Informational Lobbying and Activism *

Georgy Egorov† Bård Harstad‡

Preliminary – Please do not circulate
This version: March 1, 2020

Abstract

In many markets, both consumers and regulators care about characteristics of the product itself (e.g., safety) or of the production process, (e.g., pollution). At the same time, it is typical that neither the regulator nor consumers have precise information at the time of buying. NGOs and activists often have the motivation, expertise, and capacity to acquire such information, but to influence the market they need to present this information to either consumers, who might subsequently boycott the product, or to the regulator, who might enforce the regulation or withdraw the license. We show that activists are more likely to choose the former strategy (informational boycotts) if the market is very competitive and the latter strategy (informational lobbying) otherwise. Our analysis suggests that the regulator may prefer ”closed-door” policy, where she commits to ignore information from NGOs, as this makes boycotts more effective, and that this is more likely in historically more competitive markets such as the U.S.

JEL codes: D11, D72, L31, L51

Keywords: Private politics, activism, informational lobbying, cheap talk, multiple audiences, hard vs. soft information, information acquisition

---

*We are grateful to Nolan McCarty and seminar participants at Stanford GSB, Toulouse School of Economics, NGO workshop in Paris, and Private Politics Conference at Harris School of Public Policy for helpful comments.

†Kellogg School of Management and NBER. Email: g-egorov@kellogg.northwestern.edu

‡University of Oslo. Email: bard.harstad@econ.uio.no
1 Introduction

The firm producing a product is typically well informed about its quality or how it was made. The same cannot be said about a typical consumer, who might not directly observe whether the bike helmet he is about to purchase is built to safety standards or whether the t-shirt was sewn in a facility with good working conditions. Yet this consumer may care about these aspects of the product and may refrain from buying them if he suspects poor quality or poor laborers’ working conditions. Likewise, regulators, even if they have technical ability to observe the quality of the product or of the production process and authority to regulate, oftentimes lack capacity to get this information about a particular product. This information asymmetry provides an opening for agents and organizations that seek to influence the market, such as activists groups.

There are multiple ways that the activist group may use to acquire information, such as conducting a private investigation or getting documents from a whistleblower. The question is, however, how they would use this information to further their cause. In this paper, we analyze the following strategic dilemma of an activist group: Having acquired information about one of the firms in the market, would it use it to influence buyers or regulators?

The key factor that drives the trade-off is the different capabilities of buyers and regulators to verify the information presented by activists. It is reasonable to assume that buyers (or at least most of them) have no ability to verify the activist’s claim. In this case, communication between the activist and buyers effectively becomes cheap talk.\(^1\) In contrast, a regulator would have the capacity to verify the information presented by activist,

---

\(^1\) In a repeated interaction, a long-run activist player may seek to achieve credibility by building reputation. This may sometimes backfire, as in the case of Brent Spar when Greenpeace took a hit when its original estimates were disproved by Norwegian consultants (Diermeier, 1995). This effect is relevant only for major activist groups and only for consumers who have sufficient attention span and interest in the issue, so we believe that cheap talk presents a good approximation for most interactions between activists and consumers.
and likely required by law to do so before acting on it. Thus, communication between an activist and a regulator is best viewed as voluntary disclosure of hard information: while the activist is not required to reach out to a regulator, should he do so, the regulator would figure out the truth regardless of the message sent by the activist. Of course, the activist would then try to influence the regulator if he believes that the regulator would react to the truthful information in a way consistent with the activist’s interests. One simple way to summarize this logic is the following: It takes soft information to communicate with buyers, but it takes hard information to communicate with a regulator.\footnote{There may be more practical reasons for communicating hard information to regulators and soft information to buyers. For example, a regulator may be prohibited from acting upon rumors or claims unaccompanied by substantial evidence. Consumers, on the other hand, might be unable to understand technical details and would need information to be presented in a simple way, in which case it becomes indistinguishable from a call for a boycott. Regardless of the reasons, the trade-off that the activists face is the same.}

We study this activist’s problem in the context of an industry where a finite number of firms produce and sell their products to consumers; we model this market as Cournot competition. Consumers cannot observe the difference between these products, and absent any further information the products of different firms are perfect substitutes. However, consumers care about hidden characteristics of firms’ products or the firms themselves; to fix ideas, we interpret these as pollution that firms emit when producing a marginal unit that the consumer purchases. For consumers, the firms and products look identical ex ante, but they may update if provided with information about these products. In the market equilibrium, this increases the sales and profits of firms that consumers favor and decreases those of firms that consumers dislike.

We model the activist in the simplest and perhaps most radical way: the activist wants to minimize emissions. At first glance, it may seem that such state-independent preferences prohibit credible cheap talk between the activist and buyers, because the former would always want to announce that the firm is the worst possible. We show that
despite of that, there is an equilibrium where some information may be revealed.\textsuperscript{3} To see the intuition, suppose that the market consists of many firms; then the revelation that one firm is particularly bad will at best shut this firm down and reduce the market size by one, and while this will indeed reduce the equilibrium volume of the market and thus emissions, the overall effect will be quite small if the number of firms is large. Suppose, however, that the activist learned that the firm has fairly low emissions. In this case, he might be willing to let consumers know this: even though existence of a clean firm would increase the consumption of the good overall, a bigger share will come from this cleaner firm and therefore overall emissions would be lower. We prove that the activist may send two messages credibly, and we can interpret these messages as calling and not calling for a boycott.

