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Energy and Environmental
Policy Research

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July 2016

CEEPR WP 2016-010

A Joint Center of the Department of Economics, MIT Energy Initiative and MIT Sloan School of Management.

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*This version: July, 2016. We acknowledge useful comments from participants at many seminars and conferences: Toulouse School of Economics; LAMES 2012; Indian Statistical Institute – Delhi Center; University of Ottawa; ETH Zurich; University of Oxford; French Economic Association 2013; CES-ifo Munich; Goethe University Frankfurt; University of Siegen; Paris West University; NGOs vs Regulators Zurich Conference; FAERE Toulon 2015; SCSE Montreal 2015; NGO Frankfurt Conference 2015; Montreal CIREQ Workshop; Aix-Marseille School of Economics; University of Geneva; University of St Gallen; and EAERE Zurich 2016. Particular thanks to Saraly Andrade de Sá, Emmanuelle Auriol, David Baron, Marc Chesney, Vianney Dequiedt, Avinash Dixit, Guido Friebel, Christian Gollier, Jérôme Hergueux, Gerard Hertig, Chris Knittel, Jérémy Laurent-Lucchetti, Pierre Lasserre, Justin Leroux, Ross Levine, Thomas Mariotti, David Martimort, Michael Mehling, Rick van der Ploeg, Aggey Semenov, Andrei Shleifer, Bernard Sinclair-Desgagné, Jason Shogren, Jean Tirole, Nicolas Treich, and Pierre-Yves Yanni for stimulating discussions and helpful suggestions. The research leading to these results has received funding from the European Research Council under the European Community's Seventh Framework Programme (FP7/2007-2013) grant agreement 249415-RMAC and the Swiss Finance Institute.

Abstract

Now more than ever, activist NGOs oppose industrial projects/practices that have nevertheless been approved by public regulators. These NGOs are consumer associations, environmental groups, and stakeholders' advocacy groups, and are particularly active in the energy, food, retailing and banking sectors. To understand this rise in NGO activism, we develop a theory of optimal regulation in which a regulated industry seeks to undertake a project that may be harmful to society. On the one hand, public regulation is vulnerable to the influence of industry, and may approve the project even though it is harmful. On the other hand, an NGO may oppose the project. We characterize the circumstances under which NGO opposition occurs and the circumstances under which this opposition is socially beneficial. The theory is used to explain the role that NGOs have assumed in the last decades, and has implications for the legal status of NGO activism and the appropriate degree of transparency.

JEL Codes: D02, D74, D82.
Keywords: NGO activism; Public regulation; Industry lobbying; Private politics; Transparency.

I. Introduction

Activist NGOs increasingly influence industrial decisions. These NGOs are consumer associations, environmental groups, and stakeholders' advocacy groups that seek to prevent harmful projects and practices.[1] They often convince firms to "self-regulate" when public regulation seems too lax. For example, companies such as Nike (early 1990s), Citigroup (2004), and HSBC (2012) significantly strengthened their social, environmental, and risk criteria after NGO intervention. Similarly, in 2013, Starbucks offered to pay taxes that it was not legally liable for, and, in 2015, Dunkin' Donuts stopped using potentially toxic nanoparticles allowed by the US Food and Drug Administration. Among other contemporary issues, the release of endocrine disrupting chemicals (EDCs) by industry is center stage: Although the inaction of public regulators—and the influence of the industry—is often denounced, under NGO pressure an increasing number of companies is committing to the goal of zero EDCs discharge—e.g., the Adidas Group.

By "NGO activism," we refer to the advocacy and militancy of civil society through not-for-profit organizations that are independent of public authorities and special interests.[2] In general, NGO activists do not rely on the public order. They do "private politics," to use the words of Baron (2001): To oppose firms' projects and practices that they disapprove of, they use their private potential to harm these firms. This potential can be achieved in various ways—e.g., boycotts, naming and shaming, cyber-activism, etc.[3] NGOs' rising influence is one of the most significant changes in business over the past four decades (see Doh and Guay [2006], among others). For example, according to the *Covalence Ethical Quote* reputation database, 831 NGOs have levelled more than 18,000 criticisms against companies worldwide between 2002 and 2014.[4]

This paper is an attempt to understand the rising influence of NGO activists. We model a firm that hopes to implement a project requiring the approval of a public regulator. The regulator may be influenced by the industry's interests, and thus may accept the firm's project even though it is socially harmful. An NGO may decide to oppose the project on the basis of its own information. NGO involvement impacts both the efficiency

1. A famous example of such opposition is the 1995 Greenpeace-Shell conflict over the dismantlement of the Brent Spar oil platform. Ironically in that case, the option ultimately chosen by the firm under NGO pressure turned out to be worse than the option initially approved by regulators.

2. This definition excludes trade unions, which seek to generate gains for their members.

3. Activists' private nuisance potential sometimes also relies on the public order, as when activists file a lawsuit against a firm.

4. The data consist of negative reports published by NGOs against companies—see Appendix A for a detailed description.

of public regulation and the economic performance of the industry. We characterize the conditions under which the NGO effectively opposes the project and the conditions under which this opposition improves social welfare. Our results, therefore, have implications for the legal status of NGO activism: Should governments encourage it, and how?

Baron (2001, 2003) was the first to propose a theory of private politics. He assumes that activists pursue social objectives. Their motivation may arise from moral preferences (Baron [2010]), or from prosocial behavior à la Bénabou and Tirole (2006), and may depend on how well activists subscribe to the issue (Besley and Ghatak [2005]). Baron (2010) shows how NGOs can emerge when socially concerned individuals coordinate their efforts in the spirit of Dixit (2004, Ch. 3) and Tabellini (2008). When firms are targeted by activists, they may "self-regulate" to forestall this opposition and avoid the associated damages.

Recent papers that shed light on the relation between public regulation and private politics are complementary to our research. For example, Maxwell, Lyon, and Hackett (2000) study how firms may self-regulate to avoid a strengthening of regulation inspired by activists. Following Baron (2003) and Baron and Diermeier (2007), we assume instead that NGOs oppose firms directly rather than by lobbying regulators. Indeed, over the period 2002-2014, for example, US-based NGOs' lobbying expenditures amounted to $2.3 billion, while lobbying expenditures by US-based companies exceeded $36 billion.[5] One reason is that NGOs cannot match large firms' financial power. For example, Baron and Diermeier (2007, p. 600) report the following statement by Greenpeace's former head, Paul Gilding, to the *New York Times* (June 2, 2001):

> The smart activists are now saying, "O.K., you want to play markets–let's play." [Lobbying the government] takes forever and can easily be counter-lobbied by corporations. No, no, no. They start with consumers at the pump, get them to pressure the gas stations, get the station owners to pressure the companies and the companies to pressure governments. After all, consumers do have choices where they buy their gas, and there are differences now. Shell and BP Amoco . . . both withdrew from the oil industry lobby that has been dismissing climate change.

5. Source: Center for Responsive Politics, available at `https://www.opensecrets.org/lobby`. The above amounts are expressed in constant (2014) dollars; we have used the CPI-U consumer price index of the Bureau of Labor Statistics. To assess NGOs' lobbying expenditures, we have added the expenditures of all non-profit organizations and the expenditures concerning various issues on which NGOs oppose the industry: human rights, the environment, foreign and defense policy, gun control, women's issues, and miscellaneous issues.

Another reason for focusing on NGOs' direct confrontation with firms is that the Internet and social networks have facilitated the dissemination of information and lowered the cost of NGO opposition (Yu [2005]).[6] Lyon and Salant (2015) show that NGO opposition is likely to reduce industries' subsequent influence on regulation. Finally, Egorov and Harstad (2015) study the dynamics of the conflict between NGOs and firms, in a setup in which the intervention of a benevolent and independent regulator can put an end to such conflicts.

In contrast to the above, our theory allows for the opposition of activists **after** public regulators have approved a firm's project, as illustrated by our introductory examples. A fundamental question is why society relies on NGO opposition when externalities could have been resolved at the outset by public regulation. In our view, this is because the influence of firms on regulators is unavoidable, and can best be counterbalanced by the direct intervention of the public. We also highlight the key role of information asymmetries. As Baron puts it (2003, p. 55), "the activist challenge to the firm begins with the identification of the issue." Large industries' projects are often opaque and/or complex, and, unlike regulators, NGOs have no legal mandate to examine them. For example, Greenpeace significantly overestimated the quantity of oil left in the Brent Spar platform in 1995 (5,000 tons instead of 50), because they had not collected enough samples during their illegal and perilous occupation of the platform.

This paper can be viewed as the continuation of Glaeser and Shleifer's (2003) analysis of the rise of public regulation at the dawn of the twentieth century—see also Shleifer (2012). Glaeser and Shleifer explain the predominance of public regulation over private litigation by the fact that the former proved less vulnerable than the latter in the face of growing industrial stakes. We suggest that during the second half of the twentieth century, the influence of large companies on regulatory decisions continued to increase dramatically. NGO activism has been one way society can rebalance public and private interests—as a complement to public regulation.

NGO activism is reminiscent of Coasian bargaining. According to Coase (1960), the bargaining's appeal is its potential to resolve externalities when transaction costs are low. In this respect, we point to two costs of NGO activism. First, NGO mobilizations and campaigns consume financial and human resources that could be used elsewhere. Second, due to their imperfect information, activists may mistakenly oppose socially beneficial projects. We argue that the Internet and social media have contributed to a decrease in

6. On the role of public persuasion in NGO opposition, see, for example, Chirouleu-Assouline and Lyon (2016), and Couttenier et al. (2016).

both types of costs.

Whether NGO activism is optimal for society partly depends on the prevailing resistance of public regulation to the influence of the industry. In situations in which industrial interests have the potential to subvert public regulation, the economics of regulation has suggested that more regulation is needed to prevent harmful conduct, not only in developing countries (e.g., Stiglitz [1994]), but also whenever regulatory capture is possible (Laffont and Tirole [1993, Ch. 13]).[7] However, Glaeser and Shleifer (2003) show that when law enforcement is weak, regulation may lead to corruption (see also Djankov et al. [2002]). Similarly, when industry lobbying is intense, regulation enhances, rather than discourages, influence (e.g., Gibson Brandon and Padovani [2011]). Our theory highlights NGOs' possible role in complementing regulation. NGO opposition affects the performance of regulation in two basic ways. First, it renders public regulation less vulnerable to industrial interests, and second, it induces firms to self-regulate by abandoning their most hazardous projects. Yet the appeal of NGO intervention on top of public regulation relies on NGOs' efficiency, in both identifying and opposing the most hazardous projects.

This paper is organized as follows. Section II discusses an important fact: The rise of NGO activism has coincided with increased corporate lobbying and regulatory failures. Section III presents a basic model in which public regulation can be influenced by the industry it supervises. Section IV introduces NGO opposition. Section V examines the impact of NGO opposition on public regulation. Section VI studies the vulnerability of public regulation with and without NGO opposition. Section VII examines the circumstances under which (*i*) NGO opposition arises and (*ii*) this opposition contributes to social welfare. Section VIII shows how our analysis accommodates more complex environments. Section IX concludes by drawing implications for the recent rise of NGOs, as well as policy implications about transparency and about the legal status of NGO activism.

