Why Great Minds Think Alike: A Theory of Strategic Information Dissemination and Demand for News*

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Abstract

When deciding whether and which media outlet to read or watch, consumers may not only be driven by the considerations of getting direct utility or obtaining new information. In addition, they may take into account the opportunity that knowing certain news facilitates communication with other people. We build a model where agents of heterogeneous talent benefit from impressing their prospective employers. We show that the employer gets a more precise estimate of the worker's talent if they talk about the same news rather than about different issues. Consequently, smart agents have an incentive to read the same news as employers do in order to facilitate communication. Intuitively, doing the opposite would mean educating the employer at the expense of leaving a positive impression. If the initial polarization in preferences is not sufficiently low, everyone watches the same media outlets in equilibrium. The effect poses an endogenous limit on social learning and has important implications for the demand for information and for polarization within societies. This gives rise to several important implications.

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JEL Classification: D71, D74, C71.

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1 Introduction

In modern democracies, media play a key role in providing information to voters. This role is crucial because each individual voter has a negligible probability of being decisive for the outcome of an election and will therefore not find it in his self-interest to actively acquire information for the purpose of deciding for whom to vote, if such information acquisition is costly and has no further benefits for the voter. A fundamental question for the efficiency of democratic decisions is therefore what determines the individuals' demand for news, and how does the process of information dissemination affect the information level of voters.

In existing models in which media demand is endogenously determined, consumers' demand for news is determined by either a direct utility effect of (particular) news, or the instrumental value of news for the consumers' decision problems. (We provide a more detailed review of the related literature in Section 2). In this paper, we propose a new possible determinant of consumers' news demand and analyze its implications. We argue that watching news stories covered by the media allows agents to communicate with each other about these stories. Moreover, if two agents share the same background knowledge of a story, they obtain more reliable information about their communication partner's competence. When agents obtain a payoff from impressing other agents, they have an incentive to acquire information from the media, and specifically that type of information that their communication partners are also likely to know. This effect has profound implications for the diversity of information within society, effectively providing an endogenous limit on the demand for alternative information and viewpoints.

We illustrate this effect in a simple labor market context, where prospective employers and employees are randomly matched. In our model, agents of heterogeneous talent aim to impress their prospective employers because their wage depends on their employer's perception of their competence. Before contracting, the communication with a potential employee generates a signal for the employer about the worker's competence, and this signal is more precise if employer and worker both have prior knowledge of the story that they talk about. In contrast, if the agent tells the employer about news that the latter did not know, he will learn more new information, but will not receive a very precise signal about the agent's ability. In this setup, we show that high-type agents have an incentive to talk about issues that their communication partner already knows in order to facilitate communication and employer learning about their type. If agents' initial exogenous preference for a particular news story is not too high, this effect is powerful enough to eliminate equilibria where people watch different news; in every equilibrium, all agents watch the same news.

Our model suggests that individuals will condition the type of news that they choose to observe on their expectation of what their communication partners will focus on. Thus, people who have a strong prior expectation of which type of information will be useful for communication purposes have a strong incentive to watch the same news, but a very weak incentive to watch any other type of news. In contrast, people who are less certain of whom they will interact with have an overall lower incentive to watch any news; on the other hand, their incentive to watch the type of news that is less likely to be useful for communication is higher than for the group that is certain with which type they will interact.

For example, suppose that strong partisans are likely to interact mostly with other partisans who share their political point of view. Such strong partisans have a strong incentive to watch the same type of news that all of their ideological brethren watch, but a very low incentive to watch news geared towards the opposing party. As a consequence, we would expect that strong partisans know some news stories very well, while not knowing some equally or even more important ones. In contrast, people who interact with people of all ideological convictions (perhaps because they are moderates, or because they are supporters of what is the minority party in their part of the country) have a lower incentive to watch every last detail of partisan news, but do have a larger incentive to watch some news that is not geared to their own group.

To illustrate this point, consider the question: Was U.S. President Barack Obama born outside the United States and is therefore ineligible to serve as U.S. president? This is an ideal question for our purposes: In contrast to most knowledge questions in opinion polls that people may get wrong either because they were misinformed or because they have forgotten the correct answer, it here appears fair to assume that an individual would only answer the question in the affirmative if he heard news stories that Obama was born in Kenia (mainly in some right-wing news outlets) and did not hear news stories in main stream and left-leaning news outlets that debunked this rumor. We would expect that Republicans who live in areas that are strongly Republican and who therefore have to interact less frequently with Democrats or Independents than Republicans who live in areas where Republicans are a minority. A series of opinion polls by Research 2000 conducted in September 2009 supports this prediction. Among Republicans, the percentage of respondents answering No to the question "Do you believe that Barack Obama was born in the United States of America or not?" was 36 percent in Kentucky, 31 percent in Virginia, 29 percent in Arkansas, 18 percent in Nevada, 13 percent in Connecticut, and 10 percent in Maine. Thus, there appears to be a strong variation in this percentage, with the proportion being significantly higher in states with a higher percentage of conservatives.

While we do not explicitly analyze the effects of endogenous information acquisition on voting outcomes, it is clear that the coordination effect can give rise to persistent and decisive misinformation. That is, agents may focus on a particular type of news because their average communication partners are likely to focus on the same type of news. In this case, people are extremely well informed about some subjects, but may never learn other, potentially very pertinent information.

Another potential application of the model is to the problem of how scientists choose their line of research. Our model suggests that working in a "hot" area (in the sense that many smart individuals choose to study it) has the advantage that the receiver's prior belief about the agent's smartness is positive, and also to facilitate information transmission about the sender's type. The latter is particularly attractive for smart types. However, the positive aspect of coordination benefits also suggests that researchers may choose to remain in "hot" fields even though the intrinsic expected benefit of research would be higher in other fields. Moreover, in a dynamic version in which intrinsic expected benefits vary over time, a "hot" topic may cease to be hot very suddenly, because when some people move out of the area, the expected benefit from coordination for the remaining ones diminishes.

The rest of the paper is organized as follows. Section 2 describes related literature. Section 3 introduces a formal model and introduces the equilibrium concept. Section 4 analyzes (stable) equilibria and discusses their welfare implications.Then, in Section 5 we explore the consequences of the effect of restricted information dissemination in a variety of social and political-economic contexts. Section 6 concludes. Appendix A contains the proofs of results, and Appendix B describes the entire set of equilibria (both stable and unstable).

2 Related literature

Our model contributes to the literature analyzing the demand for media. This literature also focuses on how media demand feeds back into the type of news reported in equilibrium by the media. In a first class of models, the selection of news provided by a media outlet may directly affect the utility that different consumers would obtain from listening to the media outlet (e.g., **?**), **?**)) the direct consumption utility provided by the news. Second, consumers may value the information provided by news outlets because it is useful for agents in their private decision problems (e.g., **?**)). In this case, media benefit if they have a reputation for accurately reporting news (e.g., **?**)).

