does the patient's well-being fit into the equation?
>
> Statement of Senator Herb Kohl, February 27, 2008

> The public is misled by individuals who present themselves to be independent, unbiased experts or reporters, but are actually shills promoting a prepackaged corporate agenda. ... Shoddy practices make it difficult for viewers to tell the difference between news and propaganda.
>
> Statement of FCC Commissioner Adelstein, August 14, 2006

1 Introduction

In June and July 2008, the New York Times reported that three prominent psychiatrists at the Harvard Medical School and its affiliated Massachusetts General Hospital, Drs. Joseph Biederman, Timothy E. Wilens, and Thomas Spencer, have underreported the consulting fees they have received from drug companies by amounts of one million dollars or more. The case was brought to light by a congressional investigation initiated by Senator Charles Grassley of Iowa. The issue is particularly controversial because the Harvard group's research has helped to popularize the use of certain potent antipsychotic drugs, affecting the profits of the industry that has paid the consulting fees.[1]

We do not have to look far to find plenty of other high-profile cases in which different types of opinion makers - researchers, consultants, investigative reporters, and policy makers - fail to disclose either a conflict of interest or direct influence on

[1] See the reports in the New York Times on June 8, 2008, [40], and July 12, 2008, [13].

their reports by a third party.[2] Revelations about such conflicts of interests usually trigger some form of investigation by a regulator, often followed by a policy initiative or an enforcement action intended to improve disclosure or prevent payments from third parties to opinion makers. It is a simple and natural regulatory response.[3] On the other hand, the industry usually opposes these initiatives, citing a variety of reasons, including potential for market self-regulation as well as possible distortions and negative externalities created by the regulatory intervention.

In this paper, we want to clarify whether stricter disclosure of opinion makers' interests and sources of reports can help improve the quality of the decisions made by the public and, if so, under which conditions. There are three components to our analysis. First, at a cost, the expert may use their training and prior knowledge to *acquire* and distill information relevant to the specific circumstances of their clients or audience. Second, instead of information acquisition, experts may take favors from interested groups and promote their agenda.[4] Third, *reputation concerns* are what keeps the experts from acting myopically and ill serving their clients. We model reputation concerns, in the spirit of Kreps and Wilson [45] and Milgrom and Roberts [52], by introducing a *truthful* type who always conducts an independent investigation and reports her findings truthfully.

The interaction of these factors creates an effect that might have been overlooked in the debate over stricter disclosure policy: the option to receive a payment from

[2] In April 2008, the New York Times [7] reported that a number of former military officers, who served as TV military analysts or contributors to newspaper opinion pages, had received paid trips and special privileges from the Pentagon; these former officers made statements about the progress of the Iraq war, without disclosing their current relationship with the Pentagon.In November 2007, the Washington Post revealed that manufacturers of toys, home appliances, and fireworks had repeatedly paid in full or in part for trips of the present and the former chiefs of the Consumer Product Safety Commission. In 2006, two studies by a media watchdog organization, Center for Media and Democracy, [28], [29], uncovered TV stations' "widespread and undisclosed" use of video news releases prepared by public relations firms that are hired by corporations and government agencies.

[3] In the case of drug companies and medical device manufactures, Senators Charles Grassley and Herb Kohl have introduced legislation, Physician Payment Sunshine Act, to require manufacturers of pharmaceutical drugs, devices, and biologics to disclose direct and indirect payments and gifts they give to doctors and researchers. In the case of the Consumer Product Safety Commission, a group of senators have indicated their support for a legislation to ban travel paid-for by the industry. In the case of TV stations, the Federal Communication Commission has issued a fine to the Comcast broadcasting company for the failure to disclose the source of its news.

[4] Our use of the phrase "interest group" is broader than the conventional one, for example, that by Grossman and Helpman [39]. In addition to its apparent political annotation, we also use it to refer, for example, to drug companies in their dealing with doctors.

a third party for distorting information, available under nondisclosure, increases the value of reputation building for the expert, potentially leading to more information acquisition in equilibrium. This is because the third party is only willing to pay an expert if she can sway public opinion and an expert is only able to sway public opinion if she is reputable enough. As a result, although it is true that in the absence of disclosure a reputable expert faces steeper incentives to cash in and distort her reports, the expert also has stronger incentives to build reputation through acquiring and reporting useful information in the first place.

This observation raises the question of whether the stronger incentives to build reputation in the absence of disclosure result in higher probability of correct actions by the public. The difficulty is that more information acquisition under nondisclosure may not translate into better choices because the public might not want to follow the expert's recommendations until the expert reaches high reputation.

We find that the net effect of nondisclosure on the quality of the decisions by the public could go either way: In the basic setup of our model, with stakes constant across time and a short-lived interest group, the quality of decisions by the client *decreases* under nondisclosure. At the same time, we point out a number of factors that might lead to a positive effect of nondisclosure: clientele growing in reputation, variable stakes of the interest group, and a long-lived interest group.

To the best of our knowledge, our paper is the first to study the reputation of experts in a repeated-games framework which considers both information acquisition and information transmission. In a sense, we make the bias of the expert endogenous by allowing her to be captured by an interest group. We also make a technical contribution by providing a procedure that yields an *explicit* characterization of the (stationary Markov perfect) equilibrium for any discount factor, which allows for better understanding of the parties' behavior and provides sharp comparative statics results. Our work is most related to the classic work of Sobel [64] and a forthcoming paper by Durbin and Iyer [23]. We compare our paper with these and other existing papers in more detail in Section 5.

The rest of the paper is organized as follows. In Section 2, we study the benchmark model. In Section 3, we consider three extensions of the basic model: variable stakes of the interest group, long-lived interest group, and clientele that increases in the expert's reputation. In Section 4, we look at the role of the assumption about the existence of the truthful (behavioral) type in our model and investigate two possible alternatives. In Section 5, we review related literature. In Section 6, we conclude. Some of the results and proofs are provided in the appendix.

2 Benchmark model

In this section, we present the basic model and characterize its equilibria. In particular, we compare the properties of equilibria depending on whether the source of the expert's report is disclosed.

2.1 Model

There are three players: an expert (she), a client (he), and an interest group (it). There are infinitely many periods. The expert is a long-lived player with a discount factor $\delta \in (0, 1)$. The client and the interest group are short-lived players; they maximize their current period payoff. The interpretation of this assumption is that the expert faces different clients and interest groups each time or that the client and the interest groups are myopic and are not concerned about future interaction.[5]

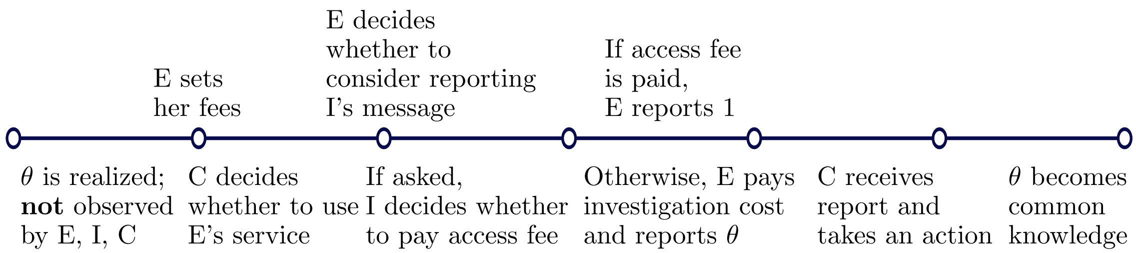

Figure 1: Timing of the stage game. Notation: E – the expert, C – the client, I – the interest group. If the client does not pay the service fee to the expert, he does not receive any report from the expert and takes optimal action given his prior.

The timing of the game played in each period is as follows (see Figure 1). First, at the beginning of each period, the state of nature, θ, is realized. The state is a random variable taking a value of either 0 or 1 and is independent across periods. Let q be the probability of $\theta = 1$. We assume that

$$q < 1/2.$$

The state is not immediately observable to the expert, the client, or the interest group.

After the state is realized, the expert announces a service fee, ϕ, upon which the client decides whether to pay the fee and use the expert's service. If the client pays the fee, the expert provides a report to the client. She can obtain the report from two sources. First, it can obtain a report through investigation at cost c, which yields the

[5]In Section 3.2, we investigate what happens if the interest group is long-lived.

true state with certainty. Alternatively, it can charge the interest group an access fee, α, and engage in propaganda by choosing the report prepared by the interest group.[6] After the client observes the report, he takes an action $y \in \{0, 1\}$. We will consider two versions of the game, with and without mandatory disclosure of the source of the report to the client.

If the client does not use the expert's service, then he bases his action only on his prior beliefs. At the end of each period, all players observe the true state, and the current-period payoffs are realized. We also assume that beliefs about the credibility of the expert are perfectly passed on to future generations of short-lived players.

The action taken by the client affects both his own and the interest group's payoff. The client prefers the action that matches the state of the nature and his utility function U can be expressed as

$$U(y, \theta) \quad = \quad \begin{cases} 1, & y = \theta; \\ 0. & \text{otherwise}, \end{cases}$$

The interest group prefers high actions and its utility function $\tilde{U}$ can be expressed as

$$\tilde{U}(y) \quad = \quad \lambda y,$$

where $\lambda \geq 0$ measures the interest group's stake on the issue. We assume, naturally, the interest group always reports high state when approached by the expert. We interpret it as deliberately assembled evidence in support of high action.

We also assume that both the client and the interest group's preferences are quasilinear in money. Therefore, their payoffs are the utility functions defined as above minus any fees they pay to the expert. The expert is not affected by the client's action and maximizes her revenue from service fees and access fees net of the costs of investigation.