Appendix A examines the empirical relationship between industry lobbying and NGO mobilization. Appendix B gathers the proofs of the propositions that are not in the main text.

7. Laffont (2005), however, suggests that regulation be adjusted to the stage of development: Situations of weak law enforcement may require less sophisticated regulatory schemes, and thereby provide weaker incentives (p. 57).

II. Lobbying and the Failure of Regulators

The best one can say about the recent performance of public regulators is that it has been mixed. They have failed to prevent catastrophes that could and should have been avoided. For instance, the 2008-2009 global financial crisis caused a significant worldwide recession, and the explosion of the Deepwater Horizon oil-drilling rig in 2010 caused the largest oil spill in history, with serious consequences for the environment. Similarly, the Fukushima Daiichi catastrophe in 2011 was the largest nuclear accident since the Chernobyl disaster.

These examples suggest that regulators may have failed to impose adequate standards on the industries they are supposed to monitor. They also indicate a reason for this failure: Industries can subvert their regulators. Indeed, each of the above catastrophes revealed cases of regulatory capture or industry influence—specifically, banking supervisors prior to the global financial crisis; the US Minerals Management Service, which was responsible for offshore drilling activities in the Deepwater Horizon era; and the Nuclear and Industrial Safety Agency, which regulated the Japanese nuclear sector during the Fukushima catastrophe.

Goldberg and Maggi (1999) show that industries do influence public policies and regulations in their favor. This influence has mostly been documented for the banking sector in the empirical literature that emerged following the global financial crisis. Using disaggregated data, this literature shows that lobbying expenditures, political contributions, and political connections have effectively helped banks favorably distort voting by representatives[8] to obtain laxer regulations and more public support. This, in turn, allows them to take more risks and, ultimately, leads to bigger losses (e.g., Mian, Sufi, and Trebbi [2010]; Igan, Mishra, and Tressel [2011]; Duchin and Sosyura [2012]). In addition, lobbying efforts by individual firms are complementary and are coordinated at the industry level (e.g., Godwin, Ainsworth, and Godwin [2013]). Collective influence also plays an important role, through industry associations such as the US Financial Services Roundtable.

The naive view that expert regulators benignly supervise an industry on behalf of an uninformed and defenseless public has clearly been disproved by the facts. Consequently, the notion of regulatory capture (Stigler [1971]; Buchanan, Tollison, and Tullock [1980]; Laffont and Tirole [1993]) is returning to center stage and is receiving renewed attention

8. Our paper deals with regulatory agencies rather than lawmakers, for which a slightly different model would be needed.

in all social sciences (e.g., Carpenter and Moss [2014]).

Public regulators have certainly experienced a golden age. Glaeser and Shleifer (2003) describe and explain the rise of public regulation at the end of the nineteenth and the beginning of the twentieth centuries. This golden age lasted until at least the end of the Progressive Era (Hofstadter [1955]), a period during which "the average American tended more and more to rely on government regulation, to seek in governmental actions a counterpoise to the power of private business" (p. 233).

Since then, regulators have, to a large extent, lost public trust, as argued by Aghion et al. (2010). Trust barometers further reveal that the public believes that industries are inadequately regulated, and trusts NGOs significantly more than public authorities. According to the 2015 Edelman Trust Barometer, 65% of people surveyed in the US trust NGOs, whereas only 41% trust the federal government.

Accordingly, we suggest that the recent rise of NGO activism is a response to the failure of public regulation. Indeed, over the period 2002-2014 in the US, for example, NGOs' criticisms against companies have been positively associated with prior increases in companies' lobbying expenditures (see the details in Appendix A).

Our view of NGO activism is reminiscent of Galbraith's (1952) notion of "countervailing power" that operates in the public interest, in the face of too-powerful industries: We depart from the naive description of a society in which public regulation alone resolves market failures. Our analysis of NGO activists is also reminiscent of Kofman and Lawarrée's (1993) and Acemoglu and Gietzmann's (1997) analyses of how external auditors could be used by the shareholders of a firm to limit managers' influence on internal auditors. In contrast to the dual-auditor optimal-contracting problem, however, NGO activists cannot be controlled by society through contractual relationships.

III. A Model of Public Regulation with Industry Lobbying

We introduce industry lobbying into an otherwise standard model of public regulation. A single firm, representative of the industry, can undertake some project. For example, the firm may implement a new operational unit or financial technique, release a new consumer product, etc. The project is characterized by its fixed (exogenous) size $q > 0$. It generates both a net private value $vq > 0$ that accrues to the industry and a net external cost cq that is borne by the rest of society (e.g., consumers or workers).[9] The external

9. The net private value is the difference between the private revenue and the private cost of the industry. The net external cost is the difference between the social cost (due to health or environmental

cost reflects the fact that a new operational unit, a new product or a new technique may turn hazardous for the environment, for consumers, or for financial stability.

There are two possibilities: Either the project is good or it is bad, depending on whether the private value vq covers or falls short of the external cost cq. Precisely,

$$\begin{cases} \text{with probability } \ p_L, \ \text{ the project is good, as its external cost is low: } \ c = c_L < v; \\ \text{with probability } \ p_H, \ \text{ the project is bad, as its external cost is high: } \ c = c_H > v. \end{cases}$$

The firm would always undertake the project, since it generates a profit $vq > 0$. However, the project may be bad for society (when $c = c_H$). This is observed by an expert—the regulator—who is delegated the decision to approve or reject the project, as in the two-tiered regulatory structures of Tirole (1986), Laffont and Tirole (1991), and Laffont (1994).

The original feature of our model is lobbying: The industry can ex ante (i.e., before the external cost is observed) influence the preferences of the regulator by making lobbying expenditures $e \geq 0$. In the spirit of Hiriart and Martimort (2012), we assume that lobbying causes the regulator to be biased in favor of the industry. Denoting by $\pi = vq$ and $\mathcal{U} = -cq$, respectively, the firm's profit and the rest-of-society's surplus when the project is undertaken, the total surplus generated by the project is $\mathcal{U} + \pi$. Under the industry's influence, however, the regulator pursues the biased objective[10]

$$\mathcal{V} = \mathcal{U} + \big(1 + \alpha(e)\big)\pi, \tag{1}$$

where the regulatory-bias variable $\alpha(e) \geq 0$ positively depends on the firm's lobbying expenditures $e \geq 0$. We assume a linear influence function

$$\alpha(e) = \frac{e}{i}, \tag{2}$$

where the parameter $i > 0$ should be interpreted as the marginal cost of influence. When $e = 0$, there is no lobbying, and the regulator is not influenced at all: $\alpha(0) = 0$. In that case, the objective (1) coincides with the surplus $\mathcal{U} + \pi$ generated by the project and the regulator allows the project when it is good and rejects it otherwise.

damages, for example) and the benefit of stakeholders (e.g., consumers or workers) who bear this social cost.

10. The regulator's objective need not integrate the ex ante lobbying expenditures of the industry, which are sunk at the moment of the regulatory decision to accept or reject the project. Those expenditures will, however, be considered later in our analysis of social welfare.

Lobbying takes place when $e > 0$, which leads the regulator to give the extra weight $\alpha(e) > 0$ to the industry's profit relative to the external cost. Sufficient lobbying expenditures can induce the regulator to approve the project not only when it is good, but also when it is bad. In the absence of an NGO, we obtain the following proposition.

Proposition 1 (Regulation with no NGO). *In the absence of an NGO,*

1. *The regulator approves a bad project if and only if*

$$\alpha(e) \geq \bar{\alpha} \equiv \frac{c_H - v}{v}; \tag{3}$$

2. *Lobbying takes place if and only if*

$$\frac{i}{q} \leq \left(\frac{i}{q}\right)^R \equiv \frac{p_H v^2}{c_H - v}. \tag{4}$$

Proof. The regulator approves a bad project if and only if $(1 + \alpha(e))\, v \geq c_H$, which is equivalent to $\alpha(e) \geq \bar{\alpha}$ as given in (3).

The influence function (2) gives the minimum expenditures $\bar{e} = i\bar{\alpha}$ that induce the regulator to approve the project when it is bad. The industry is willing to make these expenditures if and only if $i\bar{\alpha}$ is less than the additional expected profit $p_H vq$ due to the approval of the project when it is bad: $p_H vq \geq i\bar{\alpha}$. Substituting (3) in the latter inequality yields (4). ■

Note that if lobbying were assumed ex post—i.e., specific to the project's type—instead of ex ante, our results would remain qualitatively the same: In that case, lobbying would take place only when the project is bad and if $i/q \leq v^2/(c_H - v)$.

The threshold $\bar{\alpha} > 0$ defined in (3) measures the minimum influence that the industry must have to convince the regulator to allow all projects. According to (4), the occurrence of lobbying depends on the parameter

$$\frac{i}{q} > 0,$$

which measures the relative cost of influence, which is adjusted by the size of the project.[11]

In the absence of lobbying, the social surplus generated by the industry is positive because the project is only allowed if it is good ($c = c_L$). We denote this first-best surplus

11. This is reminiscent of Glaeser and Shleifer's (2003) degree of "law and order," which in their context is the maximum enforceable fine that can be imposed on the firm, adjusted for the project's size.

by

$$\mathcal{W}_L^R = p_L(v - c_L)q > 0. \tag{5}$$

When the industry effectively lobbies, however, it may not be so. Expected welfare in that case can be written as

$$\mathcal{W}_{LH}^R = p_L(v - c_L)q + p_H(v - c_H)q - i\bar{\alpha}, \tag{6}$$

which differs from $\mathcal{W}_L^R$ in (5) by its second and third terms, which are both negative. The second term reflects the fact that the project is approved and undertaken even when it is bad. The third term further reduces social welfare by the industry's resources that have been sunk into lobbying.[12] We assume, nevertheless, that the expected social welfare generated by the industry is nonnegative, despite the industry's influence:

$$\mathcal{W}_{LH}^R \geq 0. \tag{7}$$

This rules out the uninteresting situation in which it would be socially optimal to simply shut down the industry.

IV. NGO Activism

We now introduce an activist NGO; the conditions under which it is effectively active will be established later, in Section VII. We focus on confrontational activists that do not lobby regulators, but mobilize directly against the firm's project, as in our introductory examples (e.g., Baron [2003, 2012]).

Nature first determines whether the project is good or bad, which is observed by the regulator. In either case, the regulator decides whether to reject or approve it. If the project is not approved, nothing else happens—but if it is approved, activists enter the discourse.[13]

12. An alternative view is that lobbyists are "advocates" in the spirit of Dewatripont and Tirole (1999), and contribute by informing regulators—see also Grossman and Helpman (2001) on informational lobbying. We believe that this view fits better with the case of courts or lawmakers than regulators, who are chosen for their expertise.

13. The timing of actions, therefore, assumes that NGO opposition takes place after the regulatory decision whether to reject or approve the project. In some cases, however, NGOs identified potentially hazardous industrial projects that were still on the track for approval—i.e., before they were approved. Public regulation was sometimes sensitive to NGO opposition in these situations—as, for example, when fracking was banned by various US states and European governments, and when the Keystone XL pipeline was canceled. To address those cases, our model would have to be slightly modified.