Our model provides a new theory for how people choose the news that they consume, based on their expectations about what news will be most useful in order to successfully communicate with their communication partners. While there is nothing in the model that compels these news to be "biased" in a political sense, it is certainly possible that this is the case and a very focal coordination point. For example, as long as there are some small forces that push society in the direction of media bias (for example, supply-based as in **?**) or **?**), or demand-side driven as in **?**) or **?**)), our model provides a reason why such a configuration may remain stable even though many people might, in principle, prefer a different type of news: As long as everybody watches a particular type of news, there are considerable benefits to being "well-informed" with regard to those stories that everyone focuses on.

There are wide-spread concerns that the decline of the traditional media together with the rise of internet sources that are perceived as more biased may generate a more intense partisan divide fueled by voters who listen to disjunct sets of news and thus cannot agree on some basic facts that are essential both for sound decision-making by the electorate and for the legitimacy of the elected government: If the core of the news that affects an election is more or less shared among voters, the perceived legitimacy of the government (even among opposition party supporters) is higher than when government supporters and opposition supporters listen to completely separate news stories. For example, the Economist writes that "the 50-50 nation appears to be made up of two big, separate voting blocks, with only a small number of swing voters in the middle",[1] and that "America is more bitterly divided than it has been for a generation".[2] In contrast, **?**) argue that even though partisans may be more partisan, there is a large center of voters who are largely ambivalent or indifferent and that "there is little evidence that Americans' ideological or policy positions are more polarized today then they were two or three decades ago, although their choices often seem to be."

Our paper contributes to the literature that analyzes whether democratic election aggregate information efficiently. **?**) argues that democracy leads to efficient outcomes as long as voters do not make systematic mistakes. The reasons for why voters are poorly informed, and the exact circumstances of information are important for the electoral consequences. The work on the Condorcet Jury Theorem (see, e.g., **?**), **?**)) suggests that democratic societies are very efficient in aggregating information as long as different voters receive independent information. Similarly, **?**) endogenizes voters' decisions about how much information to acquire. If marginal information acquisition costs are initially zero, then efficient outcomes arise despite the public good provision problem.

However, informational diversity plays a more important role than the average quality of information for these results: As long as all individuals receive independent signals, the election result will (for large societies) fully aggregate information even if individuals are, on average, very poorly informed. In contrast, if all individuals receive the same signals, there is a substantial probability that the election outcome will match the state of the world correctly, even if the quality of the signal is high.

[1] "On His High Horse," Economist, November 9, 2002: 25.
[2] "America's Angry Election," Economist, January 3, 2004.

3 Model

There are two sources of information, A and B. For simplicity, we will refer to them as TV news channels, but these may be newspapers, books, movies, or any other source of information. There is a unit continuum of agents, of which share α prefers channel A ($\nu = A$) and share $1 - \alpha$ prefers channel B ($\nu = B$). In the beginning of the game, agents decide which channel to watch (each agent i chooses $z_i \in \{A, B\}$); those who watch their favorite channel $z_i = \nu_i$ get an additional utility $b \geq 0$. Watching channel z_i makes the agent aware of the message m_{z_i} (either m_A or m_B).[3] In addition, each agent exerts some effort, which determines the probability of becoming productive, or smart ($\tau = H$ with productivity $t = h$) as opposed to unproductive, or incompetent ($\tau = L$ with productivity $t = l = 0$). Assume that to become productive with probability π, an agent needs to pay cost $c(\pi)$, which is smooth and strictly convex and such that $c(0) = c'(0) = 0$, $c'(1) = +\infty$. We assume that agents learn their productivity prior to choosing the source of information; the interpretation is that education is a once-in-a-lifetime decision, while news source may be reconsidered on a regular basis.

Workers and employers are randomly matched (worker i is matched to employer γ_i), and each pair has a job interview, which determines worker's wage. As part of the interview, the worker tells the employer a story about the news he watched (we assume that he cannot talk about the news that he did not watch). During the interview, the employer gets a signal s about the worker's productivity τ. More precisely, $s_i = t_i + m_{z_i} + \varepsilon_i$; here, t_i is the productivity of worker i (known to the worker but not the employer), m_{z_i} is the message broadcasted by channel z_i (known to the worker, and perhaps to the employer if he watched the same news), and error term ε_i (unknown to either party). We assume that m_z is distributed as $\mathcal{N}\left(\mu, \sigma_m^2\right)$ for $z \in \{A, B,\}$, and ε_i is distributed as $\mathcal{N}\left(0, \sigma_\varepsilon^2\right)$; all these variables are independent. After talking with the prospective employer, the worker makes a take-it-or-leave-it offer about his wage, which the employer either accepts or rejects.[4]

The interpretation we have in mind is as follows: what the applicant says is more likely to seem smart to the employer if the underlying message is interesting (m_{z_i} is high), the applicant is really smart, which allows him to add some interesting details or draw interesting conclusions from the news he watched, and there may be some noise in communication.[5] More precisely, the timing of the game is as follows.

1. Each agent i chooses the probability that he becomes productive π_i, and ultimately learns

[3] Our results would not change if agents who watch channel z get noisy signals about m_z. We discuss this in the end of the paper.

[4] This assumption is made to avoid modeling bargaining under asymmetric information explicitly. For the modeling purposes, it would be sufficient that a better impression (i.e., employer's higher posterior belief that the worker is smart) increases the worker's wage.

[5] Our results do not depend qualitatively on whether this noise is high or low.

his productivity $\tau_i \in \{H, L\}$.

2. Each agent i learns his preferences about the news channel, ν_i, chooses the news channel, A or B ($z_i = A$ or $z_i = B$, respectively), and gets message m_{z_i}.

3. Each agent becomes either employer or worker, and workers and employers are randomly matched.

4. Worker i tells his employer γ_i the news. Employer γ_i gets signal $s_{\gamma_i} = t_i + m_{z_i} + \varepsilon_i$. In addition, he knows m_{z_i} if $z_{\gamma_i} = z_i$ (where z_{γ_i} is the news that employer γ_i watched). Worker i also knows this signal (the implicit assumption is that at this stage, he knows both ε_i and whether or not employer watched m_{z_i} himself).

5. Worker i makes a take-it-or-leave-it offer w_i to employer γ_i.

6. Employer γ_i agrees or disagrees ($\zeta_i = 1$ if agrees, $\zeta_i = 0$ otherwise).

7. Everyone receives payoffs: worker i gets $w_i\zeta_i + b\mathbf{I}\{z_i = \nu_i\}$, employer $\gamma(i)$ gets $(t_i - w_i)\zeta_i + b\mathbf{I}\{z_{\gamma_i} = \nu_{\gamma_i}\}$.

We adopt the following equilibrium definition. The set of strategies of each agent i is $(z_i, \pi_i, w_i, \zeta_i)$, where w_i and ζ_i may depend on all relevant variables known to the agent at that stage.

Definition 1 *The equilibrium concept is Perfect Bayesian equilibrium (PBE) in pure strategies.*

The focus on pure strategies is reasonable, since we have a continuum of agents. For the most part of the paper, we are going to focus on a subset of Bayesian Nash equilibria, which we will call *stable*.