The regulator seeks to enforce some maximum emission level set by the law, but it is natural to assume that it does not have the capacity to investigate every firm and every industry. Once it becomes aware of a violation, it withdraws the firm’s license and effectively shuts it down.\textsuperscript{4} This makes the activist willing to lobby the regulator whenever the firm’s emissions exceed the legal standard, but it also makes boycotts less effective, since consumers are aware the the firm that is not shut down is at least not too bad. We show that this effect is stronger if the number of firms is large. This implies that in a sufficiently competitive market with customers that are sufficiently concerned about hidden characteristics of the product to boycott the firm, the activist might commit to stay away from informational lobbying and use informational boycotts instead. The flip side of this is that introducing regulation of an issue that consumers care about enough to organize credible boycotts may backfire. This implies, for example, that emissions might be reduced if the regulator adopts a “closed-door” policy which restricts it from

\textsuperscript{3}Feddersen and Gilligan (2001) establish a similar result; we discuss this paper below in more detail. See also Chakraborty and Harbaugh (2007) on comparative cheap talk.

\textsuperscript{4}Implicitly, we assume that the firm cannot satisfy the regulator by investing in lowering pollution (and perhaps paying a fine), for example because the doing so is too costly and time consuming.
getting information from activists. We show that the regulator’s role is less important in a competitive market with a high number of firms, or if the firms are sufficiently clean in expectation: in these cases, activists can be credible to the buyers and let the buyers influence emissions.

It is interesting to note that the patterns and rules of communication between government agencies and activist groups differ between jurisdictions in a way consistent with the predictions of our model. For example, the European Union does have a relatively open-door policy in that activist groups are often consulted before policy decisions are made. In contrast, this is much less common in the US (Delia and Ano, 2006). At the same time, the US economy is ranked as more competitive than markets in Europe, according to the The Global Competitiveness Index (2016-17), and the World Economic Forum ranks the US sixth in “intensity of local competition,” with the UK and Malta being the only European countries ranked above the US. In other words, a more competitive economy relies less on informational lobbying and more on informational boycotts, as our theory would suggest.

The two channels that activist groups can use, lobbying government agencies and organizing corporate campaigns to influence buyers’ decisions, are well studied in the literature. This is particularly true for the lobbying literature (see Austen-Smith, 1993; Grossman and Helpman, 1994, 2001; see Dal ó, 2006, for a review), but the literature on corporate campaigns and boycotts has been growing fast in the recent years (Baron, 2003, 2009; Baron and Diermeier, 2007).

The literature of investment in environmentally-friendly technologies, or other forms of self-regulation, by firms in a competitive environment is particularly relevant. Similar to our model, in Baron (2001), investments in corporation’s reputation increase demand for its product (in our model, consumers’ beliefs that a given company is polluting decrease consumers’ willingness to pay). In a different theory, Feddersen and Gilligan (2001) suggest
that self-regulation by some of the competing firms helps them differentiate from each other thus reducing price competition. In this paper, as in ours, the activist is able to communicate that one firm is good because doing so would reduce demand for the bad firm’s products considerably. In other models, self-regulation does not lead to any direct benefits to the firms but is rather a response in order to avoid a boycott (Baron, 2003, among others), government action (e.g., Maxwell, Lyon, and Hackett, 2000), or both (Baron, 2014a; Egorov and Harstad, 2017). Maxwell, Lyon, and Hackett (2000) model a group of firms who can lobby for government regulation to prevent further entry, though they must self-regulate themselves to comply with the lobbied requirements. (See also Daubanes and Rochet, 2013, for society’s trade-off between having informed but captured regulators versus uninformed activists exert pressure on the industry, and Daubanes and Rochet, 2016.) Lyon and Maxwell (2008) provide an overview of theoretical motives for self-regulation.

There is a small number of papers that study the activists’ strategic choice of targeting consumers versus regulators, like we do. On the theory side, Lyon and Salant make a related point: activists can use corporate campaigns to make some firms self-regulate, which in turn makes these firms willing to lobby for regulation in order to create a level playing field. Our paper focuses on the questions on using information and credibility rather than these strategic forward-looking considerations. Empirically, Eesley, Decelles, and Lenox (2015) study different activists’ tactics (e.g., boycotts or lawsuits) and show that activists tactics often vary by their cause.

Our paper is also related to IO literature on imperfectly informed buyers, price signals, and credence goods. In fact, our model is set up in a way to avoid the possibility of price signals, largely for the sake of simplicity. While price signals is an interesting phenomenon, it requires existence of informed buyers which would lead to at least partial market segmentation (Mahenc, 2004), and this goes beyond the scope of our paper where
we assume that all buyers are equally well—or poorly—informed.

The rest of the paper is organized as follows. Section 2 introduces the model. Section 3 studies its equilibria and comparative statics. Section 4 presents a few extensions, while Section 5 concludes.

2 Model

2.1 The Market

There are \(n\) firms that make products that are indistinguishable for a customer, except for their brand. Each producer \(i\) uses technology that has marginal cost \(c_i\), but also causes environmental pollution of \(h_i\) units (say, tons of \(CO_2\)) per unit of production. The marginal cost of firm \(i\) is known to everyone, and for simplicity we assume that these are equal: \(c_i = c\) for all \(i\). In contrast, \(h_i\) is firm \(i\)'s private information; everyone else on the market only knows that it is taken from a distribution with c.d.f. \(F(\cdot)\) and p.d.f. \(f(\cdot)\). We will maintain the assumption that this distribution is uniform on \([\mu - \sigma, \mu + \sigma]\), so \(\mu\) is the mean of the distribution, whereas \(\sigma\) is proportional to standard deviation (which is \(\sigma/\sqrt{3}\) in this case).