IV.A. NGO-Industry Confrontation

When the project is approved by the regulator, the activists evaluate its external cost and decide whether to oppose it—the information available to activists and their assessment of the external cost will be detailed further below. As far as the activists' opposition is concerned, we rely on Baron's (2012) model of confrontational activism.[14] Their opposition consists of two stages: Activists first mobilize, then campaign if needed. No successful campaign can arise without prior mobilization efforts. For example, in the 2004 conflict in which Rainforest Action Network opposed Citigroup's financing of environmentally-harmful projects, the NGO first committed personnel and earmarked funds to the issue, and engaged in specific public communication, before demanding that the bank strengthen its environmental standards.[15] In the first stage, the activists mobilize with an intensity

$$m \geq 0$$

against the project. We assume that mobilization efforts m are publicly observable and entail a dead weight loss γm, where $\gamma > 0$ is the marginal cost of mobilizing. When $m = 0$, we say that the activists do not mobilize. In that case, the approved project is ultimately undertaken by the firm.

Facing mobilization, the industry can always self-regulate. Given an intensity of mobilization $m > 0$, the firm decides whether to abandon or continue the project. If the firm abandons the project, nothing else happens.

When the project is opposed but continued by the firm despite the mobilization, the activists launch a campaign against it with the intent to hurt the firm. For example, in its conflict against Citigroup, Rainforest Action Network urged Citigroup cardholders to cut their cards into pieces and mail them to the bank. In the conflict between As You Sow and Dunkin' Donuts, the former ultimately coordinated a hostile shareholder resolution. These actions can take the form of calling for a boycott, mounting a cyber-attack, launching a negative advertisement campaign, lawsuit, shareholder resolution, etc.[16] This is the second stage of the activists' opposition. In addition to the NGO's mobilization efforts, a large variety of factors that are not under the NGO's control

14. This model was inspired by the well-documented conflict in which the NGO Rainforest Action Network opposed Citigroup in 2004 (Baron and Yurday [2004]).

15. In general, NGO mobilization involves public communication. This is reflected, for example, by the criticisms levelled by NGOs against companies, which are described and used in Appendix A.

16. Various modes of campaigning, including boycotts, lawsuits, and shareholder resolutions, may sometimes be directed to the news media and amount to harmful advertising. See, for example, Friedman (1999, pp. 181-195) on the effects of boycotts.

determine the success of a campaign. Therefore, a campaign randomly generates a harm $h \geq 0$ to the firm. We assume that h is drawn from a uniform distribution of support $[0, m]$:

$$h \sim U[0, m]. \tag{8}$$

Given the realized harm h, the firm decides whether to concede to the campaign. If the firm does not concede and undertakes the project despite the campaign, it bears the harm h that reduces its profit accordingly. If the firm concedes to the campaign, it is only inflicted a fraction

$$\omega \in (0, 1)$$

of the harm h. That is, conflict always negatively impacts the firm, but less so when it ultimately concedes. In that case, the harm ωh reflects the persistency of campaign damages, such as when society does not immediately forgive the firm after its concession, which causes a loss in terms of reputation or brand value.

The timing of actions is summarized by the game form presented in Figure I. The regulator acts first (after Nature has determined the project's type), then the NGO, and finally the firm. The information set encompassing the NGO nodes represents the fact that the NGO does not observe whether the project is good or not, but only receives a signal about the external cost—see further below. Solid nodes indicate that the project is ultimately undertaken. Hollow nodes indicate that it is not, either because it has been rejected by the regulator, or because it has been abandoned by the firm. The firm may abandon the project after NGO mobilization, i.e., before a campaign—or, if it continues with the project, after the campaign or not at all. The game is solved backward, so as to select a subgame perfect equilibrium. We start with the firm's decision.

IV.B. The Firm's Behavior in Front of Activists

After a campaign. Assume that the firm has not conceded after a mobilization of intensity m, so that a campaign is launched and generates a potential harm h. When the firm undertakes the project despite the campaign, it makes a net profit $vq - h$. When it concedes to the campaign, it is inflicted persistent damages ωh. Therefore, the firm concedes after a campaign if and only if $vq - h \leq -\omega h$, that is, equivalently, if and only if

$$h \geq \hat{h} \equiv \frac{vq}{1 - \omega}, \tag{9}$$

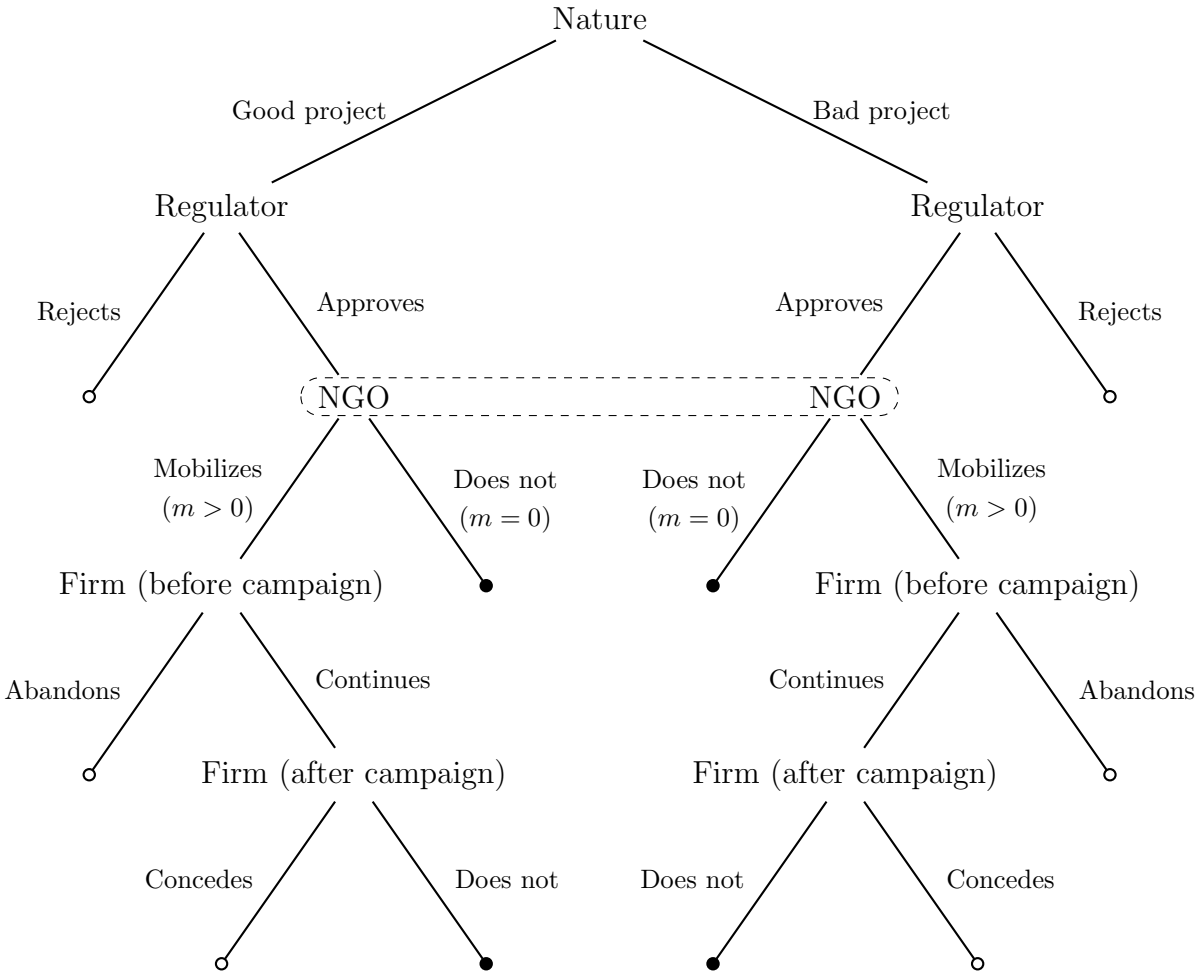


Figure I: Game form

where the concession threshold $\hat{h}$ increases with v and with ω: Conceding is relatively less attractive when the project's private value is high, and when campaigns' effects are more persistent. It follows from (8) that (9) is satisfied—and the firm concedes after a campaign—with the probability $\max(1 - \hat{h}/m, 0)$.

Before a campaign, in front of a mobilization. Let us now turn to the decision of the firm to self-regulate in front of a mobilization of intensity m, before a campaign has been launched.

When $m > \hat{h}$, the probability that $h \geq \hat{h}$ is strictly positive, so that the firm might ultimately concede if a campaign was launched. Its expected net profit if it continued

after the mobilization would be

$$\frac{1}{m}\left[\int_0^{\hat{h}}(vq-h)\,dh-\int_{\hat{h}}^{m}\omega h\,dh\right] \tag{10}$$

and would be zero if it abandoned the project. Therefore, the firm decides to abandon the project immediately after a mobilization if and only if the profit in (10) is non positive, which is equivalent to

$$m\geq\hat{m}=\frac{vq}{\sqrt{\omega(1-\omega)}}. \tag{11}$$

We say that the mobilization is "strong" in that case. Otherwise, the firm decides to continue the project despite the mobilization, and a campaign takes place, which successfully causes the firm to concede when $h\geq\hat{h}$.

When $m\leq\hat{h}$, the probability that $h\geq\hat{h}$ is zero, so that, if a campaign was launched, the firm would never concede to it. Therefore, the expected net profit that it would obtain if it continued after the mobilization becomes, instead of (10),

$$\mathbb{E}\left(\pi-h\right)=\frac{1}{m}\int_0^{m}(vq-h)\,dh=vq-\frac{m}{2}. \tag{12}$$

In that case, the mobilization is strong—the firm self-regulates before a campaign is launched—if and only if

$$m\geq 2vq. \tag{13}$$

Otherwise, we say that the mobilization is "weak:" The firm decides to continue, and no campaign will ultimately induce it to concede.

In the (ω,m) plane, Figure II represents the rising curve $m=\hat{h}$ expressed in (9), the U-shaped curve $m=\hat{m}$ expressed in (11), and the $m=2vq$ line. The intersection of these curves at $\omega=1/2$ implies two main cases of analysis.

The case of highly persistent campaign damages: $\omega\geq 1/2$**.** As Figure II shows, $\omega\geq 1/2$ implies $\hat{m}\leq\hat{h}$. In that case, when $m<\hat{m}$, we have necessarily $h<\hat{h}$, because $h\leq m<\hat{m}\leq\hat{h}$. A mobilization that is not strong—inducing the firm to continue—is, therefore, necessarily weak—not causing the firm to concede after a campaign neither. As will be clear shortly below, the activists are sensitive to the cost of mobilization; it cannot be optimal for the NGO to make unnecessarily costly mobilization efforts. As a result, the NGO makes either the cost-effective strong mobilization of intensity $m=2vq$—this is sufficient to induce the firm to abandon the project—or does not mobilize at all. Note that, when $\omega\geq 1/2$, no NGO campaign takes place in equilibrium.