We follow the adverse-selection approach to reputation. To model the expert's credibility, we introduce the possibility of a truthful type which always chooses investigation. We further assume that this type will set the same fees as the strategic

[6] In reality, besides monetary payments, an expert can implicitly benefit from privileges, access, etc. For example, former generals described the treatments they received from the Pentagon in "information sessions": "the uniformed escorts to Mr. Rumsfeld's private conference room, the best government china laid out, the embossed name cards, the blizzard of PowerPoints, the solicitations of advice and counsel, the appeals to duty and country, the warm thank you notes from the secretary (of defense) himself." (See [7].)

type.[7] It is commonly known that the expert is of the truthful type with probability $p_1 \in (0, 1)$. We call p_1 the prior reputation of the expert. The reputation of the expert in period t is the probability with which the client believes it to be of the truthful type, denoted by p_t.

We view the truthful type as a modeling shortcut that helps us avoid issues not central to our analysis. In Section 4.1, we replace the truthful type by a strategic (payoff) type who has a lower cost of investigation. We show that for some cost parameters there exist equilibria observationally equivalent to the equilibria in the model with the truthful type.

Later on, we show that the presence of a truthful type affects the behavior of the parties, though it does not affect the strategic expert's profits when her initial reputation is low. In particular, whenever the fees that can be collected by the expert are smaller than the cost of investigation, information acquisition is impossible in the model without the truthful type,[8] while it is possible with that type.

Our solution concept is stationary Markov perfect equilibrium, in which the Markov state is the client's belief about the type of the expert. In this equilibrium, the past play may influence the future play only through the expert's reputation; the players' actions must be independent of the other aspects of the history. The equilibrium is stationary because the actions do not depend on the length of history either.[9] Finally, we focus on equilibria in which the expert sets the service and access fees equal to the maximum willingness to pay of the parties. We will demonstrate that equilibria that satisfy these conditions exist.

2.2 Disclosure

We start with analysis of the benchmark model in which the source of the report is disclosed to the client. Our main interest is in the equilibria in which the expert investigates with the highest probability so the client's decision is most likely to be correct.

Imagine that in equilibrium the strategic expert investigates with probability 1. Hence, the client will always take the correct action and achieve a payoff of 1 if he

[7] Alternatively, one can assume that there is a set of types with every possible pricing strategy, all of which are committed to investigation. Then, in each equilibrium the non-truthful type mimics one of these commitment types.

[8] This result is shown in Section 4.2.

[9] See Section 5.5.2 of Mailath and Samuelson [50] for a definition of stationary Markov perfect equilibrium. Although the game we study does not belong to the class of games considered therein, their definition extends straightforwardly to our setting.

uses the expert's service. On the other hand, the client will obtain a payoff of $1-q$ if he forgoes the expert's service and takes an action according to his prior beliefs. In equilibrium, the expert will charge the service fee equal to the difference of these payoffs, q. Then, her expected payoff equals

$$v \quad = \quad -c+q+\delta v = \frac{-c+q}{1-\delta}.$$

If the expert deviates and does not investigate, she will save the cost c, but has to take the report from the interest group. Furthermore, because of disclosure this deviation will be observed by the client. The strongest punishment for this deviation is the continuation equilibrium in which the client ignores the reports of the expert and the expert never investigates and thereby obtains the payoff of 0. Hence, the expert will find it optimal to investigate with probability 1 if and only if $c \leq \delta v$ or, equivalently, if the discounted value of the service fee is greater than the cost of investigation, $c \leq \delta q$.

Lemma 1. *There exists an equilibrium in which the expert always chooses investigation on the equilibrium path if and only if $c \leq \delta q$.*

If $c \geq \delta q$, the cost of investigation is greater than the maximal benefit from investigation, making it optimal for the expert to always choose propaganda.

Lemma 2. *There exists an equilibrium in which the expert always chooses propaganda if and only if $c \geq \delta q$. Furthermore, there is no equilibrium in which the expert chooses investigation with non-zero probability if $c > \delta q$.*

Proof. The proof of existence is straightforward. Let us prove uniqueness. Denote by v_t the continuation payoff of the expert in period t. Consider an expert with zero reputation, on or off the equilibrium path, in period t. As long as she investigates with a positive probability, her reputation will remain zero regardless of her choice and the realized state. Therefore, she would strictly prefer propaganda to investigation. Hence, in equilibrium, she must investigate with probability zero and collect zero fees. This behavior is supported by (out of equilibrium) beliefs about the type of the expert that are never revised after the expert has revealed herself to be strategic. Hence, $v_t = 0$ if the expert is believed to be strategic.

Now consider an expert with positive reputation. Imagine that she chooses investigation in the current period t. If she never chooses propaganda in the future, then $v_{t+1} \leq \frac{q-c}{1-\delta}$. If she chooses propaganda in period $t+k+1$ and investigation in the prior periods, then $v_{t+k+2} = 0$ and $v_{t+1} \leq \frac{1-\delta^k}{1-\delta}(q-c) + \delta^k q$. In either case, we have $-c + \delta v_{t+1} < 0$. □

2.3 No disclosure

We now turn to the model in which the source of the report is not disclosed to the client. Similar to the model with disclosure, if the cost of investigation is sufficiently low, there is an equilibrium in which the expert always chooses investigation. Let

$$c_* \quad = \quad \frac{\delta(1-q)q}{1-\delta q} - \frac{\lambda(1-q)(1-\delta)}{1-\delta q}.$$

Lemma 3. *There exists an equilibrium in which the expert always chooses investigation on the equilibrium path if and only if $c \leq c_*$.*

Proof. The proof is straightforward and is skipped. □

Observe that c_* is increasing in δ. Hence, similar to the model with disclosure, perpetual investigation becomes sustainable for a larger set of costs as the expert becomes more patient. At the same time, $c_* < \delta q$, implying that perpetual investigation is feasible for a smaller set of costs under no disclosure than under disclosure. This is because without disclosure a deviation of the expert to propaganda remains undetected whenever $\theta = 1$, making it more difficult to provide incentives for the expert to choose investigation.

On the other hand, if the cost of investigation is sufficiently high, there is a unique equilibrium with propaganda. Let

$$c^* \quad = \quad \frac{\delta(1-q)q}{1-\delta q} + \frac{\delta\lambda(1-q)^2}{1-\delta q}.$$

Lemma 4. *There exists an equilibrium in which the expert always chooses propaganda if and only if $c \geq c^*$. This equilibrium is unique if $c > c^*$.*

Proof. The proof of existence is straightforward. The proof of uniqueness is analogous to the proof in Lemma 2 and is skipped. □

Consider now an environment in which the cost of investigation is medium,

$$c_* < c < c^*.$$

Observe that c_* is decreasing in λ, and c^* is increasing in λ and therefore the range of costs that satisfies this condition is also increasing in λ.

In this environment, there is no equilibrium in which the expert chooses investigation with probability 1. Nevertheless, as Proposition 1 below demonstrates, there exists an equilibrium in which the expert chooses investigation with a positive probability. Furthermore, the equilibrium is essentially unique. In this equilibrium, the strategic expert randomizes between costly investigation and propaganda whenever her reputation is low and non-zero. Costly investigation increases the future reputation of the expert and, as a result, the expected future revenue from the fees collected from the client and the interest group. In equilibrium, the current cost of investigation is equal to the additional revenues expected in the future, which makes randomization an equilibrium action. After the expert reaches high reputation, she stops acquiring information and delivers reports received from the interest group.

We construct the equilibrium as follows. Let p denote the expert's reputation, $r(p)$ the probability with which the client believes this expert chooses costly investigation, and $v(p)$ the expert's expected payoff. Furthermore, denote by $v^1(p)$ and $v^0(p)$ the continuation payoff of the expert in the next period if she provides a correct report in high and low state respectively. Finally, note that the payoff of an expert with reputation 0 is 0.[10]

Now, consider the incentives of the expert deciding between propaganda and investigation. If the expert chooses propaganda, then she receives the access fee from the interest group for the current period, $\alpha(p, r)$. Therefore, the benefit from propaganda, net of the sunk service fee, is the sum of the access fee and the discounted continuation payoff after making a correct report in the high state,

$$\mathcal{P}(p, r) \;\; = \;\; \alpha(p, r) + \delta q v^1(p).$$

On the other hand, if the expert chooses investigation, she gets no access fee and incurs the cost of investigation, c. Therefore, the benefit from investigation is

$$\mathcal{I}(p, r) \;\; = \;\; -c + \delta q v^1(p) + \delta(1-q)v^0(p).$$

Hence, the net benefit of investigation *relative* to propaganda is the discounted value of reputation after state 0 minus the investigation cost and the access fee,

$$\mathcal{L}(p, r) \;\; = \;\; -c - \alpha(p, r) + \delta(1-q)v^0(p).$$

Next, we demonstrate that if the expert's reputation is sufficiently high, $p > p^*$, the net benefit of investigation is negative and the expert will always choose propaganda. This is done in two steps. First, we can bound from above the value of payoff v^0. In the meantime, for the expert with a high reputation, the value of the

[10] This observation follows from an argument analogous to the one the proof of Lemma 2.

access fee is very high, $\alpha(p,r) = \lambda(1-q)$, which makes investigation unattractive. This is ensured by the assumption $c > c_*$.

If the expert's reputation is low, $p < p^*$, she must mix and hence be indifferent between investigation and propaganda, $\mathcal{L}(p,r) = 0$. Again, this can be shown in two steps. First, it cannot be that the expert always chooses propaganda. This is ensured by the assumption $c < c^*$ and the continuation utility at reputation one, as we have shown above that a reputation-one expert always chooses propaganda. Next, it cannot be that the expert always chooses investigation: if this were the case, her reputation would not change over time and her payoffs from investigation and propaganda would be the same as those of the expert with reputation one; yet, the expert with reputation one never chooses investigation in equilibrium.