The demand side is modeled as a representative buyer\(^5\) \(B\) whose utility \(u\) from buying quantities \(\{q_i\}_{i=1\ldots n}\) at prices \(\{p_i\}_{i=1\ldots n}\) is given by

\[
u = -\frac{1}{2\alpha} \left( b - \sum_i q_i \right)^2 - \sum_i p_i q_i - \gamma \sum_i h_i q_i,\]  

(1)

where \(\gamma \geq 0\) captures the buyer's concern about the environmental that his purchase causes.\(^6\) When making purchasing decision, the buyer does not know the values of \(h_i\), but knows their prior distribution and possibly other information and maximizes his expected

\(^5\)The model with a unit continuum of buyers would be isomorphic to this, and we assume one representative buyer for simplicity.

\(^6\)We think of parameter \(\gamma\) as capturing all consequences of production and consumption of a marginal unit produced by firm \(i\); this includes possible direct harm to the consumer and any externalities or ethical considerations that the buyer may care about.
utility. The functional form is chosen such that in the benchmark case where \( \gamma = 0 \) and all prices are equal to \( p \), total market demand is linear:

\[
\sum_i q_i = b - ap.
\]

Let \( g_i = \mathbb{E}(h_i \mid \ast) \) denote the buyer’s expectation of \( h_i \) conditional on all the information he has at the time of purchase decision. Then the effective price that the buyer pays when purchasing from \( i \) equals \( p_i + \gamma g_i \), and in equilibrium this value must be the same for all \( i \) for which the buyer purchases a positive amount. If we denote this value \( \hat{p} \), then buyer maximizing his expected utility implies that

\[
\hat{p} = \frac{b - \sum_i q_i}{a}.
\]  

(2)

Definition 1 A tuple \( (\{q_i\}_{i=1,\ldots,n}, \{p_i\}_{i=1,\ldots,n}) \) is called Cournot equilibrium (or simply equilibrium) if for each \( i \), \( q_i \) maximizes the profit of firm \( i \) holding other \( q_{-i} \) fixed:

\[
\Pi_i = p_i q_i - c_i q_i = \left( b - \frac{\sum_j q_j}{a} - \gamma g_i \right) q_i - c_i q_i.
\]  

(3)

In what follows, we assume for simplicity that \( b > a(c + \bar{\gamma} h) \); this guarantees that there is a positive production in the market even if all firms are known to be the worst possible polluters.

2.2 Regulator

We model the regulator as an agency that will take away the firm’s license to operate if it finds the firm in violation of the law that prescribes that each firm’s emission level satisfies \( h_i \leq r \) (we will endogenize \( r \) later). The regulator has limited capacity and cannot afford to monitor all firms, especially because it may have other markets or industries to regulate, or perhaps it cannot inspect a firm without a warrant, which would require a probable cause.\(^7\) However, if presented with credible information about violations, the regulator will enforce the law and take the firm’s license.

\(^7\)For example, in the U.S., the courts have maintained that the Fourth Amendment, which prohibits unreasonable searches, extends to most businesses. In Marshall v. Barlow’s, Inc, the Supreme Court held that federal inspectors are in violation of privacy if they search the work area of any employment facility
2.3 Activist group

We assume that the activist group seeks to minimize total emissions by this industry. The group has acquired information on emissions of a single firm in the industry.\(^8\) Suppose for simplicity that the information is precise, so the activist knows \(h_i\). The activist can send a message to the buyer and/or to the regulator. As argued in the Introduction, we find it natural to assume that the activist cannot present any hard evidence that the buyer can understand; in other words, its communication to the buyer amounts to cheap talk.

In contrast, we assume that the buyer needs to present hard information to the regulator in order to prompt regulation. For example, the regulator might be overwhelmed by cheap talk messages and refuse to act on these, or it may be criminal to lie to the government agency. This assumption is not innocuous: for example, it rules out scenarios where the activist asks the regulator to inspect a random firm while asking the buyer to boycott another one. We find such possibilities sufficiently unrealistic and prefer to focus on the main case where the regulator requires hard information.

3 Analysis

3.1 Market equilibrium

We start by analyzing the Cournot equilibrium:

**Lemma 1** There is a unique Cournot equilibrium with the following properties:

covered by the Occupational Safety and Health Act without a warrant, with the exception of liquor and firearms industries. The scope of this ruling was later limited by cases such as Donovan v. Dewey, which specifically allowed inspections in the mining industry, and in a few other cases. Nevertheless, it is reasonable to think that the regulator is considerably likelier to act when confronted with credible evidence of violations.

\(^8\)Here, we are agnostic about the way the activist group has got the information or the reasons this particular firm is chosen, because all firms are ex-ante symmetric. We relax the assumption of symmetry and study strategic information acquisition in an extension (Section 4).
1. Each firm $i$ produces

$$q_i = \max \left\{ \frac{b - a \left( c + \gamma (m + 1) g_i - \gamma \sum_j g_j \right)}{m + 1}, 0 \right\},$$

where $m$ is the number of firms with $q_i > 0$.