Definition 2 *We call Perfect Bayesian equilibrium in pure strategies σ* stable *if for there exists $\varepsilon > 0$ such that if set X of agents, the measure of which does not exceed ε, deviate to strategies $\{\sigma_i'\}_{i\in X}$, and the beliefs are updated accordingly, then each such agent i is at least as well of playing the equilibrium strategy σ_i as playing the new strategy σ_i'.*

Our motivation to focus on stable equilibria is the following. First, such equilibria are natural to focus on, as they are arguably more likely to be played in reality. Second, in any such equilibrium, all players with the same productivity and preferences over media channels end up watching the same channel; in this sense, equilibria are simple. Third, the main question we are focusing on is under which conditions agents will watch their favorite channel, when all agents will pool and watch the same channel, and what are the welfare implications of these equilibria. As we show below (Proposition 6), only such equilibria may be stable. In addition, in the light of this result, although the full characterization of equilibria is somewhat cumbersome, stable equilibria are quite easy to characterize. For this reason, we focus on stable equilibria throughout the paper, and relegate full characterization of equilibria to the Appendix.

4 Analysis

To analyze the equilibria in this case, we proceed in several steps. First, in Subsection 4.1, we study the incentives and trade-offs involved in strategic communication. We then proceed by backward induction. We fix the investment decision of agents which they make at the beginning of the game, and assume that share $p \in (0,1)$ of agents are smart (productive). In Subsection 4.2, we characterize the equilibria in the corresponding subgame in a simpler game where employers' choice of the news channel is fixed and non-strategic, and in Subsection 4.3 we do so for the main case where both employers and workers choose strategically, prior to knowing which one they become. Analyzing both cases will help us understand the incentives of workers and employers separately. Finally, in Subsection 4.4, we study the equilibria of the entire game, and characterize the agents' investments in their productivity, as well as discuss welfare implications.

4.1 Strategic Communication

Let us first fix p, the share of smart workers, and assume that it takes some interior value: $p \in (0,1)$. Denote the share of workers of type $\tau \in \{L,H\}$ preferring channel $\nu \in \{A,B\}$ that in equilibrium watch channel A by $\delta_{\tau\nu}$. Notice that, unless $b=0$, $\delta_{\tau B} > 0$ implies $\delta_{\tau A} = 1$, and $\delta_{\tau A} < 1$ implies $\delta_{\tau B} = 0$: indeed, if some smart workers who prefer B are indifferent between A and B, then those preferring A should choose A in equilibrium, etc. If $b=0$, then the preferences of workers may be ignored, and without loss of generality we may assume that the same properties on $\{\delta_{\tau\nu}\}$ hold. Let

$$\begin{aligned} \delta_H &= \alpha\delta_{HA} + (1-\alpha)\,\delta_{HB}, \\ \delta_L &= \alpha\delta_{LA} + (1-\alpha)\,\delta_{LB}; \end{aligned}$$

denote the shares of smart and incompetent workers who watch channel A, respectively. In that case, the probabilities that a worker is smart conditional on his choice of channel A or B are given by

$$\begin{aligned} q_A &= \frac{p\delta_H}{p\delta_H + (1-p)\,\delta_L}, \\ q_B &= \frac{p\,(1-\delta_H)}{p\,(1-\delta_H) + (1-p)\,(1-\delta_L)}, \end{aligned}$$

respectively.

Let us now compute $\Pr(\tau = H \mid z, s, m)$ and $\Pr(\tau = H \mid z, s)$ (recall that $z \in \{A, B\}$ denotes the type of news that the worker watched). Below, we will abuse the notation Pr to denote densities as well as probabilities.

If the recipient knows s and m, his task is to separate $s - m$ into t and ε.

$$
\begin{aligned}
\Pr(\tau = H \mid z, s, m) &= \frac{\Pr(\tau = H; s, m \mid z)}{\Pr(s, m \mid z)} \\
&= \frac{q_z \frac{1}{\sqrt{2\pi}\sigma_\varepsilon} \exp\left(-\frac{(s-m-h)^2}{2\sigma_\varepsilon^2}\right)}{q_z \frac{1}{\sqrt{2\pi}\sigma_\varepsilon} \exp\left(-\frac{(s-m-h)^2}{2\sigma_\varepsilon^2}\right) + (1 - q_z) \frac{1}{\sqrt{2\pi}\sigma_\varepsilon} \exp\left(-\frac{(s-m)^2}{2\sigma_\varepsilon^2}\right)} \\
&= \frac{1}{1 + \frac{1-q_z}{q_z} \exp\left(-\frac{1}{\sigma_\varepsilon^2}\left(h(s-m) - \frac{h^2}{2}\right)\right)}.
\end{aligned}
$$

If the recipient knows s, his task is to separate it into t and $m+\varepsilon$, which he knows is distributed as $\mathcal{N}\left(\mu, \sigma_m^2 + \sigma_\varepsilon^2\right)$.

$$
\begin{aligned}
\Pr(\tau = H \mid z, s) &= \frac{\Pr(\tau = H; s \mid z)}{\Pr(s \mid z)} \\
&= \frac{q_z \frac{1}{\sqrt{2\pi}\sqrt{\sigma_m^2+\sigma_\varepsilon^2}} \exp\left(-\frac{(s-\mu-h)^2}{2(\sigma_m^2+\sigma_\varepsilon^2)}\right)}{q_z \frac{1}{\sqrt{2\pi}\sqrt{\sigma_m^2+\sigma_\varepsilon^2}} \exp\left(-\frac{(s-\mu-h)^2}{2(\sigma_m^2+\sigma_\varepsilon^2)}\right) + (1 - q_z) \frac{1}{\sqrt{2\pi}\sqrt{\sigma_m^2+\sigma_\varepsilon^2}} \exp\left(-\frac{(s-\mu)^2}{2(\sigma_m^2+\sigma_\varepsilon^2)}\right)} \\
&= \frac{1}{1 + \frac{1-q_z}{q_z} \exp\left(-\frac{1}{\sigma_m^2+\sigma_\varepsilon^2}\left(h(s-\mu) - \frac{h^2}{2}\right)\right)}.
\end{aligned}
$$

Since we assume that workers can make a take-it-or-leave it offer to their employers and that they observe the signals that employers get, then (assuming risk neutrality), a worker's wage is given by $h\Pr(\tau = H \mid z, s)$ or $h\Pr(\tau = H \mid z, s, m)$. The purpose of giving the worker all bargaining power is to make sure that the worker's wage depends positively on the employer's belief. Any alternative modeling in which this is true would yield qualitatively similar results.