We construct the rest of the equilibrium recursively. We know the behavior of the expert with high reputation and hence the continuation payoff v^0 for all $p \in (p^*, 1]$. This allows us to find pairs of p and r satisfying $\mathcal{L}(p,r) = 0$ for some interval $p \in ((p^*)^2, p^*]$. Next, we calculate the continuation payoffs for the expert with reputation in this interval. This allows us to find pairs of p and r satisfying $\mathcal{L}(p,r) = 0$ and continuation payoffs for another interval, and so on.

We now describe the value of reputation in equilibrium. Let

$$w \;=\; \frac{\delta(1-q)}{1-\delta q}.$$

and assume that $p \in ((p^*)^{n+1}, (p^*)^n)$ for some $n \in \{0, 1, \dots\}$.[11] Then, the payoff of the expert equals

$$v(p) \;=\; \max\left\{ -\frac{c}{1-\delta q}\frac{1-w^n}{1-w} + w^n \frac{\left(\frac{p}{(p^*)^n} + \lambda - 1\right)(1-q) + q}{1-\delta q}, 0 \right\}. \qquad (1)$$

The value of $v(p)$ is depicted in Figure 2.

In order to state the probability of investigation in the equilibrium, let $\tilde{p}$ be the lower bound of the reputation levels for which the continuation payoff is strictly positive and $\overline{n}$ be the largest integer for which $v(p) > 0$ and $p \in ((p^*)^{\overline{n}+1}, (p^*)^{\overline{n}})$. In equilibrium, the expert's payoff is 0 if her reputation is less than or equal to $\tilde{p}$ and positive otherwise. The value of $\overline{n}$ is the equilibrium number of successes in low state which are required for the expert with reputation $p \leq \tilde{p}$ to convince the client to

[11] If $p = (p^*)^n$, $n \in \{1, \dots\}$, the payoff depends on the probability with which the client follows the expert's reports if her reputation is $p = p^*$. There could be multiple equilibria which differ in this probability; we describe the set of probabilities for which the equilibrium exists in the body of the proof of Proposition 1.

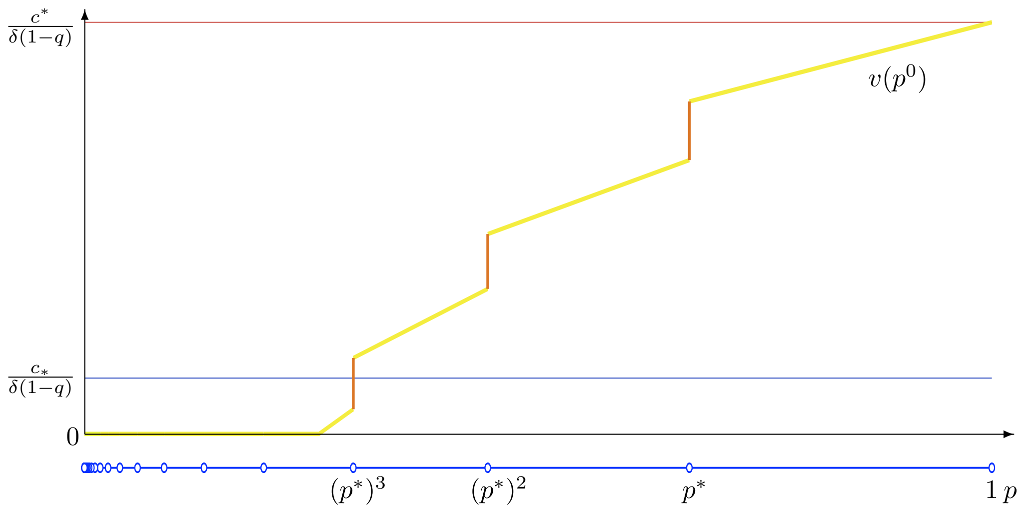

Figure 2: The horizontal axis represents the reputation. The vertical axis represents the expert's payoff. The parameters are: $q = \frac{1}{4}$, $c = \frac{7}{20}$, $\delta = 0.95$, $\lambda = 1.4$.

pay positive service fees and follow her reports. In equilibrium, the expert chooses investigation with probability

$$r(p) = \begin{cases} 0, & \text{if } p \geq p^*; \\ \frac{p^*-p}{1-p}, & \text{if } \tilde{p} \leq p < p^*; \\ \frac{p}{1-p}\frac{p^*-\tilde{p}}{\tilde{p}}, & \text{if } p < \tilde{p}. \end{cases} \tag{2}$$

In particular, if the expert's initial reputation is low, $p_1 < \tilde{p}$, her reputation will jump up to some value $p \in [\tilde{p}, \tilde{p}/p^*]$ after the first truthful report in low state. After that, the reputation will grow exponentially increasing with each truthful report in low state from p to p/p^*, until it reaches p^*.

Proposition 1. *Let $c_* < c < c^*$. There exists an equilibrium. Furthermore, in any equilibrium, (1) and (2) are satisfied. In addition, there exists an equilibrium in which (1) and (2) are satisfied if $c = c^*$.*

Proof. See the appendix. □

2.4 Disclosure versus nondisclosure

Probability of correct decision. If the cost of investigation is intermediate, $\delta q < c < c^*$, the strategic expert chooses propaganda under disclosure, but may engage in costly investigation under no disclosure.[12] Nevertheless, the client cannot benefit from the information acquired by the strategic expert under nondisclosure.

The intuition behind this result is as follows. Consider the game without disclosure. First, since the cost of investigation is relatively high, the expert with high reputation, $p > p^*$, finds it strictly preferable to choose propaganda over investigation. Yet, in equilibrium the client follows her reports. Second, the reports of the expert with low reputation are of no value to the client even though the expert investigates with a positive probability. To see this, observe that the value of future reputation cannot be worth more for a low-reputation expert than for a high-reputation expert. Thus, in order for a low-reputation expert to be willing to choose investigation, it must be that the opportunity cost of investigation is lower for a low-reputation expert. Consequently, her influence over the public, which is positively related to the interest group's access fee, must be lower than that of a high-reputation expert who never investigates. The only way to achieve this in equilibrium is for her to choose investigation with a probability that makes the client indifferent about whether to follow the expert's report.

We can also compare the effect of disclosure for other parameter constellations, which gives the following result.

Remark 5. If $c > c_*$, the ex-ante expected probability of correct decision by the client is higher under disclosure than under no disclosure. Otherwise, the ex-ante expected probability of correct decision is the same under both types of policies.

Payoff of the expert. If the cost of investigation is small, $c < c_*$, the expert chooses investigation with certainty and obtains the same positive payoff under any disclosure regime.

Now, let $c \geq c_*$. Consider the game without disclosure. If $c \geq c^*$, the expert always chooses propaganda in equilibrium and her service and access fees are 0, resulting in zero profits. If $c < c^*$, the expert will attempt to build her reputation in equilibrium. The only possibility to do so is to randomize between independent investigation and pushing the interest group's agenda. If the expert's initial reputation is low, choice of propaganda results in zero profits: the expert has no influence on the public and, hence, cannot collect positive revenues from the client or the interest group. At the same time, in order to randomize the expert must be indifferent between propaganda and investigation. Therefore, the expected benefit from costly investigation, even if it results in more credibility and larger revenues in the future, must be 0.

[12]We have that $\delta q < c^*$ if λ or δ are sufficiently large.

By contrast, under disclosure the expert will obtain positive profits if $c < \delta q$. Therefore, if the initial reputation of the expert is low, her profit under no disclosure is always lower than or equal to her profit under disclosure. Moreover, as c_* is decreasing in the stake of the interest group, a higher value of λ implies a larger set of the costs for which the expert is worse off under no disclosure. The above discussion leads to the following conclusion:

Remark 6. The profit of the expert with a sufficiently low reputation is greater under disclosure if $c_* < c < \delta q$ and is equal to the profit under no disclosure otherwise. Furthermore, the profit of the expert under no disclosure is non-increasing, and sometimes decreasing, in the stake of the interest group.

3 Extensions

In our model, nondisclosure decreases the quality of decisions made by the client. This is so even when the incentives of the expert to acquire information are improved. In equilibrium, the strategic expert does not acquire information frequently enough to be useful for the client. This feature of equilibrium might, however, change if we vary some of the assumptions of our model. In this section, we present three possible extensions of the model, in which the results of the previous section are reversed and the quality of the client's decisions may be higher under no disclosure.

3.1 Variable importance of issues

First, we look at a setting in which the stake of the interest group varies over periods. In such an environment, the expert could find it optimal to acquire information with certainty when the stakes are low in order to preserve its reputation and obtain a higher payoff from propaganda when the stakes are high. Hence, variability of stakes creates a channel through which the client can benefit from the improved incentives of the expert. In this section, we present an example in which the ex-ante expected probability of correct decision by the client is *greater* under no disclosure than under disclosure.

Let the stake of the interest group, λ, be a realization of a random variable distributed identically and independently across periods, with support $\{0, \overline{\lambda}\}$. Let β denote the probability that $\lambda = 0$. The value of λ is realized at the beginning of each period and is observed by each player. The rest of the model is unchanged. The solution concept is stationary Markov perfect equilibrium, in which the Markov state is the client's belief about the type of the expert *and* the realization of stake, λ.

In the model with disclosure, the expert cannot obtain a positive access fee. Hence, the variability in the stakes of the interest groups does not affect the incentives of the expert. As a result, Lemmas 1 and 2 characterizing equilibria in the original model continue to hold.

We now turn to the model without disclosure. We assume that the prior reputation of the expert is greater than p^*. This assumption significantly simplifies analysis: for any $p > p^*$, the client finds it optimal to follow the reports of the expert regardless of its behavior.