2. Suppose that $g_i = g$ for all $i$. Then each firm produces

$$q_i = q^{(n)} = \frac{b - a (c + \gamma g)}{n + 1}. \quad (5)$$

3. Suppose that $n - 1$ firms other than $i$ have $g_j = g$, while firm $i$ has a potentially different $g_i$. Then if $g_i \leq g - \frac{b - a (c + \gamma g)}{n \gamma}$, all firms except $i$ produce zero, while firm $i$ produces $q^{(1)}$. If $g_i \geq g + \frac{b - a (c + \gamma g)}{n \gamma}$, then firm $i$ produces zero, while other firms produce $q^{(n-1)}$ each. Otherwise, all firms produce positive amounts given by:

$$q_i = \frac{b - ac - a \gamma (ng_i - (n - 1)g)}{n + 1},$$

$$q_j = \frac{b - ac - a \gamma (2g - g_i)}{n + 1} \text{ for } j \neq i. \quad (6)$$

Naturally, a firm will produce less if the firm’s expected environmental damage $g_i$ is large, because it would face a smaller demand. The other firms will take advantage of this reduced quantity and increase their production quantities. It is possible that a particularly bad reputation will force the firm to produce zero, in which case a smaller number of firms will be producing in equilibrium. One helpful insight from Proposition 1 is that expected environmental damage, while technically reducing demand, in equilibrium acts as an increase in the marginal cost that the firm must incur. This would imply, for example, that investing in decreasing marginal costs and in enhancing one’s reputation would be qualitatively similar from the standpoint of how they affect market equilibrium quantities.

Our next result is auxiliary: it provides explicit formulas for computing of some aggregate variables.
Lemma 2  Take any parameter values and suppose that all firms produce a positive amount in the Cournot equilibrium. Denote $\bar{g} = (\sum_i g_i) / n$. Then:

1. Total output is given by

$$Q = \sum_i q_i = \frac{n}{n+1} (b - a(c + \gamma \bar{g})); \quad (7)$$

2. Buyer’s expected utility is given by

$$U = \frac{1}{2a} (Q^2 - b^2); \quad (8)$$

3. Total expected pollution, from the standpoint of buyers, is given by

$$H = \sum_i g_i q_i = \bar{g}Q - a\gamma \sum_i (g_i - \bar{g})^2; \quad (9)$$

4. Total firms’ profits:

$$\Pi = \sum_i (p_i - c_i)q_i = \frac{1}{an}Q^2 + a\gamma^2 \sum_i (g_i - \bar{g})^2. \quad (10)$$

In other words, the total output depends only on average expected emissions and the number of active firms. The buyer’s utility is particularly simple, and it is a convex function of equilibrium production. The expected pollution consists of two terms: the first reflects the pollution if all firms polluted equally, and the second term decreases this amount, because in equilibrium firms that are thought to be cleaner produce more (this term may be naturally interpreted in terms of variance of emissions). The total profit in the industry, similarly, consists of a term that reflects the profits if the firms produced equally plus the term that captures variance of emissions. Intuitively, the latter increases firms’ profits by introducing vertical differentiation, with some firms being more attractive to the buyer.
3.2 Informational boycotts

It is helpful to start the analysis with the case where the law is very lax \((r > \mu + \sigma)\), so the regulator is effectively not part of the game. Consider the problem of activists. Suppose they know that the true emission level of firm \(i\) equals \(h_i\), whereas the buyer’s prior is that it equals \(g_j = \mu = \mathbb{E}h_j\) for all firms. Before characterizing the cheap talk equilibrium, consider the following thought experiment. Suppose that the activist, knowing \(h_i\), could impose on the buyer any posterior belief \(g_i\) about firm \(i\). Which posterior belief would he choose and how would this choice depend on the value of \(h_i\)? The activist seeks to minimize the expected total harm (from his standpoint):

\[
\sum_j \mathbb{E}(h_j q_j \mid h_i) = h_i \frac{b - ac - a\gamma (ng_i - (n - 1)\mu)}{n + 1} + (n - 1)\mu \frac{b - ac - a\gamma (2\mu - g_i)}{n + 1}
\]

\[
= ((n - 1)\mu + h_i) \frac{b - a(c + \gamma\mu)}{n + 1} + a\gamma \frac{(n - 1)\mu - nh_i}{n + 1} (g_i - \mu).
\]

In the last line, the first term reflects the activist’s expected harm in the baseline case where it does not alter the buyer’s belief and thereby leaves it at \(g_i = \mathbb{E}h_i = \mu\); in this case, all the firms would produce the same amount, and the activist would expect \(n - 1\) firm to have emissions \(\mu\) in expectation, but would know that firm \(i\)’s emissions are \(h_i\).

The second term is the adjustment if the buyer’s belief \(g_i\) deviates from this baseline \(\mu\). As one can see, the activist’s total harm is linear in \(g_i\), and furthermore it is increasing in \(g_i\) if \(h_i > \frac{n - 1}{n}\mu\) and it is decreasing in \(g_i\) if the opposite inequality holds. In other words, if firm \(i\) is dirtier than average, or even if it is a little cleaner, the activist would prefer to damage this firm as much as possible, and ideally send its output to zero, because even though other firms would increase their output, the total industry output would be lower. On the other hand, if firm \(i\) is significantly cleaner than average, the activist would rather try to help this firm as much as possible. While this may appear surprising given the activist’s interest in minimizing output by any firm, there is a simple intuition: if firm \(i\) is clean enough, the activist expects to reduce pollution by inducing customers to buy from
this firm rather than from dirtier ones. The threshold $\frac{n-1}{n} \mu$ is increasing in $n$, which is also intuitive. Indeed, the worst the activist can do to a firm is to send its production to zero so that there will effectively be $n - 1$ symmetric firms, but if $n$ is sufficiently large, the difference in output and therefore pollution will be minimal. For this reason, it makes more sense to reduce pollution by helping the single firm known to be cleaner. In the other extreme $n = 1$, the cutoff goes to 0: indeed, in the monopoly case the activist always wants to damage the firm, and because of that he cannot send a credible message that would alter the buyer’s prior (except for the degenerate case $h_i = 0$). Lastly, this argument shows that activists may transmit some information credibly only if $\mu < n\sigma$, which requires that there is sufficient variance between firms ($\sigma$ is high) and the firms on average are not too dirty ($\mu$ is not too high). In the situation where a clean or almost clean technology is theoretically possible ($\sigma$ is close to $\mu$ so the distribution of $h_i$ can take values close to 0), credible communication is possible.