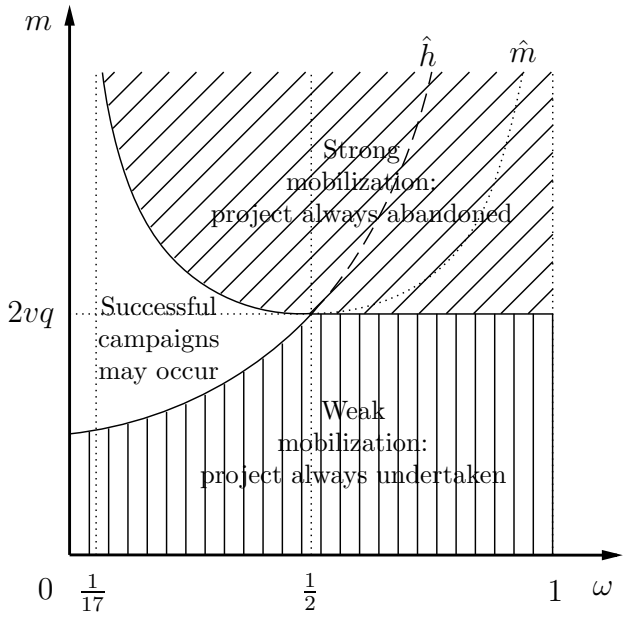


Figure II: Impact of NGO mobilization

The case of low persistent damages: $\omega < 1/2$**.** By contrast, potentially successful NGO campaigns may take place when $\omega < 1/2$. Indeed, Figure II shows that, in that case, there exist mobilizations that are neither weak, not strong: Mobilization intensities $m \in (\hat{h}, \hat{m})$ do not induce the firm to self-regulate immediately after the mobilization, but are able to generate successful campaigns to which the firm would concede. Therefore, there are three possible cost-effective options for the NGO, rather than two. The first option is not to mobilize at all ($m = 0$). The second option is to make the strong mobilization efforts $m = \hat{m}$ that induce the firm to abandon the project immediately. The third option is to make intermediate mobilization efforts $m \in (\hat{h}, \hat{m})$, knowing that the firm will not immediately self-regulate, but hoping that the subsequent campaign will be sufficiently successful to make it ultimately concede.

IV.C. The NGO Choice of Mobilization Intensity

We relax Baron's (2012) assumption that the activists maximize social welfare. Instead, we assume that their valuation of the project is biased against the firm's profit: $\mathcal{U} + (1 - \beta)\pi$. The bias parameter $\beta \geq 0$ captures the activists' radicalism in a manner symmetric with the regulator's bias α in favor of the industry's profit π. We assume that the activists do not internalize the damages that their campaign may cause to the firm, but only the cost of their mobilization. Therefore, the NGO chooses its mobilization

intensity m in such a way as to maximize

$$\mathcal{X} = \mathbb{E}^N [\mathcal{U} + (1-\beta)\mathcal{\Pi}] - \gamma m, \tag{14}$$

where the superscript N means that the expectation is conditional on the information available to the NGO—see below for details.

We focus on the case where ω is not too low—i.e., campaign damages are sufficiently persistent—to reflect the fact that reputational risk has become a major concern for companies. As *The Economist* (January 22, 2004, Special Report on Risk) puts it, "The biggest risk any company faces is the loss of its good name, and you cannot insure against that." Interestingly, the special report adds that "some of the most vigorous wreckers of reputations have been NGOs." Even in the eventuality of a concession, therefore, a conflict with activists may be prohibitively costly in terms of both reputation and brand value.[17]

Assumption 1 (Campaign damages persistency). *Campaign damages are sufficiently persistent:*

$$\omega \geq \frac{1}{17}. \tag{15}$$

Under this assumption, the following proposition is obtained.

Proposition 2 (NGO mobilization intensity). *The firm does not concede in the last stage, after an NGO campaign. For the NGO, there are two possible cases:*

1. *Either $m = 0$, and the project is undertaken by the firm;*
2. *Or $m = \bar{m}$, where*

$$\bar{m} \equiv \eta v q, \quad \textit{with} \quad \begin{cases} \eta = \frac{1}{\sqrt{\omega(1-\omega)}} & \textit{if} \ \ \frac{1}{17} \leq \omega < \frac{1}{2} \\ \eta = 2 & \textit{if} \ \ \frac{1}{2} \leq \omega \leq 1 \end{cases}; \tag{16}$$

in this case, the firm abandons the project in the first stage, following the NGO mobilization.

Proof. When $\omega \geq 1/2$, we have $\bar{m} = 2vq$. The result, in that case, has been shown in the main text preceding Subsection IV.C.

17. *The Economist*'s special report continues: "Greenpeace and Friends of the Earth now routinely picket and boycott firms of whose practices they disapprove, such as Nestlé, Esso and Shell. Companies that do business in poor countries (e.g., Nike) are liable to find themselves charged with running sweatshops."

When $\omega < 1/2$, we have $\bar{m} = \hat{m} = vq/\sqrt{\omega(1-\omega)}$ as per (11). In that case, as explained earlier in the main text, there are three possible cost-effective options for the NGO. First, no mobilization: $m = 0$. Second, the cost-effective strong mobilization $m = \bar{m} = vq/\sqrt{\omega(1-\omega)}$. Third, an intermediate mobilization intensity $m \in (\hat{h}, \bar{m})$ that does not induce the firm to self-regulate immediately, but that is able to generate a successful campaign. Appendix B examines this more complex situation and establishes an implication of Assumption 1: No intermediate mobilization is optimal. This result completes the proof of the proposition when $1/17 \leq \omega < 1/2$. ■

Thus Assumption 1 implies that activist campaigns never occur in equilibrium; the resulting game form is represented in Figure III. Therefore, it allows our analysis of the NGO-industry confrontation to focus on the industry's self-regulation in the face of activists' mobilization, highlighting the empirically most important facet of NGO activism. Admittedly, mobilizations do not always suffice, such that firms sometimes concede to activists' requests after harmful campaigns have been carried out.[18] In our framework of analysis, campaigns might take place if the persistency of campaign damages were very low: $0 < \omega < 1/17$—Appendix B establishes the exact conditions under which they effectively occur. As a matter of fact, nevertheless, those campaigns are only the tip of the iceberg; in many more cases, although perhaps less noticeable, firms proactively self-regulate in front of a latent mobilization of NGO activists, to avoid the eventuality of harmful campaigns (e.g., Baron [2003, p. 36]).

We now characterize activists' optimal choice to mobilize or not against the firm's project.

IV.D. The NGO Information and Decision

According to Proposition 2, the NGO's optimal strategy is either not to mobilize ($m = 0$), in which case the project is undertaken, or to mobilize with the minimum effective intensity $\bar{m} = \eta vq$ needed to induce the project's abandonment. In the first case $\mathcal{X} = \left[(1-\beta)v - \mathbb{E}^N(c)\right] q$, where $\mathbb{E}^N(c)$ denotes the NGO's assessment of the external cost c, while $\mathcal{X} = -\gamma\eta vq$ in the second. It follows that the NGO opposes the project if and only if

$$\mathbb{E}^N(c) \geq \bar{s} \equiv (1 + \gamma\eta - \beta)v. \tag{17}$$

18. As already mentioned, this was the case, for instance, in the 2004 conflict between Rainforest Action Network and Citigroup, in the 2012-2013 conflict between UK Uncut and Starbucks, and in the 2015 conflict between As You Sow and Dunkin' Donuts. In fact, the most famous examples of NGO activism involve a campaign—for example, a boycott—because such conflicts are the most noticeable manifestation of NGO opposition.

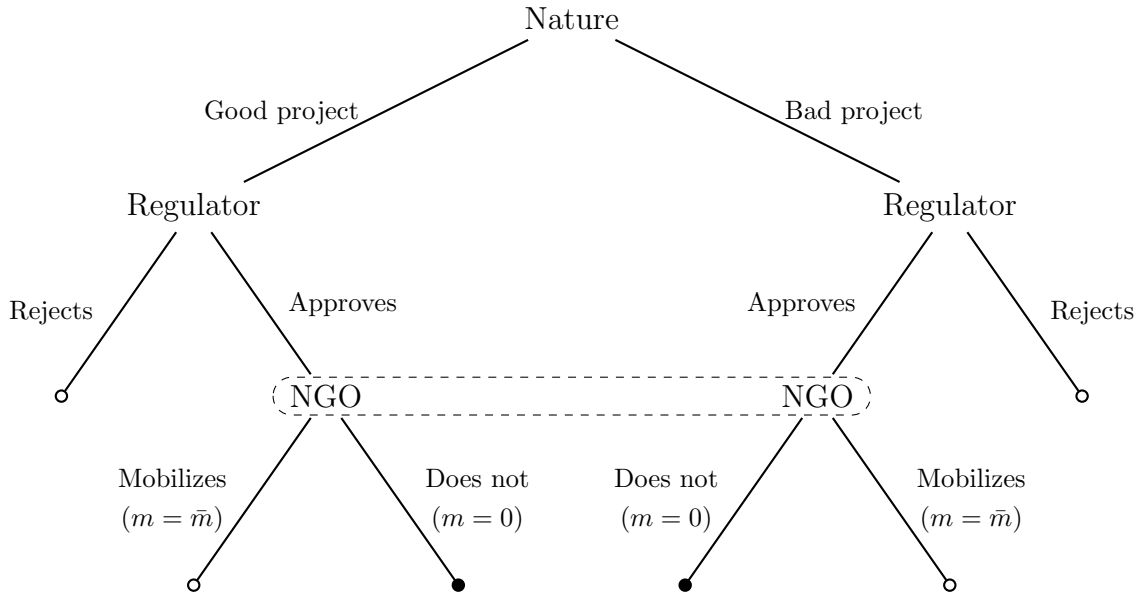


Figure III: Reduced game form after two steps of backward induction

Otherwise, there is no mobilization and the project is undertaken.

In expression (17) of the NGO's opposition threshold, $\gamma\eta - \beta$ plays a role similar to that of its counterpart α for the regulator in Section III. This effective NGO bias is decreasing in β and increasing in γ. Thus opposition becomes more likely as the NGO becomes more radical and mobilizations become less costly.

Complete information. Suppose first, as in Baron's (2012) original model, that the NGO is perfectly informed about the project's external cost c. It follows that the NGO opposes the project if and only if its external cost $c = c_L, c_H$ exceeds the threshold $\bar{s}$ expressed in (17). There are three possibilities: (i) If $\bar{s} \leq c_L$, the NGO always opposes the project, irrespective of whether it has a high cost c_H or a low cost $c_L < c_H$. (ii) If $c_H < \bar{s}$, on the contrary, the NGO always remains inactive: It never opposes the project, even when it perfectly knows that it is bad. (iii) Otherwise, $c_L < \bar{s} \leq c_H$, and the perfectly-informed NGO only induces the abandonment of the project when it is bad, as in the first-best outcome. In either of cases (i) and (ii), the NGO is "extremist" in the sense that its decision is independent of the (perfect) information at its disposal, making the analysis less interesting.

No information. Suppose now that the NGO has no information at all on the project's external cost. Whether the project is good or bad, the activists' assessment of its cost is simply the prior $\mathbb{E}^N(c) = p_L c_L + p_H c_H$. There are two possibilities. Either $\bar{s} \leq p_L c_L +$

$p_H c_H$, in which case the NGO is also extremist: It systematically opposes the project despite the fact that it has no information at all about its cost. Or $p_L c_L + p_H c_H < \bar{s}$, in which case the NGO remains inactive when it is uninformed.