Denote

$$\tilde{c}^* \;=\; \beta\frac{\delta(1-q)q}{1-\delta q} + (1-\beta)\frac{\delta\overline{\lambda}(1-q)^2}{1-\delta q}.$$

Remark 7. Let $c \in (\delta q, \tilde{c}^*]$. The ex-ante expected probability of correct decision is greater under no disclosure if $\beta > p^*$ and

$$\overline{\lambda} \;>\; \frac{q(1-\delta q-\beta(1-q))}{(1-\beta)(1-q)^2}. \tag{3}$$

Proof. Define

$$\tilde{c}_* \;=\; \frac{\delta(1-q)q}{1-\delta q} - \frac{\overline{\lambda}(1-q)(1-\delta)}{1-\delta q}.$$

We first prove the following observation:

> (*) Let $\tilde{c}_* \le c \le \tilde{c}^*$. Then, there exists an equilibrium in which the expert with reputation $p > p^*$ investigates with probability 1 if $\lambda = 0$ and probability 0 if $\lambda = \overline{\lambda}$.

To prove (*), observe that, in any continuation game in which the expert has reputation zero, her choosing propaganda and collecting zero fees is a unique stationary equilibrium. Now, consider an expert with reputation $p > p^*$. In equilibrium, she collects the access fee of 0 if $\lambda = 0$ and $\overline{\lambda}(1-q)$ if $\lambda = \overline{\lambda}$. Furthermore, her service fees are q if $\lambda = 0$ and $2q - 1 + p(1-q)$ if $\lambda = \overline{\lambda}$. As a result, the payoff of the expert with reputation $p > p^*$ along the equilibrium path can be expressed as

$$\begin{aligned} v(p) \;&=\; \beta(q - c + \delta v(p)) + (1-\beta)(2q - 1 + p(1-q) + \overline{\lambda}(1-q) + \delta q v(p)) \\ &=\; \frac{\beta(q-c) + (1-\beta)(2q-1+p(1-q)+\overline{\lambda}(1-q))}{1-\delta+\delta(1-\beta)(1-q)}. \end{aligned}$$

The condition $c \leq \tilde{c}^*$ ensures that the net benefit of investigation is non-negative if $\lambda = 0$,

$$\mathcal{L}(p, 1) \quad = \quad -c + \delta(1-q)v(p) \geq 0. \quad (p > p^*)$$

At the same time, the condition $c \geq \tilde{c}_*$ ensures that the net benefit of investigation is non-positive if $\lambda = \overline{\lambda}$,

$$\mathcal{L}(p, 0) \quad = \quad -c - \overline{\lambda}(1-q) + \delta(1-q)v(1) \leq 0,$$

which establishes (*).

By (3), $\delta q < \tilde{c}^*$. Then, by (*), for any $c \in (\delta q, \tilde{c}^*]$, investigation is impossible in equilibrium under disclosure but there exists an equilibrium under no disclosure in which investigation occurs with certainty if $\lambda = 0$. The expected probability of correct decision in each period under disclosure is equal to

$$\kappa_{\text{disclosure}} \quad = \quad p_0 + (1-p_0)(1-q).$$

Under no disclosure, the probability of correct decision depends on the history of realizations of θ and λ. The strategic expert maintains its reputation as long as there has not been a period in which $\theta = 0$ and $\lambda = \overline{\lambda}$; the corresponding probability of correct decision is equal to

$$\kappa_{\text{no disclosure}} \quad = \quad p_0 + (1-p_0)(\beta + (1-\beta)q).$$

After the period in which $\theta = 0$ and $\lambda = 1$, the type of the expert is revealed to the client and the probability of the correct decision coincides with the one under disclosure. We conclude that whenever $\kappa_{\text{no disclosure}} > \kappa_{\text{disclosure}}$ or, equivalently,

$$\beta > p^*$$

the ex-ante expected probability of correct decision is greater under no disclosure. $\square$

3.2 Long-Lived Interest Groups

In certain settings, the same interest group has repeated interactions with the expert. Therefore, the expert and the interest group may play equilibria that make use of information available only to them, but not the client. In this subsection, we analyze whether this possibility results in equilibria where the expert investigates frequently enough such that the probability of making a correct decision under nondisclosure is higher than under disclosure.

In the discussion below, we construct an equilibrium under nondisclosure in which the expert and the interest group use a coordination device to ensure the expert investigates with a high probability, even if the expert has reputation one. If the expert fails to investigate as prescribed, she is punished by being paid lowered access fees thereafter. If the interest group fails to punish the expert, it is punished by being forced to pay higher access fees to the expert thereafter. The investigation probability can be chosen high enough such that the decision maker chooses the correct decision more frequently than under disclosure.

Remark 8. There exist values of δ and c such that there is an equilibrium in which the expert with reputation $p = 1$ investigates with a probability $r \geq p^*$ and, as a result, the probability of the client taking the optimal action is higher than the disclosure case.

Proof. Let us consider the following strategy profile: every period there is a draw of a Bernoulli random variable, which is only observable to the expert and the interest group. If its realization is 1, the expert investigates when its realization is 1; if its realization is 0, she approaches the interest group, asks for an access fee, and publishes its propaganda if the interest group pays the access fee. Let us assume the realization 1 occurs with probability $r \geq p^*$. This ensures that the client takes the correct action with higher probability than under disclosure, where the strategic expert is completely ignored.

We also introduce two phases: pro-expert phase and pro-interest group phase, differing only in the amount of access fee paid by the interest group each period if the expert is supposed to approach the interest group.

- *Pro-expert phase.* In this phase, the expert asks for an access fee equal to the full surplus $\lambda(1-q)$ and the interest group accepts any access fee lower than or equal to this amount.

- *Pro-interest group phase.* In this phase, the expert asks for an access fee equal to $\lambda(1-q) - x$, where $0 \leq x \leq \lambda(1-q)$, and the interest group accepts any access fee lower than or equal to this amount.

We consider the following strategy profile as a candidate for equilibrium. Note that the expert's probability of investigation in either phase is $r \geq p^*$. Simple calculation yields that the expert should charge a service fee of $q - (1-p)(1-r)(1-q)$.

- The expert and the interest group start in the pro-expert phase.

- They start the pro-interest group phase if the expert deviates from her prescribed action.
- They start the pro-expert phase if the interest group deviates from its prescribed action.

Let $v^c(p)$ be the continuation payoff of the expert with reputation p in the pro-expert phase, and $v^d(p)$ be her payoff in the pro-interest group phase. Let $w^c(p)$ and $w^d(p)$ be the payoffs of the interest group. We focus on the case $p = 1$. Since the expert's reputation will remain one as long as her report matches the state of the world, we can write

$$\begin{aligned} v^c(1) &= q + r[-c + \delta v^c(1)] + (1-r)[\lambda(1-q) + \delta q v^c(1)], \\ v^d(1) &= q + r[-c + \delta v^d(1)] + (1-r)[\lambda(1-q) - x + \delta q v^d(1)]. \end{aligned}$$

Solving them gives

$$\begin{aligned} v^c(1) &= \frac{\lambda(1-r)(1-q) + q - rc}{1 - \delta q - \delta(1-q)r}, \\ v^d(1) &= \frac{\lambda(1-r)(1-q) + q - rc - (1-r)x}{1 - \delta q - \delta(1-q)r}. \end{aligned}$$

It is straightforward to show

$$\begin{aligned} w^c(1) &= 0, \\ w^d(1) &= \frac{\lambda(1-r)x}{1 - \delta q - \delta(1-q)r}. \end{aligned}$$

The incentive conditions that have to be satisfied include no deviations by the expert or the interest group in either phase. In the pro-interest group phase, the utility of the expert must be the same from investigation and propaganda, since the "punishment" for deviation is to continue the punishment phase. We obtain

$$c = c_* + \frac{1-\delta}{1-\delta q} x,$$

where c_* is as defined in Section 2. Note that this condition also ensures that the expert would not deviate from propaganda to investigation in the pro-expert phase, since in the pro-expert phase the continuation payoff for deviation to investigation is the same as in the pro-interest group phase while the payoff for sticking to propaganda is higher. To deter deviation by the expert from investigation to propaganda in the pro-expert phase, we need

$$c \le c_* + \frac{\delta q(1-r)}{1-\delta q} x.$$

To ensure that both of the above conditions hold, we need

$$1 - \delta \quad \leq \quad \delta q(1 - r),$$

or

$$\delta \quad \geq \quad \frac{1}{1 + q(1 - r)}.$$

It is straightforward to check that this condition also guarantees that the interest group will not deviate in the pro-interest group phase and accept an offer that gives it less than x. Further, the interest group has no incentive to deviate in the pro-expert phase, as regardless of what it does, it cannot earn a payoff higher than zero. Finally, we need to require that x be small enough such that $v^d(1) \geq 0$.

Indeed, when $r = p^*$, we can find values of δ, c, and x that satisfy all the conditions, the inequalities strictly. By continuity, there exists $r > p^*$ that satisfy all the conditions. $\square$

For other reputation levels, we can find conditions such that the expert is induced to investigate, though we also need to vary x according to the expert's reputation.

3.3 Growing clientele

In this subsection, let us suppose the size of the clientele of the expert grows as her reputation increases. Higher reputation enhances not only the expert's persuasiveness, but also her exposure. Compared to the benchmark model, she has extra incentives to build reputation: a larger clientele means first a larger base to collect subscription fees; it means also higher access fees from the interest group as she now has wider influence. Thus, she is more inclined to choose investigation. We now provide an illustration that such concerns may cause the expert to investigate frequently enough to make her client's decision more likely to be correct under nondisclosure.

Let $1 + \sigma(p)$ be the client base of an expert of reputation p, where σ is nondecreasing in p. We assume that the expert's service fee and access fee are proportional to her client base.