We formalize this result in the next proposition.

**Proposition 3** In the communication game between the activist and the buyer, there is essentially one informative equilibrium if $\mu < n\sigma$ (and there is no informative equilibrium otherwise). This equilibrium may be supported by a message space of two messages: the activist sends message “bad” if $h_i \leq \bar{h} = \frac{n-1}{n} \mu$ and message “good” otherwise. It is unique in the sense that in any other informative equilibrium, the buyer’s posterior belief of any given type of the firm will be the same for all types, except perhaps for the cutoff type. The informative equilibrium, when it exists, is ex ante preferred to the uninformative one by the buyer, the activist, and also by the firms in the industry before their types are realized.

In the informative equilibrium, the quantities produced following the “good” message

---

9A similar result is established in Feddersen and Gilligan (2001) in the case of two firms and binary distribution of emissions.
about firm $i$ are:

$$q_i^{(g)} = \frac{b - ac - a\gamma \mu - n\sigma}{n + 1},$$

$$q_j^{(g)} = \frac{b - ac - a\gamma \frac{(2+1/n)\mu + \sigma}{2}}{n + 1} \text{ for } j \neq i.$$  \hspace{1cm} (12)

The quantities produced following the "bad" message are:

$$q_i^{(b)} = \frac{b - ac - a\gamma \mu + n\sigma}{n + 1},$$

$$q_j^{(b)} = \frac{b - ac - a\gamma \frac{(2+1/n)\mu - \sigma}{2}}{n + 1} \text{ for } j \neq i,$$

provided that $q_j^{(b)} \geq 0$. Otherwise, firm $i$ produces 0 and other firms produce $q^{(n-1)}$ each.

In the light of Proposition 3, we will assume from now on that the informative equilibrium is played whenever it exists. The other takeaway from the proposition is that while an activist, when sending a "good" message about a firm, makes it increase its production at the expense of other firms, but never to the extent that the firm becomes a monopoly. In contrast, if the activist sends a "bad" message about a firm, then it may have to produce 0 (essentially, go bankrupt); this will happen if $n$ is sufficiently large. In what follows we focus on the case where it does not happen, so all $n$ firms keep producing positive quantities, unless stated otherwise.

Our next result quantifies the reduction in emissions if the activist informs the buyer.

**Proposition 4** In the informative equilibrium, as compared to the uninformative one, the expected change in pollution is

$$\Delta H = -a\gamma \frac{(\sigma n)^2 - \mu^2}{4n(n + 1)}.$$  \hspace{1cm} (14)

As easy to see, the expected reduction is larger if $\gamma$ is large, so consumers care about pollution, and if $a$ is large, meaning that market demand is more sensitive to willingness to pay. It is also increasing in variance, thanks to the higher credibility of activists, and decreasing in expected emissions for the same reason. Perhaps most interestingly,
it is unambiguously increasing in $n$: this captures the intuition that activists’ are more powerful when the number of firms is high, which here comes from two factors: the buyer’s ability to switch from bad firms to better firms and the higher credibility that activists enjoy as a result.

### 3.3 Informational lobbying

In the analysis so far, we have assumed that the regulatory emission cutoff $r$ is not binding, $r > \mu + \sigma$. Consider now the case $r \leq \mu + \sigma$, which means that with some positive probability a given firm is violating the law.

Let us first assume that the regulation not too strict, $r \geq \bar{h}$; this condition means that in the absence of the regulator, the activist would call any firm that violates the law “bad”. Recall that upon learning that $h_i > \hat{h}$, and in particular if $h_i > r$, the activist would like to damage firm $i$ as much as possible. Since sending the “bad” message to the buyer would keep the firm producing some positive amount, referring the firm to the regulator is a more efficient strategy. Thus, in the subgame where $h_i > r$, the activist will present the information to the regulator rather than the buyer.

If the activist learned $h_i$ and found that it does not exceed $r$, it still wants to hurt the firm if $h_i > \bar{h}$ and help the firm if $h_i < \bar{h}$, consistent with Proposition 3. Notice that conditional on receiving the “good” message, the buyer’s belief about firm $i$’s emissions are the same as in the case without regulator. In contrast, if the buyer receives the “bad” message, his belief now is that the firm is not too bad, and at the very least its emissions do not violate the law, for otherwise the firm’s license would be revoked. A decrease in $r$ makes this effect stronger, so a stricter law implies that informational boycotts when the activist is seeking to hurt the firm become less severe.

Consider now the case where the regulation is very strict, $r < \bar{h}$. This may be possible, for example, in jurisdictions where draconian laws coexist with weak enforcement which,
for example, results in most or all firms violating the letter of the law. Of course, the activist would want to hurt the firm and contact the regulator if $h_i > \bar{h}$. The most interesting thing happens when $h_i \in (r, \bar{h})$. In such situation, the activist is able to shut the firm down, but would prefer not to; here, the firm is sufficiently good, and the total emissions in the industry would decrease by a bigger amount if the firm produces more and attracts some demand from dirtier competitors, rather than if it is shut down.

Therefore, whenever $h_i < \bar{h}$, the activist does not use informational lobbying, even if it would be effective in curtailing the firm’s emissions. In contrast, in all such situations the activist wants to help the firm, and as a result it cannot be credible; there is only the uninformative equilibrium in the game between the activist and the buyer in this case.