Incomplete information. Here, the assessment of the external cost c by the activists depends on both their perception of the regulator's behavior and the (imperfect) information at their disposal. We represent the latter as the following noisy signal on c

$$s = c + \sigma\varepsilon, \tag{18}$$

where ε is the realization of a random noise with zero mean, density $f(\varepsilon)$, and cumulative distribution function $F(\varepsilon)$. We assume that f is symmetric and single peaked at $\varepsilon = 0$. We also assume that $\log(f)$ is strictly concave, implying the standard property that a higher signal s indicates that a bad project is more likely. In (18),

$$\sigma > 0$$

measures the "opacity" of the industry: A higher parameter σ reflects less transparency, and, therefore, less precise information available to the activists. The industry's degree of opacity results from various components: the complexity of industrial projects, the transparency of regulation, and the expertise of NGO activists.

The following assumption rules out the least interesting cases identified above.

Assumption 2 (Non-extremist NGO).

1. *If the NGO were perfectly informed—as when σ tends to zero—it would oppose the project when it is bad:*
$$\bar{s} < c_H; \tag{19}$$
2. *If it were not informed at all—as when σ tends to infinity—it would not oppose any project:*
$$p_L c_L + p_H c_H < \bar{s}. \tag{20}$$

   Note that (20) implies
$$\bar{s} > c_L; \tag{21}$$

i.e., a non-extremist perfectly informed NGO would not oppose a good project.

Assumption 2 allows our analysis to focus on the most interesting—and least obvious—case of an imperfectly-informed NGO that would not remain inactive if it perfectly knew that the project was bad, but would not oppose it if it had no information at all.

In a subgame perfect Bayesian equilibrium, the NGO's perception of the regulator's behavior is rational. When the regulator only accepts good projects, activists correctly infer that an accepted project is good: (21) implies that they do not mobilize against it ($m = 0$), regardless of their signal. When the regulator accepts the project irrespective of whether it is good or bad, the activists assess the external cost c by using the probabilities that the project is good ($c = c_L$) or bad ($c = c_H$), conditional on s. By Bayes' rule, these probabilities are

$$P(c = c_j|s) = \frac{p_j f(\frac{s-c_j}{\sigma})}{p_L f(\frac{s-c_L}{\sigma}) + p_H f(\frac{s-c_H}{\sigma})},\ j = L, H, \tag{22}$$

where $f\left((s-c)/\sigma\right)$ gives the likelihood that the activists' signal will be s, conditional on the project's having an external cost c. Therefore, the NGO mobilizes if and only if

$$\mathbb{E}^N(c) = \mathbb{E}(c|s) = P(c = c_L|s)c_L + P(c = c_H|s)c_H \geq \bar{s}. \tag{23}$$

By the assumption that f is log-concave, the conditional expectation $\mathbb{E}(c|s)$ is strictly increasing with the signal s. It follows that NGO mobilization takes place if and only if the signal s is larger than the effective opposition threshold $\hat{s}$ defined by

$$\mathbb{E}(c|s = \hat{s}) = \bar{s}. \tag{24}$$

The effective opposition threshold $\hat{s}$, which results from the activists' Bayesian inference, differs from its perfect-information counterpart $\bar{s}$ defined in (17). In particular, (22) and (23) make clear that $\mathbb{E}(c|s)$ and, therefore, $\hat{s}$ depend on σ. We define the latter as the following function:

$$\hat{s} \equiv \hat{s}(\sigma).$$

Figure IV shows the conditional expectation $\mathbb{E}(c|s)$ as a function of s and the resulting opposition threshold $\hat{s}(\sigma)$, for various degrees of opacity σ. When the realization s of the signal equals the mean cost $(c_L + c_H)/2$, it is not informative: In that case, it can be verified that $\mathbb{E}\left(c|s\right)$ takes the value of the prior expected cost $p_L c_L + p_H c_H$, regardless of σ. When σ tends to infinity—i.e., in absence of information—$\mathbb{E}\left(c|s\right)$ takes the value $p_L c_L + p_H c_H$ irrespective of s. In that case, Assumption 2—that $p_L c_L + p_H c_H < \bar{s}$—implies that $\hat{s}(\sigma)$ does not exist. For finite values of σ, $\mathbb{E}\left(c|s\right)$ increases and becomes steeper around $(c_L + c_H)/2$ as σ decreases and tends to 0. Assumption 2 implies that $\hat{s}(\sigma)$ is always greater than $(c_L + c_H)/2$ and that it increases with σ.

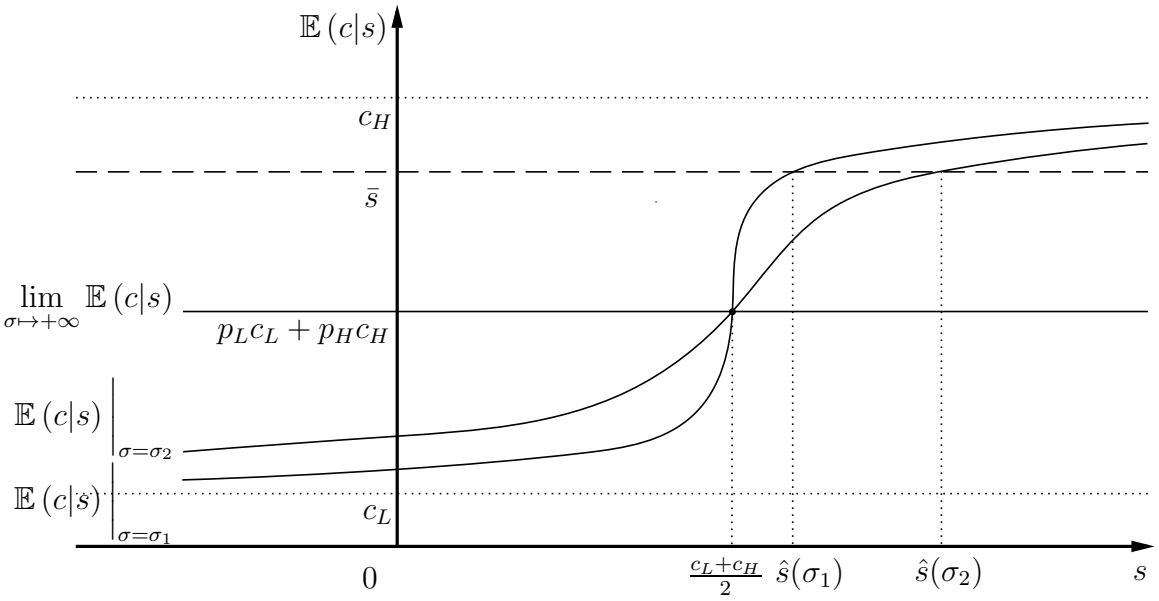


Figure IV: Activists' assessment of the external cost for various degrees of transparency: $0 < \sigma_1 < \sigma_2$

In this context, it follows that the NGO opposes bad projects with probability

$$\Phi_H(\sigma) \equiv 1 - F\left(\frac{\hat{s}(\sigma) - c_H}{\sigma}\right) = F\left(\frac{c_H - \hat{s}(\sigma)}{\sigma}\right), \tag{25}$$

and good ones with probability

$$\Phi_L(\sigma) \equiv 1 - F\left(\frac{\hat{s}(\sigma) - c_L}{\sigma}\right) = F\left(\frac{c_L - \hat{s}(\sigma)}{\sigma}\right), \tag{26}$$

where $c_L < c_H$ implies that, for all σ,

$$0 \leq \Phi_L(\sigma) < \Phi_H(\sigma). \tag{27}$$

The NGO is less likely to oppose a project when it is good than when it is bad. In this representation of NGO opposition, the probability $1 - \Phi_H(\sigma)$ that the NGO does not oppose a bad project and the probability $\Phi_L(\sigma)$ that it opposes a good one correspond, respectively, to type-I and type-II errors in statistical hypothesis testing.

The results of this section are summarized by the following proposition.

Proposition 3 (NGO opposition).

1. *If the regulator rejects bad projects, the NGO never mobilizes.*
2. *If the regulator approves all projects, regardless of whether they are good or bad, the NGO mobilizes (and induces the firm to abandon its project) with probability* $\Phi_H(\sigma)$ *given in (25) when the project is bad, and probability* $\Phi_L(\sigma) < \Phi_H(\sigma)$ *given in (26) when it is good.*
3. *As* σ *increases and the industry becomes less transparent, the NGO mobilization probability* $\Phi_H(\sigma)$ *decreases;* $\Phi_L(\sigma)$ *is single peaked.*

The proof is presented in Appendix B. $\Phi_L(\sigma)$ and $\Phi_H(\sigma)$ are depicted in Figure V.

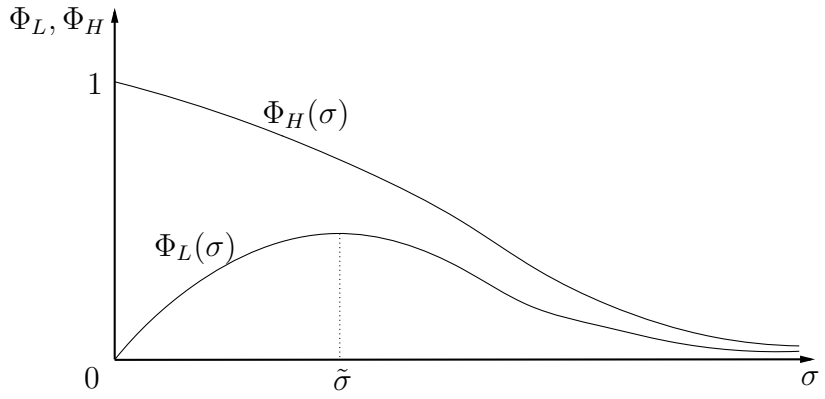


Figure V: Probability of NGO opposition to good and bad projects

The inverted-U shape of the NGO opposition probability $\Phi_L(\sigma)$ is consistent with the two following limit cases. If the NGO were perfectly informed that the project is good—as when σ tends to zero—Assumption 2.1 implies that it would not oppose the project at all: $\lim_{\sigma \mapsto +\infty} \Phi_L(\sigma) = 0$. If the NGO had no information—as when σ tends to infinity—it would not oppose it neither, by Assumption 2.2: Both $\Phi_L(\sigma)$ and $\Phi_H(\sigma)$ tend to zero in that case.

The next section examines how NGO opposition affects public regulation.

V. Public Regulation with NGO Opposition

Moving one step further back in the sequence of actions summarized in Figure III, we now consider the regulator's decision whether to reject the project when it is bad. If it does, this will be correctly anticipated by activists and NGO mobilization will never occur; in that case, the first-best outcome is realized. In contrast, if the regulator decides to approve the project when it is bad, the NGO will mobilize against the project with probability $\Phi_H(\sigma)$ given in (25).

We assume that the regulator does not internalize the cost of NGO mobilization: Its objective is the same as (1). However, in the presence of activists, the implementation of the project becomes uncertain. Therefore, the regulator's objective should be written in expected terms:[19]

$$\mathcal{V} = \mathbb{E}\left[\mathcal{U} + \big(1 + \alpha(e)\big)\pi\right].$$

It follows that the minimum influence threshold $\bar{\alpha}$ required for the regulator to accept a bad project is the same as in Section III, regardless of the presence of activists. However, the presence of an NGO reduces the stakes of lobbying. Indeed, the industry anticipates that, if a bad project were accepted, it might ultimately be abandoned with probability $\Phi_H(\sigma) > 0$ due to NGO opposition.