Given this modification, a reputation-one expert finds it optimal to investigate if and only if

$$c \quad \leq \quad \hat{c}_* \equiv \frac{\delta(1 - q)q[1 + \sigma(1)]}{1 - \delta q} - \frac{\lambda(1 - q)(1 - \delta)[1 + \sigma(1)]}{1 - \delta q}.$$

Meanwhile, a reputation-zero expert finds it optimal to always choose propaganda if and only if

$$c \geq \hat{c}^* \equiv \frac{\delta(1-q)q[1+\sigma(1)]}{1-\delta q} + \frac{\delta\lambda(1-q)^2[1+\sigma(1)]}{1-\delta q}.$$

Following what we do in the benchmark model, let $c \in (\hat{c}_*, \hat{c}^*)$.

Remark 9. Let λ be large enough such that $\delta[1+\sigma(1)]q < \hat{c}^*$ and let $c \in (\delta[1+\sigma(1)]q, \hat{c}^*)$. In addition, let

$$\sigma(p) = \begin{cases} 0, & p \geq \bar{p}, \\ 1, & p < \bar{p}, \end{cases}$$

where $\bar{p} = 1/(2-p^*)$. Then, there exist values of λ and δ large enough such that an expert of reputation $p \in [p^*, \bar{p})$ investigates with probability $r \geq p^*$. Therefore, when $p \in [p^*, \bar{p})$, the probability of the client taking the correct action is higher under nondisclosure than under disclosure.

Proof. In the case of disclosure, a reputation-p expert investigates if and only if

$$c \leq \delta[1+\sigma(p)]q.$$

Note that, for $p = 1$, this threshold is lower than $\hat{c}^*$ for large enough λ and always higher than $\hat{c}_*$. Since we assume $c > \delta[1+\sigma(1)]q$, a strategic expert never investigates under disclosure.

Recall that r is the probability of investigation by the strategic expert. The probabilities of correct decisions by the client for an expert of reputation p are respectively $1-(1-p)(1-q)(1-r)$ for nondisclosure and $1-(1-p)q$ for disclosure. The former is higher if $r \geq p^*$.

Similarly to our benchmark model, for $c \in (\hat{c}_*, \hat{c}^*)$, it is never the case that an expert always investigates. To see this, note that a reputation-p expert always investigates if and only if

$$c \leq \hat{c}_*(p) \equiv \frac{\delta(1-q)q[1+\sigma(p)]}{1-\delta q} - \frac{\lambda(1-q)(1-\delta)[1+\sigma(p)]}{1-\delta q}.$$

But, the above expression is either negative, or less than $\hat{c}_*$. In either case, a reputation-p expert would not find investigation optimal as we assume $c > 0$ and $c > \hat{c}_*$.

Recall that p^* is the reputation level above which an expert's report is followed even if the strategic expert never investigates. In the benchmark model, an expert with reputation higher than p^* always chooses propaganda. However, in the modified model, such an expert always chooses propaganda if and only if

$$c \geq \hat{c}^*(p) \equiv \frac{\delta(1-q)q[1+\sigma(1)]}{1-\delta q} + \lambda(1-q)\frac{\delta(1-q)[1+\sigma(1)] - (1-\delta q)[1+\sigma(p)]}{1-\delta q}.$$

This threshold is larger than $\hat{c}_* = \hat{c}_*(1) = \hat{c}^*(1)$. As a result, the assumption that $c > \hat{c}_*$ is not sufficient to imply that an expert with reputation higher than p^* always chooses propaganda. The reason is that by switching to investigation from propaganda, the expert maximizes her client base if she makes a correct report in state 0, which may imply next period's access fee dominates the current period's. It is possible, therefore, for an expert with reputation higher than p^* to choose investigation, though it is still the case that an expert with reputation close to one always chooses propaganda.

Since $c \geq \hat{c}_*$ and $\sigma(p) = \sigma(1)$ for all $p \geq \bar{p}$, it is straightforward to show that an expert of reputation $p \geq \bar{p}$ always chooses propaganda. Thus, for $p \geq \bar{p}$,

$$v(p) = \frac{[1+\sigma(p)][q-(1-q)(1-p)+\lambda(1-q)]}{1-\delta q}.$$

We have argued that the expert never investigates with probability one in equilibrium regardless of her reputation. Now, for $p \in [p^*, \bar{p})$, in order for the expert to mix between investigation and propaganda, we have

$$c + [1+\sigma(p)]\lambda(1-q) = \delta(1-q)v(p^0), \tag{4}$$

where p^0 is the expert's updated reputation after reporting 0 truthfully. As before, the left hand side represents the expert's cost of investigation, while the right hand side her benefit of investigation. Note that when $p = p^*$ and $r = p^*$,

$$p^0 = \frac{p^*}{p^* + (1-p^*)p^*} = \bar{p}.$$

Now, substituting $p = p^*$ and $r = p^*$ (hence $p^0 = \bar{p}$) into the incentive condition and using the expression for $v(p^0)$ when $p^0 \geq \bar{p}$, we have

$$c - \frac{1-q}{1-\delta q}\left[\delta[1+\sigma(\bar{p})]q - \delta[1+\sigma(\bar{p})](1-\bar{p})(1-q)\right] = \frac{\delta[1+\sigma(\bar{p})](1-q) - (1-\delta q)}{1-\delta q}.$$

Substituting $\sigma(\bar{p}) = \sigma(1) = 1$ into the above equation, we can see that the left hand side is strictly positive. In addition, as long as $\delta > 1/(2-q)$, there exists $\lambda^* > 0$ satisfying the above equation.

Fix $\lambda = \lambda^*$. Now, consider $p \in (p^*, \bar{p})$. We claim that the expert must investigate with probability $r > p^*$. Suppose $r \leq p^*$. As p^0 is increasing in p and decreasing in r, $p^0 > \bar{p}$. Since $\sigma(p) = 0$ for all $p < \bar{p}$ and $v(p^0)$ is strictly increasing for $p^0 \geq \bar{p}$, the right hand side of (4) is higher but the left hand side remains unchanged. Therefore, we must increase r, thereby decrease p^0, to make it hold.

To summarize, in equilibrium, the expert investigates with probability $r \geq p^*$ for $p \in [p^*, \bar{p})$, which implies the client takes the correct action with higher probability under nondisclosure than under disclosure. □

4 Discussion: Behavioral type

Our results rely on the existence of a *non-strategic* type that always acquires information, regardless of the amount of service and access fees, and never attempts to separate itself from the other type.[13] We view this type as a convenient modeling shortcut for a strategic type who either has a lower cost of investigation or experiences a positive utility from reporting truthfully to the client. This section makes this argument precise. In addition, we also compare our model against a model in which there exists only the strategic expert.

4.1 High and low cost

Let us consider a model in which there are two types of experts that have different costs of investigation, $\bar{c}$ and $\underline{c}$, where $\underline{c} < c_* < \bar{c} < c^*$. Again, the client is uncertain about the type of the expert. The rest of the model is identical to the one considered in the previous sections.

Remark 10. There exists an equilibrium in which the low-cost type always investigates and reports truthfully and the high-cost type behaves as prescribed in the previous sections.

Proof. For low values of reputation, in the original model an expert with cost between c_* and c^* is indifferent between propaganda and costly investigation. Hence, in the

[13] The equilibrium prescribes that the honest and strategic types charge the same service fee. This equilibrium can be supported by the stipulation that the client interprets any other service fee charged by the expert as a signal that the expert is of the strategic type. Then, neither type would want to deviate from the equilibrium service fee.

new model, the expert with low cost strictly prefers investigation. It remains to check that for $p \geq p^*$, the low cost expert prefers to investigate, that is,

$$\underline{c} + \alpha(p, r) \leq \delta(1-q)\underline{v}(1), \tag{5}$$

where

$$\underline{v}(1) \quad = \quad \frac{-\underline{c}+q}{1-\delta}$$

is the value of reputation 1 for the expert with low cost.[14]

A sufficient condition for (5) to hold for any $p \geq p^*$ is that this inequality holds for the highest possible access fee, $\alpha = \lambda(1-q)$, that is,

$$\underline{c} + \lambda(1-q) \leq \delta(1-q)\frac{-\underline{c}+q}{1-\delta},$$

which is equivalent to $\underline{c} \leq c_*$.

The equilibrium in the model with the truthful type can now be replicated if we assign (out-of-equilibrium) beliefs to the client that the expert has high cost whenever the service fee is different from the service fee prescribed in the original game. $\square$

4.2 Absence of Honest Type

Our model has two crucial features: uncertainty about the source of the report and the possibility of a truthful expert. Throughout the paper, we have compared the results in our model with the benchmark case in which the source of the report is known. In particular, there are circumstances under which investigation is impossible if the source of the report is always disclosed and is possible otherwise.

A similar result holds with respect to the possibility of a truthful expert. The set of costs for which non-zero probability of investigation is possible is smaller in the model without the possibility of the truthful type. This is because in the absence of the truthful type, the expert does not have a means to build its reputation and become influential. Hence, although introducing uncertainty about the credibility of the expert may not improve the payoff of the expert, it affects it behavior. This discussion is made formal by the following result, which uses sequential equilibrium as the solution concept.

Remark 11. When the expert is always strategic, investigation is possible in equilibrium if and only if $c \leq c_*$.

[14]Note that the high-cost type never investigates when $p \geq p^*$ and hence the expert's reputation becomes 1 after investigation in low state.