We can summarize the above discussion in the following proposition.

**Proposition 5** If $r \geq \bar{h}$, the activist’s strategy is the following. For $h_i > \bar{h}$, it contacts the regulator; for $h_i \in (\bar{h}, r)$, it sends the “bad” message to the buyer, and for $h_i < \bar{h}$, it sends the “good” message.

If $r < \bar{h}$, it contacts the regulator if $h_i > \bar{h}$ and does not contact him otherwise. The activist’s communication with buyer is uninformative.

We can also quantify the role of the regulator in reduction of emissions and compare the situations where (a) the activist does not communicate with the regulator, for example because the role is too lax; (b) the activist does communicate with the buyer, for example because the informative equilibrium does not exist or is not played; and (c) the activist is able to communicate with both. We have the following result.

**Proposition 6** The expected change in pollution from regulation equals:

\[
\Delta H = -\frac{(\mu + \sigma - r) (2 \mu + n (r - \mu + \sigma)) (b - ac - a \gamma \mu) + a \gamma n^2 (r - \mu + \sigma) \left(\frac{\mu + \sigma - r}{2}\right)^2 - (\mu)^2}{4 \sigma n (n + 1)}.
\]

(15)
The absolute value of the change is higher if \( n \) is small or if \( \mu \) is high.

Furthermore, if \( r \in (\bar{r}, \mu + \sigma) \) so that both informational lobbying and informational boycotts are possible, emissions are lower if the activist uses both instruments.

Here, the reduction in emissions is greater for smaller \( n \), which is intuitive: with few firms, the effect of removing one firm by the regulator is greater. This contrasts with the case of informational boycotts, where the reduction was greater for higher \( n \). A similar comparison applies with respect to \( \mu \): for a high \( \mu \), it is more likely that informational lobbying will be effective, but at the same time communication with the buyer is less credible. In other words, if activists had to use only one instrument, they would prefer to communicate with the buyer if \( n \) is large and/or \( \mu \) is small, but with the regulator if \( n \) is small and/or \( \mu \) is large. At the same time, they are better off if both channels of influence are possible.

### 3.4 Endogenous regulation

Let us now endogenize regulation by assuming that the legal cutoff of emissions \( r \) is set by the government that takes into account, with some weights, the preferences of the representative buyer, the activist, and the firms. To proceed, let us now consider preferences of different parties.

Consider first the preferences of activists, who want to minimize expected equilibrium emissions. To start, suppose that \( r = \bar{h} = \frac{n-1}{n} \mu \), meaning that the law bans emissions of all firms that the activist would ban in equilibrium. Consider the effect of a marginal increase in \( r \). This would result in a loss for the activist, because the few firms with \( h_i \) just above \( r \) would not be shut down, and instead their reputation would suffer a bit. Now consider the effect of a marginal decrease in \( r \). In this case, if the activist could commit to contact the regulator whenever \( h_i > r \), then such a decrease in \( r \) would be beneficial: while incurring a second order loss from the firms with \( h_i \in (r, \bar{h}) \), the firms with \( h_i < r \)
would see a first order gain in their reputation, which the activists strictly prefer. Thus, if the activist had commitment power, he would prefer emission requirements that are stricter than his own cutoff for calling the firm good vs. bad.\textsuperscript{10}

At the same time, by Proposition 5, the activist would not contact the regulator for $h_i < \bar{h}$ even if it is illegal. As a result, all values of $r$ below $\bar{h}$ result in the same equilibrium utility for the activist. In addition, while the values of $r$ above $\bar{h}$ are suboptimal, the effect of $r$ may be nonmonotone, as while higher $r$ makes the regulator’s intervention unlikely, it also increases the intensity of boycotts that follow the “bad” message, because the pool of firms for which the activist would call for a boycott now includes really bad firms. As a result, it is not necessarily the case the the activist would prefer the regulator to be tougher on the margin, i.e. to marginally decrease $r$. Notice that the comparative statics with respect to $n$ is straightforward: since $\bar{h}$ is increasing in $n$, so does the $r$ preferred by activists, so activists want the law to be more lax if the industry is more competitive.

The utility of the buyer, $U$ is given by (8). Prices and emissions affect it inasmuch as they affect total output $Q$. Since $U$ is a convex function of $Q$, the buyer benefits from information and the variation in $Q$ that it engenders. At the same time, regulation makes the market less competitive while keeping the remaining firms undifferentiated from the buyer’s perspective. As a result, the buyer always prefers to have $r > \bar{h}$, and it is possible that $r = \mu + \sigma$ would be strictly preferred (i.e., effectively no regulation); this would happen, for example, if $\gamma$ is close to 0, so consumers care little about emissions an want to avoid the regulation that would decrease competition. An increase in $n$ decreases the damage to competition that the regulator might do while increasing the usefulness of information in differentiating the firms. Thus, for a higher $n$, buyers prefer stronger regulation.

Like the buyer, firms prefer a higher variance of output from the ex ante perspective,\textsuperscript{18}

\textsuperscript{18}This would happen, for example, if the activist group has legal requirements to disclose its findings to the regulator.
before learning their types, because differentiation benefits them. However, they also
welcome the regulation that reduces competition. As a result, they prefer \( r < \bar{h} \). An
increase in \( n \) makes the regulator’s impact on profits lower, and at the same time the
firms benefit from the possibility that one of them would be singled out as “good”; this
force makes the firms prefer less regulation as \( n \) goes up. At the same time, since the
activist would never reach out to the regulator if \( r < \bar{h} \), then all such levels of \( r \) give the
firms even though they would be indifferent between all levels of \( r \) that do not exceed \( \bar{h} \).