Proposition 4 (Regulation and lobbying with NGO opposition). *In the presence of an NGO, lobbying takes place if and only if*

$$\sigma \geq \sigma^{RN}\left(\frac{i}{q}\right) \equiv \Phi_H^{-1}\left(1 - \left(\frac{i}{q}\right)\frac{c_H - v}{p_H v^2}\right). \tag{28}$$

Proof. In the presence of an NGO, the regulator approves a bad project if and only if $(1 - \Phi_H(\sigma))\left((1 + \alpha(e))\, v - c_H\right) \geq 0$. Since $\Phi_H(\sigma) < 1$, this is equivalent to $\alpha(e) \geq \bar{\alpha}$, where $\bar{\alpha}$ is given in (3)—as in the absence of NGO. The industry is willing to bear the minimum effective lobbying expenditure $\bar{e} = i\bar{\alpha}$ if and only if it is covered by the additional expected profit $(1 - \Phi_H(\sigma))\, p_H v q$ due to the approval of a bad project: $(1-\Phi_H(\sigma))p_H v q \geq i\bar{\alpha}$. Substituting $\bar{\alpha}$ from (3) and rearranging, the condition becomes

$$\Phi_H(\sigma) \leq 1 - \left(\frac{i}{q}\right)\frac{c_H - v}{p_H v^2}, \tag{29}$$

where $\Phi_H(\sigma)$ is a decreasing bijective function which takes values in $(0, 1)$. Furthermore,

19. Section VIII explains how the analysis would be modified if the regulator internalized the social cost of NGO mobilizations, or if he incurred a private reputational cost from their occurrence.

$\Phi_H(\sigma)$ is independent of i/q.[20] It follows that (29) is equivalent to the condition expressed in (28). It can be verified that the function σ^{RN} is continuously increasing and takes values from $\lim_{i/q \mapsto 0} \sigma^{RN}(i/q) = 0$ to $\lim_{i/q \mapsto (i/q)^R} \sigma^{RN}(i/q) = +\infty$, where $(i/q)^R$ is defined in (4). For $i/q \geq (i/q)^R$, $\sigma^{RN}(i/q)$ does not exist. ■

The result of Proposition 4 is illustrated in Figure VI in the $(i/q,\sigma)$ plane. It shows that the threshold function $\sigma^{RN}(i/q)$ exhibits an asymptote at level $(i/q)^R$, the lobbying threshold in the absence of an NGO. Indeed, when σ is infinite—i.e., without information—there is no NGO opposition, so that lobbying takes place under the same condition whether there is an NGO or not.

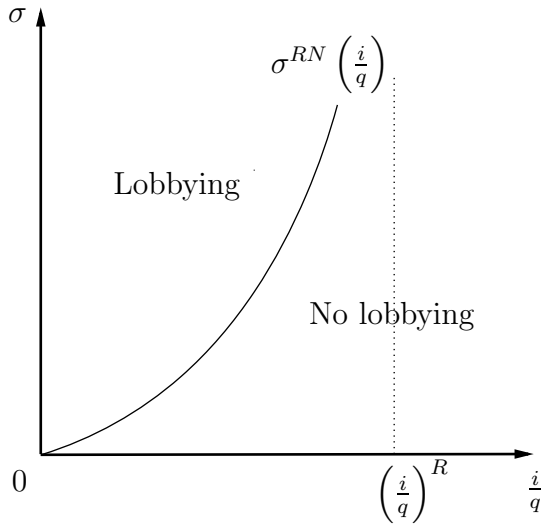


Figure VI: Occurrence of industry lobbying in the presence of an NGO

In the absence of lobbying, there is no NGO opposition, so the social surplus generated by the industry is the first-best level, as in (5):

$$\mathcal{W}_L^{RN} = \mathcal{W}_L^R = p_L(v - c_L)q > 0. \tag{30}$$

When the industry lobbies effectively, however, expected welfare becomes

$$\begin{aligned} \mathcal{W}_{LH}^{RN} &= p_L\left[(1 - \Phi_L(\sigma))(v - c_L) - \Phi_L(\sigma)\gamma\eta v\right]q \\ &+ p_H\left[(1 - \Phi_H(\sigma))(v - c_H) - \Phi_H(\sigma)\gamma\eta v\right]q - i\bar{\alpha}. \end{aligned} \tag{31}$$

20. Since both revenues and costs are proportional to the size of a project, the relative cost of influence i/q affects neither the influence threshold $\bar{\alpha}$ that induces the regulator to accept bad projects nor the opposition probability functions Φ_L and Φ_H.

In the same way as in Section III, we rule out the uninteresting situation in which it would be socially optimal to simply shut down the industry by assuming[21]

$$\mathcal{W}_{LH}^{RN} \geq 0. \tag{32}$$

The next section characterizes the occurrence of lobbying with and without an NGO.

VI. Relative Cost of Influence, Transparency, and Occurrence of Industry Lobbying

In this section, we examine the circumstances under which industry lobbying takes place with and without an NGO. According to Propositions 1 and 4, the occurrence of lobbying depends on both the relative cost of influence and the degree of transparency in the industry. The following corollary is obtained.

Corollary 1 (Occurrence of lobbying).

1. *For high relative costs of influence $i/q > (i/q)^R$, lobbying never takes place, regardless of whether there is an NGO or not.*
2. *For low relative costs of influence $i/q \leq (i/q)^R$ and*
   (a) *Low degrees of transparency $\sigma \geq \sigma^{RN}(i/q)$, the industry always lobbies;*
   (b) *High degrees of transparency $\sigma < \sigma^{RN}(i/q)$, the industry lobbies in the absence of an NGO, and does not otherwise.*

Proof. The corollary immediately results from Proposition 1 (without an NGO) and its counterpart Proposition 4 in the presence of an NGO. Its formulation highlights that there are only three possible situations. This is because, as already explained in Section V, for $i/q \geq (i/q)^R$, $\sigma^{RN}(i/q)$ does not exist. ■

Corollary 1 shows that the presence of an NGO limits the occurrence of industry lobbying, as is illustrated in the $(i/q,\sigma)$ plane in Figure VII.

21. In some cases, however, industry projects were banned only because they were meeting NGO opposition. This was especially evident when France banned GMO cultivation in 2014: The decision was justified by the opposition of the public, as demonstrated by opinion polls and by activists' destruction of experimental GMO fields (*Reuters*, May 5, 2014, available at `http://www.reuters.com/article/2014/05/05/france-gmo-idUSL6N0NR2MZ20140505`).

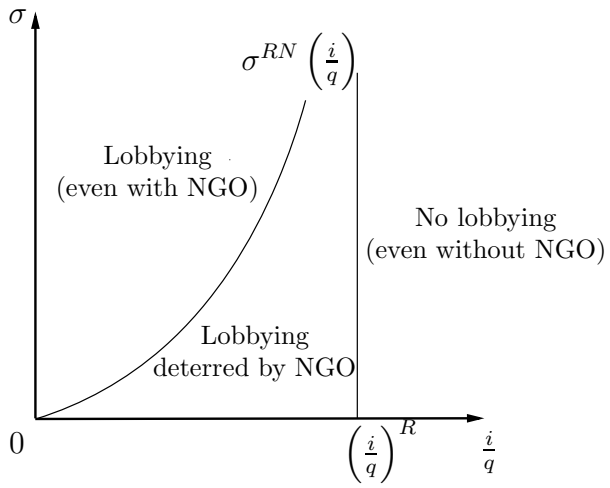


Figure VII: Occurrence of industry lobbying with and without an NGO

VII. Endogenous NGO Entry and Welfare Analysis

VII.A. Endogenous NGO Entry

Sections III and V examined the performance of an industry with and without an NGO. We now endogenize the NGO's entry decision.[22] When the NGO enters, activists dedicate resources to the monitoring of the industry's project and, based on the information they collect, decide whether to oppose this project in the way described above.

We assume that the NGO enters when the change in the activists' (biased) valuation of expected welfare $\mathcal{X}$ caused by the presence of the NGO strictly exceeds some entry cost that we normalize to zero. Therefore, we compare $\mathcal{X}$ in the presence and absence of the NGO in the industry, in the three situations identified in Corollary 1.

Consider first the situation in which industry lobbying never takes place and the regulator only approves the project when it is good. In this case, there is no NGO opposition, even in the presence of the NGO, as per Proposition 4. With or without the NGO, the valuation of welfare by activists is

$$\mathcal{X}_L^R = \mathcal{X}_L^{NR} = p_L \left[(1-\beta)v - c_L\right] q. \tag{33}$$

NGO entry, therefore, would not improve the welfare valuation $\mathcal{X}$ of activists.

Second, consider the situation in which industry lobbying only induces the approval

22. The coordination of individual activists and the NGO's formation are beyond the scope of this paper.

of a bad project in the absence of the NGO. In that case, Proposition 1 implies that the activists' valuation of welfare is

$$\mathcal{X}_{LH}^{R} = p_L \left[(1-\beta)v - c_L\right] q + p_H \left[(1-\beta)v - c_H\right] q, \tag{34}$$

which is lower than in (33) because the second term in (34) is negative. Therefore, the NGO's entry causes a change $\mathcal{X}_{L}^{RN} - \mathcal{X}_{LH}^{R} > 0$. In that case, the activists always enter.

Third, consider the situation in which the industry lobbies the regulator regardless of the NGO's presence. In the absence of the NGO, the activists' valuation of expected welfare is given by (34), which is to be compared with their welfare valuation in the presence of NGO opposition. By Propositions 2 and 3, this valuation is

$$\begin{aligned} \mathcal{X}_{LH}^{RN} &= p_L \left[(1-\Phi_L(\sigma))\left((1-\beta)v - c_L\right) - \Phi_L(\sigma)\gamma\eta v\right] q \\ &+ p_H \left[(1-\Phi_H(\sigma))\left((1-\beta)v - c_H\right) - \Phi_H(\sigma)\gamma\eta v\right] q. \end{aligned} \tag{35}$$

Analysis of the difference $\mathcal{X}_{LH}^{RN} - \mathcal{X}_{LH}^{R}$ yields that the NGO always enters in that case—see the proof in Appendix B. The above results are summarized by the following proposition.

Proposition 5 (Endogenous NGO entry and industry lobbying). *The activist NGO enters if and only if* $0 < i/q \leq (i/q)^R$*—i.e., whenever the industry lobbies in its absence.*[23]

VII.B. NGO-induced Welfare Improvement

The question arises whether the entry decision of the NGO activists analyzed in the previous subsection contributes to improve welfare. Indeed, there are two differences between the objective pursued by the NGO $\mathcal{X} = \mathbb{E}^N \left[\mathcal{U} + (1-\beta)\pi\right] - \gamma m$ and social welfare

$$\mathcal{W} = \mathbb{E}\left[\mathcal{U} + \pi\right] - \gamma m - i\alpha. \tag{36}$$

First, the activists' valuation of the surplus generated by the industry is biased against the industry's profit by the parameter $\beta \geq 0$. Second, activists do not internalize that the industry's resources are sunk into lobbying.