Proof. If the expert chooses investigation with non-zero probability in any period, it must be that

$$\lambda(1-q)+\delta q v^1+\delta(1-q)v' \quad \leq \quad -c+\delta q v^1+\delta(1-q)v^0,$$

where v^1, v^0, and v' are respectively the expert's continuation payoffs after a correct report in state 1, a correct report in state 0, and an incorrect report (in state 0), or, equivalently,

$$c \quad \leq \quad -\lambda(1-q)+\delta(1-q)(v^0-v').$$

The result, then, follows from the observation that

$$0 \leq v^1, v^0, v' \leq \max\left\{\frac{q-c}{1-\delta}, \frac{q+\lambda(1-q)}{1-\delta q}\right\}. \ \square$$

5 Related Literature

In this section, we provide a concise survey of the related literature.[15]

Reputational cheap talk. Sobel's [64] studies a repeated game of reputational cheap-talk between an expert and a decision maker.[16] Our model can be viewed as an extension of his, where we allow the bias of the expert to arise endogenously and vary over time. We also make endogenous the expert's information. Durbin and Iyer [23] study a static model of a reputational cheap-talk between an expert, who may receive an unobservable payment from a third party affected by the decision, and a decision maker. Our model can be viewed as an extension of their model, where we make explicit the origin and the form of the value of reputation by considering a dynamic model. In addition, we endogenize information available to the expert.

There are a number of other papers exploring effects of reputation on cheap-talk communication. Bénabou and Laroque [8], for example, further develop Sobel's model by allowing the expert to have imperfect information. Reputation concerns due to experts' preferences are also studied by Frisell and Lagerlöf [30], Morris [53], and

[15] There is a large literature started by the seminal work of Crawford and Sobel [18] that analyzes cheap-talk communication between an expert(s) and a decision maker(s). We refer the reader to the surveys of the literature in Krishna and Morgan [46] and Ganguly and Ray [35].

[16] Wei Li [49] presents a model of reputational cheap-talk similar in spirit to the one in Sobel [64]. She focuses on comparing direct communication and communication through a strategic, possibly biased, intermediary.

i Vidal [42].[17] Tsuyuhara [67] and Wrasai and Swank [69] present models in which reputational concerns due to experts' preferences interact with career concerns, as the decision maker has an option of firing the expert. In papers of Bourjade and Jullien [11], Li [48], Mariano [51], and Ottaviani and Sorensen [56] [57] [58], the decision maker is uncertain about how informed the expert is. Olszewski [55] considers the case where the expert would like to appear honest. Fisher and Heinkel [27] present an infinitely repeated model in which the expert is a financial analyst and there is uncertainty about the amount of perks she consumes in a given period (her type). Unlike in the rest of the literature, the expert's type is not fixed but evolves over time. In papers by Kim [44], Park [60], and Stocken [65], there is complete information about the type of the sender and reputation is interpreted as choosing among equilibrium paths.

The main focus of this literature is to study the amount of information transmission and identify the effect of reputational concerns on the expert's incentives to convey information truthfully. Often, the message is negative: reputational concerns motivate the expert to distort her reports towards the expectations of the decision maker to ensure that her reputation does not suffer. In contrast, in this paper we add information acquisition into the picture. We are interested in whether reputational concerns, absent disclosure, are sufficient to create proper incentives for the expert to acquire information.

Information acquisition. Our paper is concerned with the issue of information acquisition by experts, so it is also related to the literature on designing mechanisms to improve information acquisition. Szalay [66] studies a principal-agent model where the agent has to collect information before taking an action.[18] He shows that the principal may find it optimal to limit the agent's freedom of choice so as to improve incentives for information acquisition. Dewatripont and Tirole [21] show that competing biased experts have stronger incentives to collect information than a single unbiased expert. Che and Kartik [14], Dur and Swank [22], and Gerardi and Yariv [38] model experts as agents who both collect and transmit information. A common theme in these papers is that it might be optimal to hire experts with preferences different from the

[17] Ely and Välimäki [25] demonstrate that a long-lived expert with preferences aligned with his clients may nevertheless fail to provide service to one-shot clients, due to reputation concerns of not appearing opportunistic. Our model is, however, a "good-reputation" model, in the sense that reputation concerns induce experts to acquire more information.

[18] For further references, see survey of the literature on information acquisition in mechanism design by Bergemann and Välimäki [9].

decision maker in order to improve incentives to acquire information.[19]

Reputational concerns and information acquisition. In a model quite distant from ours, Iossa [43] combines reputational concerns about the ability to collect information of the arbitrator (expert) with information acquisition. The message of that paper is that reputational concerns may improve incentives to acquire information while making information transmission more difficult, which in turn has implication for the decision of the interested parties whether to use the arbitrator rather than resort to litigation.

Media. An earlier version of our paper has been circulated under the title "Indifferent Public, Passionate Advocates, and Strategic Media." (See [47].) In that version, we interpreted the expert as a media outlet who provides news to the public (decision maker) and can be captured by a special interest group. A growing literature explores a variety of models in which media outlets have incentives to distort their news reports.[20] Besley and Prat [10], for example, assume that media outlets can be bought by the government to suppress bad news. In their model, information is verifiable, although there is uncertainty about whether the media outlets have any information. Moreover, there are no reputation concerns. Anderson and McLaren [4] analyze incentives for competing media outlets to merge and, in particular, the effects of mergers on the information reported to the public. Mullainathan and Shleifer [54] assume that readers have a preference for news that confirms their prior beliefs and, in equilibrium, media outlets choose to slant their news accordingly. Gentzkow and Shapiro [36] present a reputation model in which there is uncertainty about the quality of the information possessed by a media outlet. They show that reputation concerns might drive the media outlet to distort news in favor of readers' prior beliefs. Burke [12] shows that media outlets' reputational concerns about appearing ideologically unbiased may prevent them from transmitting information to their audience. Our contribution to this literature is an *explicit* model of reputation dynamics of a media outlet (expert) under the possibility of capture and an analysis of the impact of different disclosure policies on the quality of information supplied by the media outlet.

Two-sided markets. Finally, the expert in our model can be interpreted as a

[19]A number of other models allow for information acquisition. For instance, Aghion and Tirole [1] study a question of the interaction between real and formal authority in which the agent can choose the amount of effort to acquire information. Ozerturk [59] focuses on the optimal incentive scheme for a financial analyst, who can be trading on her own account, and has a choice about how much information to acquire.

[20]Gentzkow and Shapiro [37] provide a survey of the literature.

platform in a two-sided market, which brings together the interest group and the public, and hence is indirectly connected with the recent work on media as a two-sided market.[21]

6 Conclusions

In this paper, we present a dynamic model of information acquisition and transmission by a profit-maximizing expert whose credibility is uncertain to the client. We characterize the equilibrium structure of information transmission with and without disclosure of the source of the expert's report. In particular, we demonstrate that absence of disclosure may create incentives for the strategic expert to choose costly investigation in the hope of improving her reputation. Nevertheless, in the benchmark model the client cannot benefit from more informative reports as they serve the goal of confusing the client and making the reports by the interest group more effective. We then demonstrate that a number of factors - varying stakes of the interest group, growing clientele of the expert, and long-lived interest group - may reverse this conclusion.

We obtain these results in a model with many specific assumptions. The benefit of this approach is that it allows us to sketch our arguments more explicitly than it would be possible in a more reduced form model. On the other hand, one worries about the robustness of results. We consider multiple extensions and perform many robustness checks in the working paper (Li and Mylovanov [47]). Here, we briefly discuss some results and caveats. First, our results are robust to competition among experts, some modifications of the assumptions on preferences and the timing of the model, and the introduction of a possibility for the expert to keep silent after collecting the fees. Second, note that our model is not a cheap-talk one. In particular, the expert cannot make up reports and has to obtain them either through investigation or from the interest group. Relaxing this assumption changes the structure of equilibria; we do not know how the possibility of cheap-talk affects our conclusions about the effects of non-dsclosure.

[21] Some of the recent contributions in this literature are Anderson and Coate [2], Choi [15], Crampes, Haritchabalet, and Jullien [17], Cunningham and Alexander [20], Ferrando, Gabszewicz, Laussel, and Sonnac [26], Gabszewicz, Laussel, and Sonnac [31] [32] [33], Gal-Or and Dukes [34], Germano [24], and Peitz and Valletti [61]. In addition, an overview of the two-sided approach to media markets is provided by Anderson and Gabszewicz [3]. Finally, for a survey of the economics of advertisement including prior literature, see Bagwell [6]. For a general analysis of two-sided markets see, for example, Armstrong [5] and Rochet and Tirole [63] and their references.

In our model, with probability one the decision maker learns the type of the expert in finite time. Hence, the reputation of the expert is impermanent and so are the effects created by the uncertainty about the expert's type.[22] There are several natural modification of the models that can remedy this problem. For example, we can assume that the type of the expert can change with a small probability in each period. This would create a possibility of rebuilding reputation even after the expert has given incorrect advice.[23] We can also consider a model in which the decision maker, who, recall, is a myopic player, observes a truncated history of play. In this model, the expert who is revealed to be strategic might have a chance to rebuild her reputation after a period of time. We do not pursue hese alternatives in the current paper and leave them for future research.

Another special aspect of our model is that we assume the expert's investigation technology to be perfect, and that the client learns the true state of the nature with certainty after each period. As a result, once a strategic expert's report fails to match the true state of the nature, it is fully exposed and deprived of any reputation. This is an assumption that greatly simplifies the analysis. Though in this paper we do not explore the relaxation of these assumptions, we believe the underlying tradeoff between building reputation and cashing it in, with corresponding implications for the client's welfare, and the implications for the desirability of disclosure policy, is present in reality and can be captured within alternative, more general, models.