Summing up this discussion, we see that the preferences of the activist group and
the firms over regulation are aligned, whereas the buyer prefers a more lax regulation,
and potentially no regulation at all. All the agents prefer more lax regulation as \( n \) goes
up, so if the market is more competitive. This implies that if the government (or the
social planner) chooses the optimal regulation while taking the expected payoffs of firms,
buyers, and activists (who also encapsulate other externalities) with some weights, the
comparative statics would be similar. We have the following result.

**Proposition 7** The optimal regulation cutoff \( r \) from the standpoints of the activist or
the firms before they learn their types is any value not exceeding \( \bar{h} \). The buyer’s optimal
cutoff strictly exceeds \( \bar{h} \) and may be equal to \( \mu + \sigma \). All these agents favor a higher \( r \) as
\( n \) increases.

In other words, it is the buyer that prefers regulation to be lax or, as an alternative
interpretation, the buyers may prefer the channel of communication between the activist
and the regulator to be severed, i.e., they might prefer a closed door policy, and it is more
likely in a more competitive market.
4 Extensions

4.1 More powerful regulators

So far, we have assumed that the regulator may regulate (take away the license) of only one firm. Suppose, however, that if the regulator learns and confirms that a firm is in violation of the law, it then has the authority and capability to inspect another firm, then with some probability another, etc. This does not change the activist’s trade-off regarding sending the two messages, so the cutoff $\bar{h}$ remains the same. At the same time, since regulation has a potentially bigger effect of reducing competition in the industry, the activist may actually prefer to invoke the regulator even if $r < \bar{h}$. Given the preferences of the activist the firms discussed above, this means that they would prefer more regulation. On the other hand, the buyer would prefer less regulation, because invoking the regulator now leads to even less competition. Thus, more powerful regulators lead to a stronger polarization in preferences over $r$.

4.2 Correlation between firms’ types

We have assumed that the firms’ types are independent. Suppose however, that they are correlated, for example, with some probability $\nu$ all firms have the same emissions, and otherwise they are independent. As before, the activist is able to learn $h_i$ of only one firm. However, now he believes that if one firm is better than the expectation, other firms are likely to be better as well. Strategically, however, he is less inclined to send the “good” signal about the firm, because the reason to do that was to help the firm by differentiating it from the competition. If the types are correlated, this rationale disappears. As a result, if the firms have (positively) correlated types, the activist is more likely to send the “bad” signal, and more generally, it is more likely that the activist cannot be credible. Indeed, in the extreme case of perfect correlation, the activist cannot transmit information to the buyer credibly for the same reason it cannot do so in the monopoly case.
4.3 Strategic information acquisition

We have so far assumed that the firms are similar and indistinguishable ex ante, which means, in particular, that the activist is indifferent which one to investigate. Suppose now that more information is known. As an example, consider two firms suppose that it is common knowledge that \( h_1 \) is distributed on \( [\mu_1 - \sigma_1, \mu_1 + \sigma_1] \) and \( h_2 \) is distributed on \( [\mu_2 - \sigma_2, \mu_2 + \sigma_2] \) such that \( \mu_1 > \mu_2 \) (so Firm 1 pollutes more in expectation) and \( \mu_1 - \sigma_1 > \mu_2 / 2 \).

Under these assumptions, as follows from Proposition 3, the activist who learned \( h_1 \) cannot transmit any information to the buyer. At the same time, information about \( h_2 \) may be transmitted, for example, if \( \mu_2 = \sigma_2 \), so Firm 2 might be sufficiently clean. This implies that the activist is no longer indifferent which firm to investigate: acquiring information about Firm 1 cannot affect emissions, but acquiring information about Firm 2 may be used to reduce emissions.

Interestingly, if the activist relied primarily on the regulator rather than the buyer to discipline the firm, it might prefer to acquire \( h_1 \) or \( h_2 \). On the one hand, \( h_1 \) is more likely to exceed \( r \), but on the other hand, if the activist learns that \( h_2 > r \), it would be able to both regulate Firm 2 and organize a boycott against Firm 1, because the latter would be considered even worse.

5 Conclusion

In a market where there is uncertainty about the level of emissions or other externalities, it is often up to activists to receive such information and transmit it to either buyers or regulators. The regulators are only helpful to the extent of the law, and in communication with buyers the activists face the problem of credibility. We study conditions under which some information may be transmitted, giving rise to informational boycotts. We then compare the welfare effects of this tactics with influencing the regulator, i.e. informational
lobbying.

Our main result is that in more competitive markets or in industries with relatively low expected pollution, informative communication between activists and buyers is more likely to be possible. As a result, under such conditions, activists would prefer to communicate with the buyers rather than with regulators if they had to choose. Stricter regulation does not necessarily reduce emissions, as it makes boycotts less effective. We also suggest that the interests of firms and activists may be quite aligned in their push for stricter regulations, even if their goals are different, whereas buyers prefer less regulation as they benefit from higher competition and lower prices. Our model also helps explain, for example, why it makes sense for activists not to target the worst firm, because it is harder for them to be credible about its emissions.

There are a number of related important questions that our paper leaves unanswered. One direction of future inquiry is robustness of our results to alternate models of regulation. Imagine, for instance, that once the regulator confirmed a violation, it forces the firm to invest in reducing its emissions, likely by increasing its marginal cost. This would effectively make the regulator a certifying agency. Another important question is the incentives that the firms have to invest in reducing emissions, both before and after confronting the activist. We hope to address these questions in the future.
References


Belot, Michèle (2007): “Why is Employment Protection Stricter in Europe than in the


University Graduate School of Business.