To calculate the prospective workers' strategies, we need to compute the expectation of the employer's perception, computed at the time when the worker decides which news to watch. Suppose that his type is t and he chooses to watch news of type z. If the employer watched the same news, then the worker's expected wage is $\mathbf{E}_{\varepsilon,m}\left(\Pr(\tau = H \mid z, s, m) \mid t\right)$; if the employer watched different news, it is $\mathbf{E}_{\varepsilon,m}\left(\Pr(\tau = H \mid z, s) \mid t\right)$, respectively. We have:

$$
\mathbf{E}_{\varepsilon,m}\left(\Pr(t = h \mid z, s, m) \mid t\right) = \int_{-\infty}^{+\infty} \frac{\frac{1}{\sqrt{2\pi}\sigma_\varepsilon} \exp\left(-\frac{x^2}{2\sigma_\varepsilon^2}\right)}{1 + \frac{1-q_z}{q_z} \exp\left(-\frac{1}{\sigma_\varepsilon^2}\left(h(x+t) - \frac{h^2}{2}\right)\right)} dx
$$

(here, x denotes $s - m - t = \varepsilon$), and

$$\mathbf{E}_{\varepsilon,m}\left(\Pr\left(\tau = H \mid z, s\right) \mid t\right) = \int_{-\infty}^{+\infty} \frac{\frac{1}{\sqrt{2\pi}\sqrt{\sigma_m^2+\sigma_\varepsilon^2}} \exp\left(-\frac{x^2}{2(\sigma_m^2+\sigma_\varepsilon^2)}\right)}{1 + \frac{1-q_z}{q_z}\exp\left(-\frac{1}{\sigma_m^2+\sigma_\varepsilon^2}\left(h\left(x+t\right) - \frac{h^2}{2}\right)\right)} dx$$

(here, x denotes $m + \varepsilon - \mu$). Both expressions are increasing in t and in q_z, which is intuitive. Also, it is clear that the only difference between the two expressions is the variance of the uncertain component: σ_ε^2 in th first case and $\sigma_m^2 + \sigma_\varepsilon^2$ in the second one.

Let us introduce the notation

$$K\left(\tau, z, z^e\right) = K\left(\tau, z, z^e \mid q_A, q_B\right) = \int_{-\infty}^{+\infty} \frac{\frac{1}{\sqrt{2\pi}\sqrt{\sigma_m^2 \mathbf{I}\{z \neq z^e\}+\sigma_\varepsilon^2}} \exp\left(-\frac{x^2}{2(\sigma_m^2 \mathbf{I}\{z \neq z^e\}+\sigma_\varepsilon^2)}\right)}{1 + \frac{1-q_z}{q_z}\exp\left(-\frac{1}{\sigma_m^2 \mathbf{I}\{z \neq z^e\}+\sigma_\varepsilon^2}\left(h\left(x+t\right) - \frac{h^2}{2}\right)\right)} dx,$$

where t is worker's type, z is the news he watched, and z^e is the news his employer watched. $K\left(t, z, z^e\right)$ also depends on q_z, which decision-makers take as given in the model, hence we suppress this notation most of the time. Then the expected utility of person i if he watches news z_i equals

$$u_i\left(z\right) = \lambda h K\left(\tau_i, z, A\right) + \left(1 - \lambda\right) h K\left(\tau_i, z, B\right) + b\mathbf{I}\left\{z = \nu_i\right\}.$$

This object, $K\left(\tau, z, z^e\right)$, has a very intuitive interpretation. It measures the impression that an employer who watched news z^e gets after communicating with a prospective worker of type t who watched news z. The next proposition is central in this subsection; it summarizes some of the key properties of $K\left(\tau, z, z^e\right)$.

Proposition 1 *The following is true.*

(i) For all τ, z, z^e, $K\left(\tau, z, z^e \mid q_z\right)$ is increasing in q_z. Moreover, if $q_z = 0$ or $q_z = 1$, then $K\left(\tau, z, z^e\right) = q$.

(ii) $K\left(H, z, z^e\right) > K\left(L, z, z^e\right)$ for any z and z^e, provided that $q_z \notin \{0, 1\}$. In other words, higher types leave, all things equal, a stronger impression.

(iii) If $q_A \notin \{0, 1\}$, then $K\left(H, A, A\right) > K\left(H, A, B\right)$ and $K\left(L, A, A\right) < K\left(L, A, B\right)$. Similarly, if $q_B \notin \{0, 1\}$, then $K\left(H, B, B\right) > K\left(H, B, A\right)$ and $K\left(L, B, B\right) < K\left(L, B, A\right)$. In other words, smart workers would, ceteris paribus, prefer to talk with employers about issues that employers already know, and incompetent workers would prefer to talk about different issues.

(iv) For any $q_A \in (0, 1)$ there exists $q_B \in (q_A, 1)$ such that $K\left(H, A, A \mid q_A\right) = K\left(Hh, B, A \mid q_B\right)$, and there exists $q_B' \in (0, q_A)$ such that $K\left(L, A, A \mid q_A\right) = K\left(L, B, A \mid q_B'\right)$. In other words, a smart worker prefers to talk about news that the employer does not know only if the pool of people that watch those news is better. Likewise, an incompetent worker prefers to talk about different news even if the the pool of people who do this is worse – yet not sufficiently worse – than the pool of people who read the same news.

Proof of Proposition 1. See Appendix A.

Part (i) of Proposition 1 is trivial: if more high types watch a given news outlet, then it is more likely that the person who watches is of high type ex post. If only high or only low types watch news outlet z, then no further updating will take place. Part (ii) suggests that high types are more likely to leave an impression that they are of high type, for any given combination of news that employers and workers read. Part (iii) highlights the key intuition in the paper: for a smart worker to make a stronger impression, he needs to talk about the news that the employer already knows. Similarly, an incompetent worker would like to talk about different news, as this allows him to hide his type. Part (iv) pushes this intuition further. A smart worker prefers to talk about z^e as long as the pool of workers who do this is not too incompetent, as compared with the pool of those who do not. An incompetent worker will avoid doing this – unless, of course, the pool of workers who do is exceptionally good.

We now study, how the incentive of smart workers to choose the news channel that employers watch (and the opposite incentive of incompetent workers) affect the equilibrium strategies of both groups.

4.2 Non-Strategic Employers

To illustrate the impact of strategic choice of media by smart and incompetent workers on the equilibrium outcomes, we start with the case where employers are non-strategic. This case may also be of separate interest: for instance, it may be realistic to think that current employers decided which newspapers to read and which newspapers to watch when they were new to the industry, and now stick to the industry standard. To give an example, it is possible that all investment bankers read WSJ in the mornings, and workers take this as given. A more important role of this section is that it allows us to see, how opposite incentives of smart and incompetent workers determine equilibria.

For the purpose of this subsection, suppose that the choice of employers about the news channel is nonstrategic: share λ of employers watch channel A, and share $1 - \lambda$ of employers watch channel B. This share λ may or may not equal α, the share of workers who prefer channel A.[6]

Proposition 1 allows us to study best responses of the prospective workers. In this case, we have the following results. First suppose that $\lambda = 1/2$ (this is a benchmark case where workers do not have incentives to watch different channels for the purpose of communication).

[6] In some cases it might be natural to think that $\lambda = \alpha$, but we allow these shares to be different. For instance, if employers have been working in the industry for a while, and among prospective workers there are newcomers to the industry, it is possible that channels that employers actually watch are different from the ones preferred by workers.

Proposition 2 *Suppose that both media outlets are equally popular among employers, i.e., $\lambda = 1/2$. Then there exist $b_1 > 0$ such that:*

(i) If $0 \leq b < b_1$, then there are two stable equilibria: where all workers watch channel A, all watch channel B, and all workers watch their favorite channel.