A Proof of Proposition 1

Proof. Existence. Let

$$f(\tilde{z}, n) \quad = \quad -\frac{c}{1-\delta q}\frac{1-w^n}{1-w} + w^n \frac{\tilde{z}\lambda(1-q)}{1-\delta q}, \quad n \in \{0, 1, \dots\}$$

If $\tilde{p} = (p^*)^{\overline{n}}$, then define z^* implicitly by

$$f(z^*, \overline{n}) = \frac{c}{\delta(1-q)}.$$

Otherwise, let z^* be any value in $[z', 1]$, where

$$z' = \frac{\delta(1-q)}{1-\delta q} + \frac{\delta q}{\lambda(1-\delta q)} - \frac{c}{\lambda(1-q)}.$$

[22] This is a general feature of reputation models with adverse selection and imperfect monitoring (Cripps, Mailath, and Samuleson [19]).

[23] The models of reputation in which the type of the players follows a stochastic process have been considered by Holmstrom [41], Cole, Dow, and English [16], Mailath and Samuelson [**?**], Phelan [62], and Wiesman [68].

The following set of strategies, together with corresponding Bayesian beliefs, is an equilibrium: The expert chooses investigation with probability given by (2). The client always pays the service fee and follows low report. Furthermore, if $p > p^*$, he follows high report. If $p = (p^*)^n$ and $p \geq \tilde{p}$, the client follows high report with probability z^*. If $p \in ((p^*)^{n+1}, (p^*)^n)$ and $p \geq \tilde{p}$, $n = \{1, \dots\}$, he follows high report with probability $\frac{c-\delta(1-q)v\left(\frac{p}{p^*}\right)}{\lambda(1-q)}$. If $p < \tilde{p}$, the client ignores high report and chooses 0. The service fee is 0 if $p \leq p^*$ and equal to $q - (1-p)(1-q)$ otherwise. The access fee is $z\lambda(1-q)$, where z is the probability that the client follows high report.

It is direct to show that if the expert follows her strategy, she obtains the payoff given by (1). Furthermore, the payoff of the expert with reputation $p = ((p^*)^n)$, $n \in \{1, \dots\}$, is equal to

$$v(p) \quad = \quad \max\left\{f(z^*, n), 0\right\}. \tag{6}$$

The optimality of the fees and the client's behavior is straightforward. Moreover, it is optimal for the expert with reputation 0 to choose propaganda because her reputation cannot increase after investigation. Now, consider the expert with reputation $p > p^*$. If the expert chooses investigation, her reputation will be 1, implying $v^0 = \overline{v}$. Furthermore, the client always follows the reports and hence $\alpha(p, r) = \alpha(1, 0)$ for any $r \in [0, 1]$. This implies that $\mathcal{L}(p, r) < 0$, making propaganda optimal.

Next, assume that the expert has reputation $p \in ((p^*)^{n+1}, (p^*)^n)$, $n = 1, \dots$, such that $p \geq \tilde{p}$. Note that her reputation after a truthful report in state 0 becomes

$$p^0(p, r_*(p)) = \frac{p}{p^*} \in ((p^*)^n, (p^*)^{n-1}).$$

Furthermore, the probability with which the client follows high report, z, satisfies

$$c + z\lambda(1-q) \quad = \quad \delta(1-q)v\left(\frac{p}{p^*}\right),$$

or, equivalently, $\mathcal{L}(p, r) = 0$, implying that the expert is indifferent about her choice. The argument for $p = (p^*)^n$, $n = 1, \dots$, $p > \tilde{p}$, and for $p < \tilde{p}$ is analogous.

Uniqueness. We now prove the second part of the proposition. First, we calculate the service fees in any equilibrium. If $p_t \leq p^*$ and $r_t \leq r_*(p_t)$, the expert does not investigate frequently enough to make her reports valuable for the client, in which case $\phi(p_t, r_t) = 0$. On the other hand, if $p_t \leq p^*$ and $r_t > r_*(p_t)$ or if $p_t > p^*$, the client will find reports informative, in which the service fee is $\phi(p_t, r_t) = 2q - 1 + (p_t + (1-p_t)r_t)(1-q)$.

The access fees depend on how frequently the client follows high report of the expert, $\alpha = \tilde{z}\lambda(1-q)$, where $\tilde{z}$ is the probability that the client takes action 1 after report 1. In equilibrium, $\tilde{z}$ is equal to 0 if $p_t \leq p^*$ and $r_t < r_*(p_t)$, is any number between 0 and 1 if $p_t \leq p^*$ and $r_t = r_*(p_t)$, and is 1 otherwise.

Next, observe that, in any continuation game in which the expert has reputation zero, choosing propaganda and collecting zero fees is the unique stationary equilibrium.

We now calculate the continuation payoff of the expert with reputation 1, $\overline{v}$. First, reputation 1 implies that the fees are $\phi(1, r) = q$ and $\alpha(1, r) = \lambda(1-q)$ for any value of r. If the expert chooses investigation, her reputation will remain 1 and, therefore, her expected payoff is equal to

$$v' = -c + q + \delta\overline{v}.$$

If, on the other hand, the expert chooses propaganda, she will lose her reputation whenever the state is 0, which happens with probability q. In this case, her expected payoff is

$$v'' = \lambda(1-q) + q + \delta(1-q)\overline{v}.$$

The value of reputation 1 is given by

$$\overline{v} \;=\; \max\{v', v''\} = \frac{\lambda(1-q)+q}{1-\delta q},$$

implying that the expert will choose propaganda and $\mathcal{L}(1, 0) < 0$. The value of $\overline{v}$ provides the upper bound on the continuation payoff of the expert with any reputation.

Let us now consider an expert with reputation $p \in (p^*, 1)$. Because $v^0 \leq \overline{v}$ and $\alpha(p, r) = \alpha(1, 0)$ for any $r \in [0, 1]$, we have $\mathcal{L}(p, r) < 0$. Thus, the expert will choose propaganda. As a result, the payoff of the expert is given by

$$v(p) = \frac{(p+\lambda-1)(1-q)+q}{1-\delta q}.$$

If $p = p^*$, then $\mathcal{L}(p, r) < 0$ for all $r \in (0, 1]$ and hence the expert with this reputation will never choose costly investigation. For $r = 0$ to be optimal, we need the client to follow high reports with probability $z(p^*) \geq z'$, which gives $\mathcal{L}(p, 0) \leq 0$.

Thus, the value of reputation is given by (1) if $p > p^*$ and $f(z(p^*), 0)$ if $p = p^*$. This implies that in any equilibrium the following properties are satisfied, with $k = 0$:

(i) The value of reputation is given by (1) for $p \in ((p^*)^{n+1}, (p^*)^n)$ and equal to $\max\{f(z(p^*), n), 0\}$ for $p = (p^*)^{n+1}$ for all $n = 0, \ldots, k$;

(ii) The probability of investigation satisfies (2) for $p \in [(p^*)^{k+1}, 1]$.

The rest of the proof is by induction. We will show that if (i) and (ii) are satisfied in any equilibrium for $k = i$, then it is also satisfied in any equilibrium for $k = i + 1$. First, let $p < p^*$. Observe that if the client expects the expert to always choose propaganda, $r = 0$, then a deviation to investigation will convince the client that the expert is truthful, implying $v^0 = \overline{v}$. It follows then that $\mathcal{L}(p, 0) > 0$, as $c < c^*$ and $\alpha(p, 0) = 0$. Therefore, in equilibrium the expert does not always choose propaganda. On the other hand, for all $r > r_*(p)$, we have $\mathcal{L}(p, r) \leq \mathcal{L}(1, 0) < 0$. Hence, in equilibrium the expert cannot choose investigative journalism with probability greater than $r_*(p)$.

Now, consider the expert with $p \in ((p^*)^{i+2}, (p^*)^{i+1})$. Let $p \geq \tilde{p}$. Note that if the expert chooses investigation with probability $r < r_*(p)$, her reputation after a truthful report in state 0 becomes

$$p^0(p, r) > \frac{p}{p^*} \in ((p^*)^n, (p^*)^{n-1}).$$

Furthermore,

$$c \leq \delta(1-q)v\left(\frac{p}{p^*}\right) < \delta(1-q)v\left(p^0(p, r)\right).$$

Therefore, the expert would prefer to investigate with probability $1 > r_*(p)$. This shows that $r_*(p)$ is the unique value for which $\mathcal{L}(p, r) = 0$ is possible.

Let now $p < \tilde{p}$. Observe that in this case, $\mathcal{L}(p, r_*(p)) < 0$ and therefore $r(p) < r_*(p)$. The probability of investigation is determined by $\mathcal{L}(p, r(p)) = 0$, which is equivalent to

$$-c = \delta(1-q)v(p^0(p, r)). \tag{7}$$

The value $v(p^0(p, r))$ is decreasing in r on $(0, r_*(p)]$. Therefore, (7) has at most one solution. By construction of $\tilde{p}$, $r = r(p)$ is a solution. The argument for $p = (p^*)^n$, $n = 1, \ldots,$ is analogous. $\square$

References

[1] Philippe Aghion and Jean Tirole, *Formal and real authority in organizations*, Journal of Political Economy **105** (1997), no. 1, 1–29.

[2] Simon P. Anderson and Stephen Coate, *Market provision of broadcasting: A welfare analysis*, Review of Economic Studies **72** (2005), no. 4, 947–972.

[3] Simon P. Anderson and Jean J. Gabszewicz, *The media and advertising: A tale of two-sided markets*, Handbook on the Economics of Art and Culture (Victor A. Ginsburg and David Throsby, eds.), vol. 1, North-Holland, 2006, pp. 567–614.

[4] Simon P. Anderson and John McLaren, *Media mergers and media bias with rational consumers*, mimeo, University of Virginia (2007), available at http://www.virginia.edu/economics/downablepapers.htm#anderson.

[5] Mark Armstrong, *Competition in two-sided markets*, RAND Journal of Economics **37** (2006), no. 3, 668–691, available at http://ideas.repec.org/a/rje/randje/v37y20063p668-691.html.