Appendix (INCOMPLETE)

**Proof of Lemma 1.** We write this proof allowing for firms’ costs $c_i$ to be different. This level of generality does not affect the proof and make the result applicable for extensions.

(1) Consider an equilibrium where all $n$ firms produce positive quantities. This means that the buyer buys positive quantities of these goods, and therefore must be indifferent between these goods. Therefore, the effective price that the buyer pays must be the same for all firms, so for all $i$, $p_i + \gamma g_i = \hat{p}$. Then (1) may be rewritten as

$$u = -\frac{1}{2a} (b - Q)^2 - \hat{p}Q,$$

where $Q = \sum_j q_j$. Then the first-order condition of the buyer’s maximization problem gives us the equation for the equilibrium effective price (2). Therefore, each firm $i$ gets paid the price equal to

$$p_i = \hat{p} - \gamma g_i = \frac{b - \sum_j q_j}{a} - \gamma g_i.$$

Each firm $i$ sets $q_i$ independently, taking into account how its and other firms’ output will translate into price $p_i$. Its profit maximization problem is therefore given by 3. Differentiating $\Pi_i$ with respect to $q_i$, we get

$$\frac{d\Pi_i}{dq_i} = \left( \frac{b - \sum_j q_j}{a} - c_i - \gamma g_i \right) - \frac{q_i}{a}.$$

Thus, in equilibrium,

$$q_i = b - a(c_i + \gamma g_i) - \sum_j q_j.$$

Summing these equalities for all $i$, we can solve for total output $Q$:

$$Q = \sum_j q_j = \frac{n}{n+1} (b - a(\bar{c} + \gamma \bar{g})),$$

where $\bar{c} = \left( \sum_j c_j \right) / n$ and $\bar{g} = \left( \sum_j g_j \right) / n$. Consequently, in equilibrium, the output of each firm is given by

$$q_i = \frac{b - a ((n+1)(c_i + \gamma g_i) - n(\bar{c} + \gamma \bar{g}))}{n+1}.$$
The calculation if \( m < n \) firms produce a positive output is similar. Furthermore, from A3 it follows that if a firm with some \( c_i + \gamma g_i \) finds it optimal to produce, then all firms with lower ones must produce as well. Consequently, the number and identity of firms that produce in equilibrium is uniquely defined, so the equilibrium is unique.

(2) This follows from A6 if we set \( c_i = \bar{c} = c \) and \( g_i = \bar{g} = g \). In this case, all \( q_i > 0 \).

(3) This directly follows from (A6). ■

**Proof of Lemma 2.** (1) This follows directly from (A5).

(2) The buyer’s utility (1) may be rewritten as

\[
  u = -\frac{1}{2a} (b - Q)^2 - \sum_i (p_i + \gamma h_i)q_i
\]

\[
  = -\frac{1}{2a} (b - Q)^2 - \hat{p}Q
\]

\[
  = -\frac{1}{2a} (b - Q)^2 - \frac{b - Q}{a}Q
\]

\[
  = -\frac{1}{2a} (b - Q)(b - Q + 2Q) = \frac{1}{2a} (Q^2 - b^2).
\]

(3) The expected emissions from the buyer’s standpoint is given by

\[
  E_H = \sum_i g_iq_i = \sum_i g_i(b - a(c + \gamma g_i) - Q)
\]

\[
  = \bar{g} \sum_i (b - a(c + \gamma g_i) - Q) + \sum_i (g_i - \bar{g})(b - a(c + \gamma g_i) - Q)
\]

\[
  = ng\bar{g}(b - a(c + \gamma \bar{g}) - Q) + \sum_i (g_i - \bar{g})(b - a(c + \gamma \bar{g}) - Q) - a\gamma \sum_i (g_i - \bar{g})^2
\]

\[
  = ng\bar{g} \left( \frac{n + 1}{n}Q - Q \right) + 0 - a\gamma \sum_i (g_i - \bar{g})^2 = \bar{g}Q - a\gamma \sum_i (g_i - \bar{g})^2,
\]

where we used (A4) and (7).
The total profit of all firms is equal to

\[ \Pi = \sum_i (p_i - c)q_i = \sum_i (\hat{p} - c - \gamma g_i)q_i \]

\[ = \sum_i (\hat{p} - c - \gamma g_i)q_i = \sum_i (\hat{p} - c)q_i - \gamma H \]

\[ = (\hat{p} - c)Q - \gamma \left( \bar{g}Q - a\gamma \sum_i (g_i - \bar{g})^2 \right) \]

\[ = (\hat{p} - c - \gamma \bar{g})Q + a\gamma^2 \sum_i (g_i - \bar{g})^2 \]

\[ = \left( \frac{b - Q}{a} - c - \gamma \bar{g} \right) Q + a\gamma^2 \sum_i (g_i - \bar{g})^2 \]

\[ = \frac{1}{a} (b - a(c + \gamma \bar{g})) Q - \frac{1}{a} Q^2 + a\gamma^2 \sum_i (g_i - \bar{g})^2 \]

\[ = \frac{1}{a} \left( \frac{n + 1}{n} Q \right) Q - \frac{1}{a} Q^2 + a\gamma^2 \sum_i (g_i - \bar{g})^2 \]

\[ = \frac{q}{an} Q^2 + a\gamma^2 \sum_i (g_i - \bar{g})^2, \]

where we used (A2), (2), and (7).