(iii) If $b > b_1$, then there exists a unique pure strategy equilibrium where all workers watch the channel they prefer. Moreover, if $b > b_2$, this is the unique equilibrium.

Proof of Proposition 2. See Appendix A.

Let us now consider the case with $\lambda \neq 1/2$. For the sake of simplicity, assume that $\lambda > 1/2$ (the opposite case is symmetric).

Proposition 3 *Suppose that $\lambda > 1/2$. There exist $0 < b_0 < b_1$ such that:*

(i) If $0 \leq b < b_0$, i.e., workers have only mild preferences (if any) for media outlets, then there are exactly two stable equilibria: in one all workers watch channel A, and in the other all workers watch channel B.

(ii) If $b_0 < b < b_1$, then there exist three stable equilibria: where all workers watch A, all watch B, and all watch their preferred channel.

(iii) If $b > b_1$, then there is a unique stable equilibrium, in which all workers watch their preferred channel.

(iv) Threshold values b_0 and b_1 are increasing in λ. In other words, stronger bias of employers decreases the set of preference parameters where workers watch their preferred channels. In addition, b_1 is increasing in p: higher share of smart workers make pooling equilibria easier to sustain.

Proof of Proposition 3. See Appendix A.

The two propositions, 2 and 3, highlight the same trend. If workers have only mild preferences for media outlets, then there are only (stable) equilibria where all workers watch the same channel. For a very high intensity of preferences, the only equilibrium is where all workers watch the same channel. In the intermediate cases, all three situations may arise in equilibrium. One can easily see that the case $\lambda = 1/2$ is the limit case of $\lambda > 1/2$; as λ tends to $1/2$, threshold b_0 tends to 0.

Here, we have the result that might seem counterintuitive at first glance: if b is small but positive, watching one's preferred news is not a (stable) equilibrium (in Appendix B we show that it is an equilibrium, albeit not a stable one, for $\lambda = 1/2$; for other λ it is not even an equilibrium). The intuition here is as follows. Suppose that $\lambda > 1/2$, and this is an equilibrium. In that case, the probability of being smart conditional on watching A is p, and conditional on watching B is also p, i.e., there is no discrimination based on the channel watched. A smart worker knows, however, that he is more likely to impress the employer if they watch the same channel. Since the majority of employers watch channel A, this gives the smart worker an incentive to watch A even if he prefers B, provided that preferences for B are relatively mild. But if some smart workers who prefer B switch to A, the rest will find themselves in an even higher disadvantage, as the probability of being smart conditional on watching B now falls. As a result, all smart workers would switch to A. In that case, incompetent workers also must switch to A, for otherwise they will be (correctly) diagnosed as incompetent, no matter what employer they encounter. So, it is impossible that in an equilibrium all workers watch the news channel is like, if b is small. Proposition 3 above captures this intuition.

We can illustrate Proposition 3 using the following diagrams. On each of Figure 3 – Figure 6, we depict candidate equilibrium behaviors of smart and incompetent agents (the horizontal axis corresponds to δ_L, the vertical axis corresponds to δ_H). For each of these parameters, we compute the optimal behavior of each agent, and write, in the corresponding region on the left, which agents will watch channel A. Dotted green lines define the borders between these areas. On the right diagram, we draw the sets of parameters where agents play their best response: red color corresponds to smart agents (both preferring channel A and channel B), and yellow color corresponds to incompetent agents (again, both preferring A and B). The intersections of these sets correspond to Perfect Bayesian equilibria. However, as Proposition 6 below will show, only the ones where all agent watch the same channel, or all agents watch their preferred channel, may be stable. This may also be seen from the diagrams. Loosely speaking, a deviation by the incompetent agents from the yellow line gives them incentives to return. In contrast, smart agents have incentives to return only if they made a minor departure from a horizontal red line; otherwise, even more smart agents will have an incentive to deviate.

On Figure 3 – Figure 6, we hold all parameters fixed, and gradually increase b from 0 to infinity.

4.3 Strategic Employers

Our next step is characterizing equilibria in the case where employers choose the news channel before knowing that they will become employers. Obviously, this exacerbates the coordination problem. Nevertheless, the main results continue to hold.

As before, we take $p \in (0, 1)$ as fixed.

Proposition 4 *There exist* $0 < b_0 < b_1$ *such that:*

(i) If $0 \leq b \leq b_0$*, i.e., workers have only mild preferences (if any) for media outlets, then there are exactly two stable equilibria: in one all workers watch channel* A*, and in the other all workers watch channel* B*. The threshold* b_0 *is positive for* $\alpha \neq 1/2$ *and is equal to zero otherwise.*

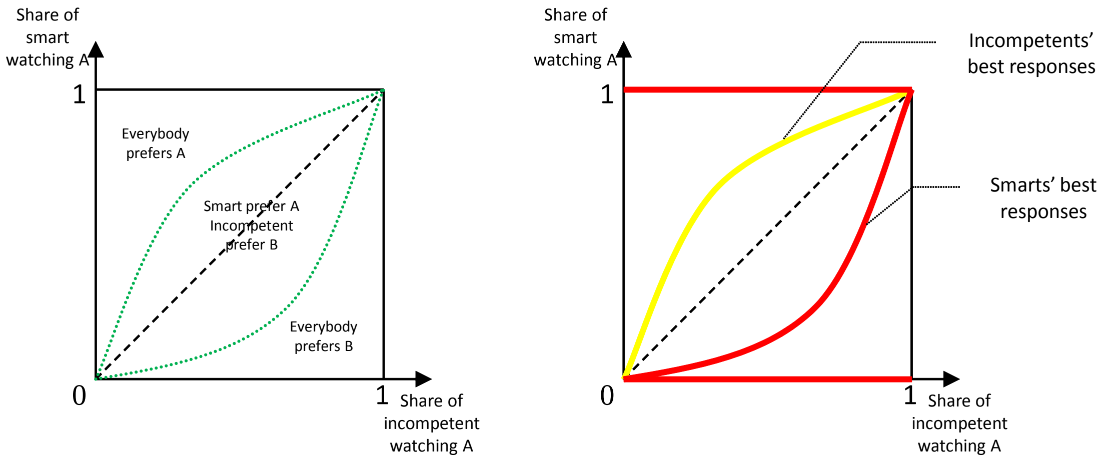

Figure 3: Non-strategic employers, $b = 0$.