To address the welfare impact of the NGO's entry, it is useful to first establish the circumstances under which this entry deters industry lobbying. We do so in the following corollary.

23. It should be clear from Corollary 1, however, that NGO entry does not necessarily deter lobbying.

Corollary 2 (NGO's deterrence of lobbying). *NGO entry deters industry lobbying if and only if $\sigma < \sigma^{RN}(i/q)$—i.e., whenever the information at its disposal is sufficiently precise.*

Proof. The corollary immediately results from the combination of Corollary 1 and Proposition 5. ■

We now examine the impact on welfare of the NGO's entry decision. When industry lobbying never takes place and the regulator only approves the project when it is good, the first-best outcome is realized despite the fact that the NGO does not enter. Social welfare in that case is given by (30), which would not be improved by the NGO's entry.

When industry lobbying is deterred by the NGO's entry, the first-best welfare level (30) is restored: Indeed, the mere presence of the NGO is sufficient in that case, and NGO mobilization is not needed: The NGO's entry is always desirable.

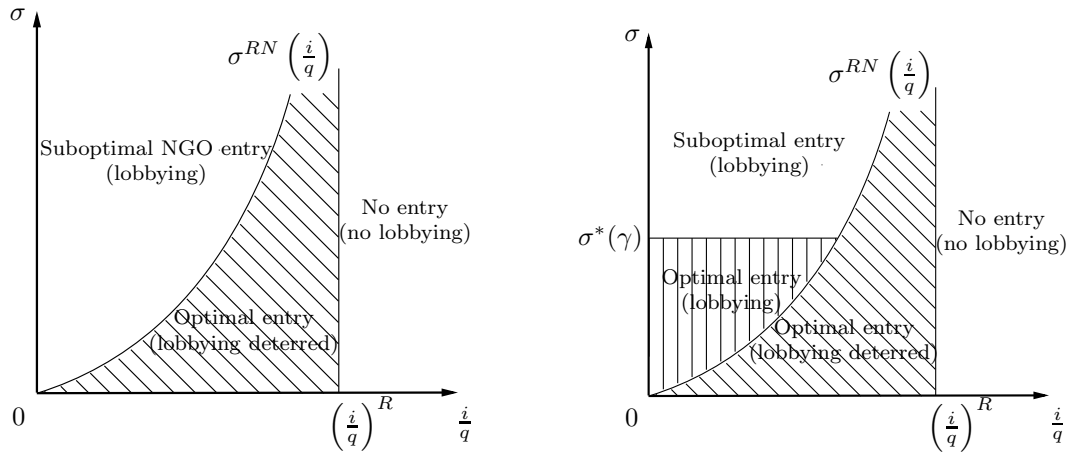
Finally, when industry lobbying takes place regardless of whether there is an NGO or not, social welfare $\mathcal{W}_{LH}^{R}$ without an NGO, as given in (6), is to be compared with its counterpart $\mathcal{W}_{LH}^{RN}$ in the presence of an NGO, as given in (31). Analysis of the difference yields the following proposition.

Proposition 6 (NGO entry and welfare improvement).

1. *NGO entry always improves social welfare when it deters industry lobbying.*
2. *When it does not deter lobbying, NGO entry improves welfare if*
   (a) *Mobilizations are not too costly: $\gamma < \bar{\gamma} \equiv \frac{c_H - v}{\eta v}$;*
   (b) *There is enough transparency in the industry: $\sigma < \sigma^*(\gamma)$, where $\sigma^*(\gamma)$ is defined in Appendix B.*

The proof of Proposition 6 is presented in Appendix B. Its result is represented in Figure VIII. In the right-hand panel, the cost of NGO mobilization is sufficiently low ($\gamma < \bar{\gamma}$). In that case, there exists a threshold degree of opacity $\sigma^*(\gamma) > 0$—decreasing in the mobilization efficiency parameter γ—below which the NGO's entry is optimal, not because it deters industry lobbying, but because NGO activists can efficiently oppose harmful industrial projects.

In environments favorable to the industry's influence, the involvement of NGO activists may become optimal for society for two reasons. First, NGOs tend to deter industry lobbying. Thus, in the presence of an NGO, regulation is less vulnerable to the



(a) High mobilization cost: $\gamma \geq \bar{\gamma}$ (b) Low mobilization cost: $\gamma < \bar{\gamma}$

Figure VIII: Optimality of NGO entry

industry's influence. Second, even when the industry's influence is unavoidable, activists directly oppose industrial projects.

Yet NGO opposition is a costly way to fight an industry's influence on its regulation, not only because NGO-industry conflicts are socially costly, but also because NGOs sometimes pick the wrong target. Indeed, our analysis stresses the crucial role of transparency. As Figure VIII illustrates, a perfectly-informed NGO—as when σ tends to zero and the diagram reduces to its horizontal axis—would always improve welfare, despite the fact that its mobilization is socially costly: Its presence would systematically deter the influence of the industry on regulation, making NGO opposition unnecessary. Some opacity ($\sigma > 0$) is needed to explain the fact that NGO entry does not necessarily deter lobbying and that NGO mobilizations effectively take place.

When an NGO becomes more efficient and when its information improves, it chooses better targets and reaches them in a less costly way. In that context, Proposition 6 demonstrates that NGO opposition has the potential to improve the existing regulatory system.

To sum up, this theory holds that public regulation becomes vulnerable to the industrial stakes both when ($\imath$) the cost of influence declines and ($\imath\imath$) economic activity grows. In either case, NGO activists may enter. When NGOs are sufficiently efficient and transparency allows them to be sufficiently well informed, activism against industrial projects is warranted. Our theory highlights the fundamental importance of transparency. Activists may only fulfill their role of countervailing the industry's influence if they have access to information of a sufficient quality to distinguish a bad project from a good one.

VIII. Extensions to More Complex Environments

This section briefly discusses two aspects that are absent from the framework presented above. First, we show that our analysis carries over unchanged to the apparently more complex case in which the firm is able to make lobbying efforts that are specific to the project's type. Second, we explain how the analysis accommodates situations in which the regulator is directly affected by NGO opposition.

VIII.A. Project-specific Lobbying

Our analysis assumes that the firm does not observe the project's type. In this context, it makes lobbying efforts under a veil of ignorance about whether its project will turn out to be good or bad. Admittedly, in some cases, the industry may be aware of the external costs that its projects would inflict to the rest of society if they were undertaken. Assume, unlike the main analysis, that the firm is perfectly informed about the project's type at the moment of influencing its regulatory approval. We will demonstrate that this alternative assumption does not modify the analysis in any manner. Indeed, lobbying efforts being observable by activists, a Bayesian equilibrium cannot be separating: Lobbying expenditures must not differ according to whether the project is good or bad.

Assume, instead, that lobbying expenditures e be contingent on the project's type: $e_L \neq e_H$. For example, the firm does not lobby at all when its project is good as it will be accepted by the regulator, but only makes efforts when its project is bad and its approval requires that the regulator be influenced. In any such separating equilibria, irrespective of lobbying expenditures, a Bayesian NGO would perfectly infer from them whether the project is good or bad. Consequently, it would successfully oppose a bad project and would do nothing in front of a good one. That means that costly lobbying efforts by the firm would be useless: Anticipating the activists' reaction, the firm would make zero lobbying expenditures for both types of projects, which contradicts the initial assumption that those expenditures would differ.

The demonstration implies that the Bayesian equilibrium of the game is necessarily pooling, regardless of whether the firm lobbies ex ante or ex post. In either case, lobbying expenditures must be the same for both types of projects, so that the equilibrium is formally equivalent to the equilibrium examined in the main text, and leads to the same conclusions.

To sum up, the analysis presented in the main text remains the same whether or not the firm knows the type of its project at the moment of choosing its lobbying expenditures.

VIII.B. Regulator's Sensitiveness to NGO Opposition

For simplicity, the main analysis assumes that the regulator is solely concerned with the surplus generated by the project. Therefore, according to (1), its objective is independent of the intensity of NGO mobilization:

$$\mathcal{V} = \mathbb{E}\left[\mathcal{U} + \big(1 + \alpha(e)\big)\pi\right].$$

It is sensible, however, to suppose that regulators are sensitive to NGO opposition, both because mobilizations entail a deadweight loss and because NGO opposition may deteriorate regulators' reputation.

Consider, unlike the main analysis, that the regulator's objective is

$$\mathcal{V} = \mathbb{E}\left[\mathcal{U} + \big(1 + \alpha(e)\big)\pi - \theta m\right],$$

where the parameter $\theta > 0$ reflects the regulator's sensitiveness to the mobilization intensity m—for example, when the regulator simply internalizes the deadweight loss caused by mobilizations, $\theta = \gamma$. The introduction of $\theta > 0$, instead of $\theta = 0$ in the main text, modifies the occurrence of lobbying in the presence of an NGO in the following manner, with no qualitative consequence on the rest of the analysis. In that case, the regulator takes into account that a mobilization of intensity $\bar{m} = \eta v q$ may take place with probability $0 < \Phi_H(\sigma) < 1$, causing the project to be abandoned. Therefore, it approves a bad project if and only if $(1-\Phi_H(\sigma))\left(\left(1+\alpha(e)\right)v - c_H\right) - \Phi_H(\sigma)\theta\eta v \geq 0$, which is equivalent to

$$\alpha(e) \geq \bar{\alpha}^{RN} \equiv \frac{c_H - v}{v} + \frac{\Phi_H(\sigma)}{1-\Phi_H(\sigma)}\theta\eta,$$

where the influence threshold $\bar{\alpha}^{RN}$ is strictly higher than its counterpart $\bar{\alpha}$ in (3), obtained when $\theta = 0$.

The industry is willing to bear an increased minimum influence expenditure $\bar{e}^{RN} = i\bar{\alpha}^{RN} > i\bar{\alpha}$ if and only if it is covered by the additional expected profit $(1 - \Phi_H(\sigma))p_H v q$ due to the approval of a bad project:

$$\left(1 - \Phi_H(\sigma)\right) p_H v q \geq i\bar{\alpha}^{RN} = i\left[\frac{c_H - v}{v} + \frac{\Phi_H(\sigma)}{1-\Phi_H(\sigma)}\theta\eta\right]. \tag{37}$$

Since $\bar{\alpha}^{RN} > \bar{\alpha}$, it is straightforward that condition (37) is more restrictive than its counterpart in the proof that follows Proposition 4.

Therefore, the result that the NGO presence contributes to deter lobbying emerges

reinforced. When the regulator is insensitive to NGO opposition, as explained in the main text, lobbying is less likely with an NGO because the probability of opposition $\Phi_H(\sigma) > 0$ to bad projects reduces the stakes of lobbying. When the regulator is sensitive to the eventuality of NGO opposition, lobbying is even less likely: Such a regulator is less incline to approve a bad project, so that lobbying demands more efforts from the industry.

The analysis with $\theta > 0$ is less immediate than with $\theta = 0$. However, one can easily show that condition (37) for the occurrence of lobbying takes a form similar to condition (28) established in the main text: Lobbying takes place in the presence of an NGO if and only if

$$\sigma \geq \sigma^{RN}\left(\frac{i}{q}\right),$$

where the threshold σ^{RN} must be adjusted, but retains its central properties. Precisely, the function remains continuously increasing in the relative cost of influence i/q and takes values from $\lim_{i/q \mapsto 0} \sigma^{RN}(i/q) = 0$ to $\lim_{i/q \mapsto (i/q)^R} \sigma^{RN}(i/q) = +\infty$, where $(i/q)^R$ is still defined by (4).