[6] Kyle Bagwell, *The economic analysis of advertisement*, Handbook of industrial organization (Mark Armstrong and Robert Porter, eds.), vol. 3, North-Holland, 2007, pp. 1701–1844.

[7] David Barstow, *Behind TV analysts, Pentagon's hidden hands*, New York Times (2008), available at http://www.nytimes.com/2008/04/20/washington/20generals.html.

[8] Roland Bénabou and Guy Laroque, *Using privileged information to manipulate markets: Insiders, gurus, and credibility*, Quarterly Journal of Economics **107** (1992), no. 3, 921–958.

[9] Dirk Bergemann and Juuso Välimäki, *Information in mechanism design*, Proceedings of the 9th World Congress of the Econometric Society (Richard Blundell, Whitney Newey, and Torsten Persson, eds.), vol. 1, Cambridge: Cambridge University Press, forthcoming, pp. 186–221.

[10] Timothy Besley and Andrea Prat, *Handcuffs for the grabbing hand? Media capture and government accountability*, American Economic Review **96** (2006), no. 3, 720–736.

[11] Sylvain Bourjade and Bruno Jullien, *Expertise and bias in decision making*, mimeo (2007).

[12] Jeremy Burke, *Unfairly balanced: Unbiased news coverage and information loss*, mimeo (2007).

[13] Benedict Carey and Gardiner Harris, *Psychiatric group faces scrutiny over drug industry ties*, New York Times (2008), http://www.nytimes.com/2008/07/12/washington/12psych.html.

[14] Yeon-Koo Che and Navin Kartik, *Opinion and incentives*, mimeo (2008).

[15] Jay Pil Choi, *Broadcast competition and advertising with free entry: Subscription vs. free-to-air*, Information Economics and Policy **18** (2006), no. 2, 181–196.

[16] Harold L Cole, James Dow, and William B English, *Default, settlement, and signalling: Lending resumption in a reputational model of sovereign debt*, International Economic Review **36** (1995), no. 2, 365–85.

[17] Claude Crampes, Carole Haritchabalet, and Bruno Jullien, *Advertising, competition and entry in media industries*, Journal of Industrial Economics (forthcoming).

[18] Vincent P. Crawford and Joel Sobel, *Strategic information transmission*, Econometrica **50** (1982), no. 6, 1431–1452.

[19] Martin W. Cripps, George J. Mailath, and Larry Samuelson, *Imperfect monitoring and impermanent reputations*, Econometrica **72** (2004), no. 2, 407–432.

[20] Brendan M. Cunningham and Peter J. Alexander, *A theory of broadcast media concentration and commercial advertising*, Journal of Public Economic Theory **6** (2004), no. 4, 557–575.

[21] Mathias Dewatripont and Jean Tirole, *Advocates*, Journal of Political Economy **107** (1999), no. 1, 1–39.

[22] Robert Dur and Otto H. Swank, *Producing and manipulating information*, Economic Journal **115** (2005), 185–199.

[23] Erik Durbin and Ganesh Iyer, *Corruptible advice*, American Economic Journal: Microeconomics (forthcoming).

[24] Matthew Ellman and Fabrizio Germano, *What do the papers sell?*, mimeo (2006).

[25] Jeffren C. Ely and Juuso Välimäki, *Bad reputation*, Quarterly Journal of Economics **118** (2003), 785–814.

[26] Jorge Ferrando, Jean J. Gabszewicz, Didier Laussel, and Nathalie Sonnac, *Intermarket network externalities and competition: an application to media industries*, International Journal of Economic Theory (forthcoming).

[27] Adlai Fisher and Robert Heinkel, *Reputation and managerial truth-telling as self-insurance*, mimeo (2007).

[28] Center for Media and Democracy, *Fake TV news: Widespread and undisclosed*, report, April 2006.

[29] ______, *Still not the news*, report, November 2006.

[30] Lars Frisell and Johan N. M. Lagerlöf, *A model of reputation in cheap talk*, Scandinavian Journal of Economics **109** (2007), no. 1, 49–70.

[31] Jean J. Gabszewicz, Didier Laussel, and Nathalie Sonnac, *Press advertising and the ascent of the 'pensee unique'*, European Economic Review **45** (2001), no. 4-6, 641–651.

[32] ______, *Press advertising and the political differentiation of newspapers*, Journal of Public Economic Theory **4** (2002), no. 3, 317–34.

[33] ______, *Programming and advertising competition in the broadcasting industry*, Journal of Economics and Management Strategy **13** (2004), no. 4, 657–669.

[34] Esther Gal-Or and Anthony Dukes, *Minimum differentiation in commercial media markets*, Journal of Economics and Management Strategy **12** (2003), no. 3, 291–325.

[35] Chirantan Ganguly and Indrajit Ray, *Cheap talk: Basic models and new developments*, mimeo (2006).

[36] Matthew A. Gentzkow and Jesse Shapiro, *Media bias and reputation*, Journal of Political Economy **114** (2006), no. 2, 280–316.

[37] ______, *Competition and truth in the market for news*, Journal of Economic Perspectives **22** (2008), no. 2, 133–154.

[38] Dino Gerardi and Leeat Yariv, *Costly expertise*, American Economic Review **98** (2008), no. 2, 187–93.

[39] Gene M. Grossman and Elhanan Helpman, *Special interest politics*, MIT Press: Cambridge, 2001.

[40] Gardiner Harris and Benedict Carey, *Researchers fail to reveal full drug pay*, New York Times (2008), http://www.nytimes.com/2008/06/08/us/08conflict.html.

[41] Bengt Holmstrom, *Managerial incentive problems: A dynamic perspective*, Review of Economic Studies **66** (1999), no. 1, 169–82.

[42] Jordi Blanes i Vidal, *Credibility and strategic communication: Theory and evidence from securities analysts*, mimeo (2006).

[43] Elisabetta Iossa, *Reputational concerns in arbitration: Decision bias and information acquisition*, mimeo (2007).

[44] Jeong-Yoo Kim, *Cheap talk and reputation in repeated pretrial negotiation*, RAND Journal of Economics **27** (1996), no. 4, 787–802.

[45] David M. Kreps and Robert Wilson, *Reputation and imperfect information*, Journal of Economic Theory **27** (1982), no. 2, 253–279.

[46] Vijay Krishna and John Morgan, *Cheap talk*, The New Palgrave Dictionary of Economics (Steven N. Durlauf and Lawrence E. Blume, eds.), McMillan, 2 ed., 2007.

[47] Ming Li and Tymofiy Mylovanov, *Indifferent public, passionate advocates, and strategic media*, mimeo (2008), available at http://alcor.concordia.ca/˜mingli/research/manirep.pdf.

[48] Wei Li, *Changing ones mind when the facts change: Incentives of experts and the design of reporting protocols*, Review of Economic Studies **74** (2007), 1175–194.

[49] ______, *Peddling influence through intermediaries: Propaganda*, mimeo, University of California, Riverside, July 2007.

[50] George J. Mailath and Larry Samuelson, *Repeated games and reputations*, Oxford: Oxford University Press, 2006.

[51] Beatriz Mariano, *Do reputational concerns lead to reliable ratings?*, mimeo (2008).

[52] Paul Milgrom and John Roberts, *Predation, reputation, and entry deterrence*, Journal of Economic Theory **27** (1982), no. 2, 280–312.

[53] Stephen Morris, *Political correctness*, Journal of Political Economy **109** (2001), no. 2, 231–265.

[54] Sendhil Mullainathan and Andrei Shleifer, *The market for news*, American Economic Review **95** (2005), no. 4, 1031–1053.

[55] Wojciech Olszewski, *Informal communication*, Journal of Economic Theory **117** (2004), no. 2, 180–200.

[56] Marco Ottaviani and Peter Norman Sørensen, *Professional advice*, Journal of Economic Theory **126** (2006), no. 1, 120–142.

[57] ______, *Reputational cheap talk*, RAND Journal of Economics **37** (2006), no. 1, 155–175.

[58] ______, *The strategy of professional forecasting*, Journal of Financial Economics **81** (2006), no. 2, 441–466.

[59] Saltuk Ozerturk, *Stock recommendation of an analyst who trades on own account*, The RAND Journal of Economics **38** (2007), no. 3, 768–785.

[60] In-Uck Park, *Cheap-talk referrals of differentiated experts in repeated relationships*, RAND Journal of Economics **36** (2005), no. 2, 391–411.

[61] Martin Peitz and Tomasso M. Valletti, *Content and advertising in the media: Pay-tv versus free-to-air*, International Journal of Industrial Organization (forthcoming).

[62] Christopher Phelan, *Public trust and government betrayal*, Journal of Economic Theory **130** (2006), no. 1, 27–43.

[63] Jean-Charles Rochet and Jean Tirole, *Two-sided markets: A progress report*, RAND Journal of Economics **37** (2006), no. 3, 645–667.

[64] Joel Sobel, *A theory of credibility*, Review of Economic Studies **LII** (1985), 557–573.

[65] Phillip C. Stocken, *Credibility of voluntary disclosure*, Rand Journal of Economics **31** (2000), no. 2, 359–374.

[66] Dezsö Szalay, *The economics of clear advice and extreme options*, Review of Economic Studies **72** (2005), no. 4, 1173–1198.

[67] Kunio Tsuyuhara, *An advice game with reputational and career concern*, mimeo (2007).

[68] Thomas Wiesman, *Reputation and impermanent types*, Games and Economic Behavior **62** (2008), no. 1, 190–210.

[69] Phongthorn Wrasai and Otto H. Swank, *Policy makers, advisers, and reputation*, Journal of Economic Behavior & Organization **62** (2007), no. 4, 579–590.