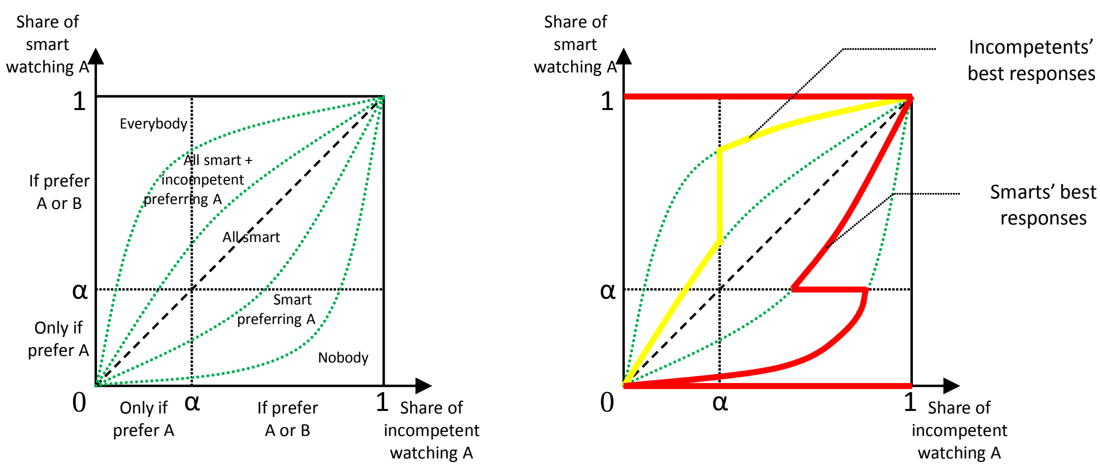

Figure 4: Non-strategic employers, $0 < b < b_1$.

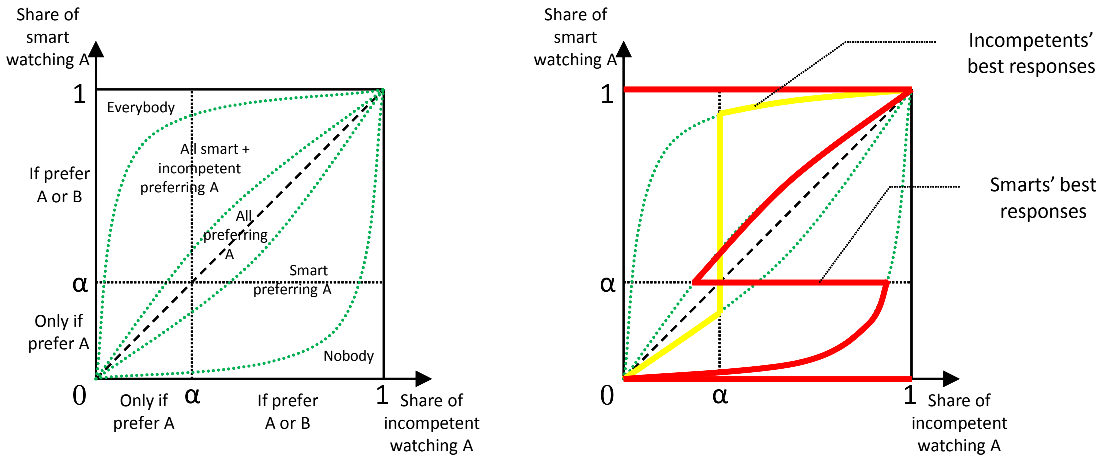

Figure 5: Non-strategic employers, $b > b_1$.

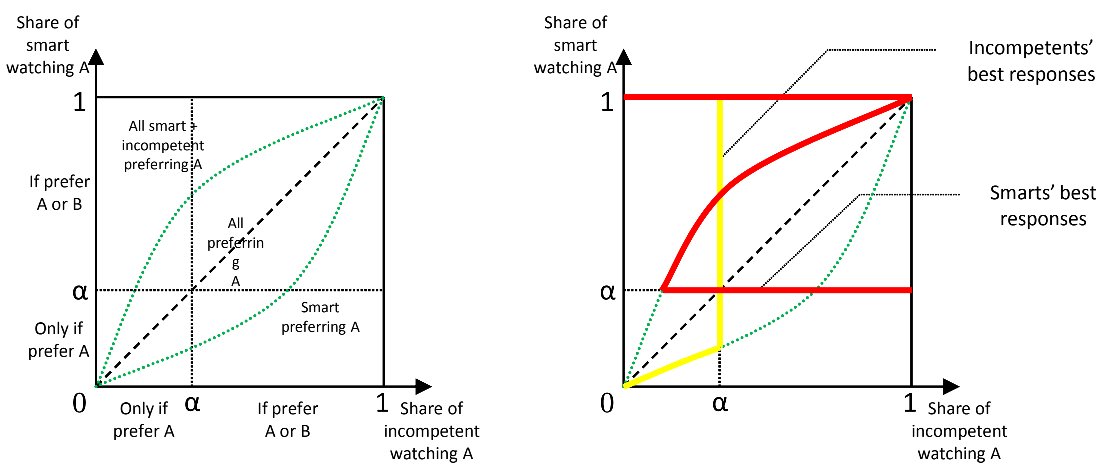

Figure 6: Non-strategic employers, $b \gg b_1$.

If $b_0 = 0$*, then there is an unstable equilibrium where exactly half of workers watch each channel.*

(ii) If $b_0 < b < b_1$*, then there exist three stable equilibria: where all workers watch* A*, all watch* B*, and all watch their preferred channel.*

(iii) If $b > b_1$*, then there is a unique stable equilibrium, in which all workers watch their preferred channel.*

Proposition 5 *There are thresholds* $0 \leq b_1 < b_2$ *such that:*

(i) If $b < b_1$*, then there are two equilibria in pure strategies: where all players watch* A *and where all players watch* B*. In addition, there is at least one mixed-strategy equilibrium. Threshold* b_1 *is positive whenever* $\alpha \neq 1/2$*.*

(ii) If $b_1 < b_1 < b_2$*, then there are three equilibria in pure strategies.*

(iii) If $b_1 > b_2$*, then there is one equilibrium in pure strategies, and in this equilibrium, all workers watch the same news.*

Proof of Proposition 5. See Appendix A.

Proposition 5 establishes a result which is similar to Proposition 3 from Subsection 4.2. Whenever b is sufficiently low, only pooling equilibria, where all agents coordinate on a single outlet, are stable. In contrast, when b is high enough, we will get either three stable equilibria, or a unique stable equilibrium where all agents watch their favorite channel.

Proposition 5 may be illustrated using the following diagrams (Figure 5 – Figure 7).[7] Note that unlike the case with fixed strategies of employers, where smart agents always had stronger incentives to watch channel A, here they only have such incentives if a majority of agents watch channel A. The diagrams are performed for $p = 1/2$; if p is different from $1/2$, they will look slightly differently but the intuition will remain.

4.4 Equilibria

In this subsection, we finish the characterization of stable equilibria of the game. The key result that facilitates characterization is the following.

Proposition 6 *In the game:*

(i) In any stable equilibrium, either all agents watch channel A*, or all agents watch channel* B*, or all agents watch the channel that they prefer.*

(ii) Conversely, any such equilibrium is stable, provided that it would remain an equilibrium after any small perturbation of parameter b*, the intensity of preferences for the favorite news channel.*

[7] Skipped from this submission due to file size limitations.

Proof of Proposition 6. See Appendix.

We are now ready to use the results above to study the optimal investment choices. There may be multiple equilibria; more precisely, the following result holds.

Proposition 7 *The equilibrium investment choice of players satisfies the following properties.*

(i) There always exists an equilibrium where each agent i chooses $\pi_i = 0$. In this equilibrium, all agents are incompetent, and all watch their favorite channel.

(ii) For any $b \geq 0$ there exists another equilibrium where all agents watch their favorite channel, but choose a positive investment $\pi_i > 0$ in the beginning of the game.

(iii) There exists a threshold $b' > 0$ such that whenever $b \leq b'$ there is an equilibrium where all agents watch A and there exists an equilibrium where all agents watch B. For $b > b'$ such equilibria do not exist. In any such equilibrium, effort $\pi_i > 0$.

(iv) If $b \leq b'$ (i.e., both types of equilibria exist), then in equilibrium with the highest π_i all players watch the same channel, and in the equilibrium with the lowest π_i (equal to zero), all players watch the channel that they prefer.

Proof of Proposition 7. See Appendix A.

The above proposition establishes the main result of the paper. If players preferences are sufficiently high, then they will necessarily watch their preferred channel, and there will be multiple equilibria. Take, however, the more interesting case, where agents' preferences over news channels are not too strong. In this case, both types of equilibria are possible. The most interesting result, however, is that while there may be multiple equilibria, the two types of equilibria may be ranked according to the share of smart workers. The equilibrium with the least share of smart workers is necessarily the one where agents watch their favorite channel. In the best equilibrium, in the sense that the share of smart workers is the highest, all agents necessarily watch the same channel. The intuition for this result is very simple. Whenever agents anticipate that a pooling equilibrium will be played, they have an incentive to invest more than if they anticipate an equilibrium where they will watch their favorite channel. Indeed, a pooling equilibrium facilitates information transmission. Consequently, the premium for being smart is higher. Moreover, the higher the share of smart agents, the easier it is to sustain a pooling equilibrium, as a deviation would result in a higher drop in employer's perception. As a result, whenever there exists an equilibrium where everyone watches the same channel, the equilibrium where agents invest most must necessarily have this property.

Proposition 7 highlights the following trade-off for the society. On the one hand, a pooling equilibrium facilitates communication, and thus provides higher incentives to invest in one's productivity. (Note that these investments may have a negative externality and decrease welfare.)

On the other, a pooling equilibrium results in welfare loss as some people will watch channel they do not like. The following result summarizes this trade-off.

Proposition 8 *If b is small enough, then welfare is maximized in a pooling equilibrium where a majority watch their favorite news.*

Proof of Proposition 8. See Appendix A.

5 Extensions

This paper identifies a strategic reason for individuals to get the information that other individuals already know: to watch the same news channels or movies, read the same newspapers or books. People will do this whenever they have an incentive to impress and their preferences for an alternative occupation is not too strong. This may arise in economic, political, and social environments. Consequently, there are numerous situations when this model may be applicable.

One trivial example would be preferences over sports, books, movies, etc. They have little to do with economic activity, but it is typical for people to form clusters according to their interests. The natural explanation is that somebody who likes baseball prefers to deal with people who also like baseball, and somebody who likes a particular TV series prefers to interact with people with a similar interest. Our model, however, suggest that an opposite effect is possible. A person may start to watch baseball simply because his colleagues do so, even though he is interested in hockey. However, a talk about hockey would hardly impress them, whereas some remark about the last baseball game may well do so.

If we are to incorporate media as businesses in the model, the a pooling equilibrium may be interpreted as a monopoly (the channel that is watched by nobody will go out of business), and separating equilibria may be interpreted as competing outlets. The desire of agents to talk about the same things will then put an endogenous limit on the competition in this market, and this effect is different from the economy of scale (even with zero production cost the effect will arise). Essentially, the model predicts that people disproportionately prefer to watch the media that their neighbors and co-workers watch. For example, Republicans rarely watch MSNBC (or Democrats rarely watch Fox News), although this would help them get a view from the other side of the political spectrum, and get a less biased view overall. According to our model, if they tend to communicate with similar people, they would leave a better impression if they do not deviate and get a less biased view, but rather stick to their biases.

Needless to say, pooling equilibria may lead to biased views of the people, with the bias not vanishing over time. Endogenous polarization is among the possible consequences, and the example from the Introduction about the share of Republicans believing that Obama was not born in the US illustrates such situation. Such endogenous polarization may shape the political map and affect electoral campaigns.

Another possible extension deals with research. It is natural to think that young researchers focus their efforts on the topic which they like best and where they are most productive. However, the need to find post-doc and tenure-track positions and publish makes them choose problems which are hot, and where they are more likely to impress existing reputable scholars. As a result, hot topics will have a tendency to remain hot for an inefficiently long period, until the preferences of most scholars for some other topic will become overwhelmingly strong. If we were to consider a dynamic version of the model, one prediction could be that hot research topics do not change gradually, but rather very fast, and ultimately too late.

Apart from the welfare trade-off discussed above (pooling equilibria increase investment in education, while separating increase the utility from watching TV), there may be other considerations which are important for the society but left aside from the model. For instance, production technology may be such that there are synergies from smart people working together; in that case, pooling equilibria will have a natural advantage as they facilitate identification of smart workers. At the same time, pooling equilibria prevent accumulation and dissemination of information within the society, and ultimately social learning. Pushing these considerations to the extreme may lead to a trade-off between a diverse society where knowledge is accumulated, and a productive society where creation and dissemination of knowledge are endogenously restricted.

6 Conclusion

In this paper, we study the problem of strategic exchange of information. The recepient of information learns something about the substance of the message and something about the sender. Consequently, a sender who wants to leave a positive impression about himself has an incentive to talk about something that the recepient already knows. Doing the opposite would mean educating the recepient at the expense of the sender. We build a model and characterize the equilibria of the game; we show that this effect indeed arises in equilibrium. It may restrict the dissemination of information within the society, and while it may be economically efficient in the short term, it has profound (and probably negative) implications for social learning in the long run.

Appendix A [INCOMPLETE]

This Appendix contains the proofs of the results from the text.

Proof of Proposition 1. Let us prove that $K(h,z,z) > K(h,z,\bar{z})$. To do this, it is sufficient to show that

$$\Lambda(\sigma,q) = \int_{-\infty}^{+\infty} \frac{\frac{1}{\sqrt{2\pi}\sigma}\exp\left(-\frac{x^2}{2\sigma^2}\right)}{1+\frac{1-q}{q}\exp\left(-\frac{1}{\sigma^2}\left(hx+\frac{h^2}{2}\right)\right)}dx$$

is decreasing in σ. Using substitution $\frac{x}{\sigma}=y$, this equals

$$\Lambda(\sigma,q) = \int_{-\infty}^{+\infty} \frac{\frac{1}{\sqrt{2\pi}}\exp\left(-\frac{y^2}{2}\right)}{1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)}dy.$$

Differentiating with respect to σ (this is a legitimate operation here due to fast convergence of integrals), we have

$$\begin{aligned}
\frac{\partial\Lambda(\sigma,q)}{\partial\sigma} &= \int_{-\infty}^{+\infty} \frac{-\frac{1}{\sqrt{2\pi}}\frac{1-q}{q}\frac{h}{\sigma^2}\left(y+\frac{h}{\sigma}\right)\exp\left(-\frac{1}{\sigma}\left(hy+\frac{h^2}{2\sigma}\right)\right)\exp\left(-\frac{y^2}{2}\right)}{\left(1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)\right)^2}dy \\
&= \int_{-\infty}^{+\infty} \frac{-\frac{1}{\sqrt{2\pi}}\frac{1-q}{q}\frac{h}{\sigma^2}\left(y+\frac{h}{\sigma}\right)\exp\left(-\frac{y^2}{2}-\frac{hy}{\sigma}-\frac{h^2}{2\sigma^2}\right)}{\left(1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)\right)^2}dy \\
&= \int_{-\infty}^{+\infty} \frac{-\frac{1}{\sqrt{2\pi}}\frac{1-q}{q}\frac{h}{\sigma^2}\left(y+\frac{h}{\sigma}\right)\exp\left(-\frac{\left(y+\frac{h}{\sigma}\right)^2}{2}\right)}{\left(1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)\right)^2}dy.
\end{aligned}$$

Using substitution $\zeta = y+\frac{h}{\sigma}$, we have

$$\frac{\partial\Lambda(\sigma,q)}{\partial\sigma} = -\frac{1}{\sqrt{2\pi}}\frac{1-q}{q}\frac{h}{\sigma^2}\int_{-\infty}^{+\infty}\frac{\zeta\exp\left(-\frac{\zeta^2}{2}\right)}{\left(1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(\zeta-\frac{h}{2\sigma}\right)\right)\right)^2}d\zeta.$$

We now have (C denotes a positive constant)

$$\begin{aligned}
\frac{\partial\Lambda(\sigma,q)}{\partial\sigma} &= (-C)\int_{-\infty}^{+\infty}\frac{\zeta\exp\left(-\frac{\zeta^2}{2}\right)}{\left(1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(\zeta-\frac{h}{2\sigma}\right)\right)\right)^2}d\zeta \\
&= (-C)\int_{0}^{+\infty}\left(\frac{\rho\exp\left(-\frac{\rho^2}{2}\right)}{\left(1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(\rho-\frac{h}{2\sigma}\right)\right)\right)^2} - \frac{\rho\exp\left(-\frac{\rho^2}{2}\right)}{\left(1+\frac{1-q}{q}\exp\left(-\frac{h}{\sigma}\left(-\rho-\frac{h}{2\sigma}\right)\right)\right)^2}\right)d\rho < 0,
\end{aligned}$$

since the denominator is larger in the second term, This completes the proof.

Now prove that $K(l,z,z) < K(l,z,\bar{z})$. To do this, it is sufficient to show that

$$\tilde{\Lambda}(\sigma,q) = \int_{-\infty}^{+\infty} \frac{\frac{1}{\sqrt{2\pi}\sigma}\exp\left(-\frac{x^2}{2\sigma^2}\right)}{1+\frac{1-q}{q}\exp\left(-\frac{1}{\sigma^2}\left(hx-\frac{h^2}{2}\right)\right)}dx$$

is increasing in σ. Using substitution $\frac{x}{\sigma} = -y$, this equals

$$\tilde{\Lambda}(\sigma,q) = \int_{-\infty}^{+\infty} \frac{-\frac{1}{\sqrt{2\pi}}\exp\left(-\frac{y^2}{2}\right)}{1+\frac{1-q}{q}\exp\left(\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)}dy.$$

Notice, however, that (multiplying the numerator and the denominator by $\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)$)

$$\begin{aligned}
\tilde{\Lambda}(\sigma,q) &= \int_{-\infty}^{+\infty} \frac{-\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)\frac{1}{\sqrt{2\pi}}\exp\left(-\frac{y^2}{2}\right)}{\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)+\frac{1-q}{q}}dy \\
&= \int_{-\infty}^{+\infty} \frac{-\left(\frac{1-q}{q}+\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)\right)\frac{1}{\sqrt{2\pi}}\exp\left(-\frac{y^2}{2}\right)}{\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)+\frac{1-q}{q}}dy + \int_{-\infty}^{+\infty} \frac{\frac{1-q}{q}\frac{1}{\sqrt{2\pi}}\exp\left(-\frac{y^2}{2}\right)}{\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)+\frac{1-q}{q}}dy \\
&= \int_{-\infty}^{+\infty} \frac{1}{\sqrt{2\pi}}\exp\left(-\frac{y^2}{2}\right)dy - \int_{-\infty}^{+\infty} \frac{-\frac{1}{\sqrt{2\pi}}\exp\left(-\frac{y^2}{2}\right)}{1+\frac{q}{1-q}\exp\left(-\frac{h}{\sigma}\left(y+\frac{h}{2\sigma}\right)\right)}dy \\
&= 1-\Lambda(\sigma,1-q).
\end{aligned}$$

Since $\Lambda(\sigma,1-q)$ is decreasing in σ (this is true for any second argument), then $\tilde{\Lambda}(\sigma,q)$ is increasing in σ. ■

Appendix B [INCOMPLETE]

In this Appendix, we characterize both stable and unstable equilibria.

Proposition 9 *Suppose that both media outlets are equally popular among employers, i.e., $\lambda = 1/2$. Then there exist $0 < b_1 < b_2$ such that:*

(i) If $b = 0$, then there is a continuum of equilibria. In each equilibrium, channel A is watched by the same share η of smart and incompetent workers, and any $\eta \in [0, 1]$ constitutes an equilibrium.

(ii) If $0 < b < b_1$, then there are three pure strategy equilibria: where all workers watch channel A, all watch channel B, and all workers watch their favorite channel. In addition, there is a continuum of equilibria where all workers who prefer A watch A, and both smart and incompetent workers who prefer B are indifferent between the two channels, and mix such that the share of A-watchers among smart voters is higher than the share of B-watchers. There is also a continuum of similar equilibria with channels A and B switched.

(iii) If $b > b_1$, then in all equilibria, both channels are watched. There exists a unique pure strategy equilibrium where all workers watch the channel they prefer. Moreover, if $b > b_2$, this is the unique equilibrium.

Proposition 10 *Suppose that $\lambda \geq 1/2$. There exist $0 < b_0 < b_1 < b_2$ such that:*

(i) If $0 \leq b < b_0$, i.e., workers have only mild preferences for media outlets, then there are exactly two equilibria; in one all workers watch channel A, and in the other all workers watch channel B.

(ii) If $b_0 < b < b_1$, then there exist three pure-strategy equilibria: where all workers watch A, all watch B, and all watch their preferred channel. In addition, there is at least one equilibrium in mixed strategies.

(iii) If $b > b_1$, then in all equilibria, both channels are watched. There exists a unique pure strategy equilibrium where all workers watch the channel they prefer. Moreover, if $b > b_2$, this is the unique equilibrium.

(iv) All threshold values b_0, b_1, b_2 are decreasing in λ. In other words, stronger bias of employers decreases the set of preference parameters where workers watch their preferred channels.

Proof of Proposition . See Appendix.