To conclude, the analysis presented in the main text remains qualitatively the same under the assumption that the regulator is directly affected by NGO opposition to a project that it approved. The extension, nevertheless, highlights that the regulator's sensitiveness to NGO mobilization reinforces the result that the NGO presence can deter industry lobbying.

IX. Concluding Remarks on the Rise of NGO Activism

Our theory can be used to explain the increasing involvement of NGOs in several industries over the past few decades. In a nutshell, our view is that the size and value of industrial projects (and thus the stakes of lobbying) have grown dramatically, while the cost of influence has not increased in most countries (and probably decreased in some). Public regulation has thus become more vulnerable. At the same time, conditions have favored NGOs' efficiency, such as the rise of communication technologies and the resulting dissemination of information. As a result, NGOs have increasingly sought to oppose the hazardous projects of industries that are difficult to regulate.

IX.A. The Rising Scale of Projects, and the Resulting Influence of the Industry on Public Regulation

In Western countries, firms have typically grown in size rapidly in the last three decades. More and more, multinational conglomerates operate in oil and energy production, banking, retailing, food production, new technologies, etc. This is mainly because technology accelerated economies of scale and increased entry costs (Bollard, Klenow, and Li [2014]; Mueller, Ouimet, and Simintzi [2015]), thereby "allowing the biggest firms to get bigger unhindered by competition" (*The Economist*, March 14, 2015). In developing countries, businesses have grown in size both because of economic development and because super big companies emerged from state capitalism.

At the same time, industrial projects have grown bigger, whether in size or valuation, and their potential external damages have scaled up accordingly. For example, outcomes such as the Deepwater Horizon explosion, the Fukushima disaster, and the global financial crisis became catastrophes because the units involved were of record size. It is remarkable that the Deepwater Horizon rig was drilling the deepest oil well in history, and that the Fukushima Daiichi nuclear power plant was one of the 15 largest power stations in the world. Furthermore, when businesses are interconnected, as in the banking sector, firm size is more critical than ever, because interconnection magnifies the social damages of misconduct.

Glaeser and Shleifer (2003) show that public regulation was the optimal way for society to regulate business in Western countries between the start of the Progressive Era, and, roughly, the Second World War. However, the progressive program could not keep its promises in the face of today's enormous stakes. The contemporary era instead sees Western governments under the thumb of super-big multinationals and not in a position to impose adequate standards on them. In some sectors, businesses are so powerful that they manage to effectively distort regulation incentives with enormous political contributions, ubiquitous lobbying efforts, occasional corruption, or more complex and subtle forms of influence. This has been the case of energy regulation in many instances, but also of the regulation of the banking sector and the food and drugs industries worldwide.

IX.B. The Rising Efficiency of NGO Activism

When governments and regulators have failed to impose adequate standards for powerful businesses, NGOs have gotten increasingly effective at mobilizing to address such failures. For example, our analysis already mentioned the effective opposition to Nike's out-

sourced production management, Citigroup's project funding, HSBC's risk management, TransCanada's and Shell's energy-related projects, Starbucks's tax-avoidance scheme, and Dunkin's Donuts's use of chemicals. Opposition to super-big corporations and projects seems inherent to the rise of NGOs, both because big businesses are typically suspected of causing the greatest harm, and because they are more vulnerable to reputational risks.

Another remarkable change that has characterized the last few decades is the emergence of the Internet and associated communication technologies (ICT hereafter). As Joseph Nye (2004) points out, the ICT revolution has dramatically accelerated the rise of NGOs. According to our theory, there are two important aspects: information quality and mobilization efficiency. First, the ICT revolution has facilitated NGOs' ability to identify issues to oppose. Indeed, information is increasingly being disseminated at the global level about everything and, *a fortiori*, about industrial projects and their regulatory treatment. To sum up, in the words of *The Economist* (January 22, 2004), "The Internet [has] greatly improved transparency. Corporate secrets are becoming ever harder to keep." Baron (2003, pp. 34-35) illustrates the changes in NGO strategies that resulted from the ICT revolution. For example, he describes environmental activists' rapid circulation of information released by the Environmental Protection Agency. Similarly, an essay by the head of a NASA research institute was circulated in 2011, which informed NGOs about the Keystone XL pipeline's being on the track for approval. Second, the ICT revolution greatly improved the ways in which the public can be mobilized through social media, as well as NGOs' ability to coordinate their efforts through networks. This is well illustrated by recent mobilizations, such as the opposition to TransCanada's exploratory drilling in Québec in 2014.

IX.C. NGO Activism as a Response to These Recent Changes

According to our theory, therefore, the economy has moved, over the last few decades, in the southwest direction in the diagrams in Figure VIII. On the one hand, in the face of greater industrial stakes, public regulation has become more susceptible to pressure from industry to approve hazardous projects. In our model, this means a fall in the relative cost of influence i/q. On the other hand, NGO activism has benefitted from improved communication technologies and gotten increasingly better at targeting harmful projects. This means a fall in the parameter σ measuring opacity. Our theory, therefore, suggests that the involvement of NGO activists was a response to the recent changes described above.

The remaining question is whether this response was legitimate from the perspective of society as a whole. For example, Joseph Nye (2004) considers that the rise of NGO opposition has contributed to social progress. Improved communication technologies have not only generated more transparency, but also favored activists' efficiency in opposing targeted projects. This means a fall in the cost of mobilization γ: The economy would have moved from the diagram on the left in Figure VIII to the diagram on the right, and in the southwest direction in the latter. In that context, NGO opposition was more likely to be socially optimal as σ decreased, for two reasons. On the one hand, NGOs became better at detecting the most hazardous projects. On the other hand, with more transparency, NGOs became more effective at deterring industry lobbying. For example, over the period 2002-2014 in the US, NGOs' criticisms have been negatively associated with companies' subsequent lobbying expenditures (see the details in Appendix A).

Thus our theory tells that the rise of NGO activism is socially optimal if the joint decrease in σ and γ has been sufficiently marked. Another possible change in the same direction is that NGOs are likely to become less radical over time—that is, to exhibit a lower β. On the one hand, NGOs can be expected to attract, at first, the most radical activists, and, with time, less radical ones. On the other hand, NGOs have increasingly been competed with each other to mobilize the public. The need to mobilize a larger part of the public can be expected to lead NGOs to increasingly align their objectives with social welfare.

The conjecture that NGO activists have become less radical can be illustrated by the example of the Environmental Defense Fund (EDF), a famous advocacy group whose net assets have increased by more than 50% over the past four years. EDF's rapid growth relies on sponsors' contributions, mostly from its more than 1,000,000 members. The most well-known characteristic of EDF is its use of science, economics, and law to propose the most appropriate changes. Created in 1967—and, in 1975, the first environmental group to hire economists—EDF has been called "America's most economically literate green campaigners" (*The Economist*, August 31, 1991).

IX.D. Other Possible Policy Responses

Ahead of more vulnerable public regulation, our theory suggests other responses besides NGO activism that could contribute to social progress. The first and most obvious would be to strengthen regulation's ability to resist industry influence by increasing the cost of influence i. This is, for example, the message of the Tobin Project initiative and of Carpenter and Moss's (2014) book, which calls for more attention to how the influence

of special interests can be limited. Especially in reaction to the global financial crisis, the call for the prevention of capture found a particular echo in the US policy arena in 2009-2010, with the creation of new agencies under the 2010 Dodd-Frank bill. The question still arises, however, how agencies should be designed to increase their independence (see, for example, the measures suggested by Sheng [2012, p. 157]). Indeed, as shown by Gibson Brandon and Padovani (2011), strengthened regulation—as per the Dodd-Frank bill—has led to an increase in lobbying efforts by the US banking industry. Their finding is consistent with our theory: Starting from an environment highly favorable to the industry's influence, an increase in i that is not sufficient to deter lobbying only increases influence expenditures $i\bar{\alpha}$. Our theory suggests, therefore, that the Dodd-Frank bill's intent to strengthen regulation resistance has not been sufficiently strong to be effective.

The second response would be to increase transparency in regulatory affairs, which amounts to decreasing σ. NGOs often call for more transparency. US environmentalists, for example, backed legislation by which the EPA must make information about chemical emissions public across the country. Similarly, in states in which fracking is approved by regulation, anti-fracking activists have often demanded, with some success, that the fluids injected underground be disclosed. The idea that transparency must be improved has also found a particular echo in the debate on financial regulation; improved transparency was one objective of the Dodd-Frank bill. Moreover, the academic literature on financial regulation has suggested that the disclosure of financial data collected by regulators to third parties may improve regulators' incentives (Landier and Thesmar [2011]). To some extent, NGOs also contribute to increased transparency—as, for example, Finance Watch in the financial industry—by conducting research on regulation. In turn, more transparency in regulation is likely to contribute to limiting special interests' influence over regulators and policy makers by improving the latter's accountability.

Last, the cost of NGO opposition γ could be lowered by involving NGOs more directly in the regulatory process. For example, in his measures to prevent regulatory capture, Sheng (2012) suggests the empowerment of stakeholders as a countervailing power. This raises other questions, such as the independence of NGOs, that go beyond the scope of our analysis.

IX.E. The Legal Status of NGO Activism

Our theory rests on the assumption that the rise of NGOs occurred when activists perceived that their involvement would be an effective way to contribute to social progress. This is only possible when and where NGO activism is allowed by the legal environment.

Notably, the legal status of activism is ambiguous in most countries. Activism is generally tolerated by law in developed countries; sometimes, it is even guaranteed some financial independence. For instance, the Dutch government financially supports human-rights activist groups. Yet the right to protest only applies as long as protests do not break the law. When activist campaigns involve extreme behavior, activists often run the risk of legal repercussions. Even peaceful actions, such as calls for boycotts, may violate refusal-to-deal, anti-discrimination, and anti-defamation laws. It is on these grounds, for example, that several calls for boycotts by the French consumer association UFC have been declared unlawful. For its call to boycott Shell in response to the wreck of the Amoco-Cadiz oil tanker, the UFC was fined a prohibitive amount, which corresponded to Shell's estimated lost sales.

The legal protection of NGO activism is a more urgent issue for developing countries. In transitional economies and emerging markets, NGOs are often banned, especially in autocratic governments, on the ground that their opposition to the industry destroys business—see, e.g., *The Economist*, May 9, 2015. Our analysis calls for more protection of NGOs, and especially in these contexts, so that NGOs can effectively play their role of countervailing and disciplinary power.

Appendix A (For Online Publication): The Empirical Relationship between Industry Lobbying and NGO Mobilization in the US

This appendix examines the empirical relationship between industry lobbying and NGO mobilization. We combine two data sources to assemble a panel dataset. This dataset contains, for each year between 2002 and 2014, and each industrial sector, ($\imath$) the number of negative reports by US-based NGOs about US-based companies and ($\imath\imath$) the lobbying expenditures of US-based companies. The next subsection describes our data sources in more details.

A. Data Description

Industry Lobbying. We use the lobbying expenditures data compiled by the Center for Responsive Politics.[24] The data comprise the entire federal lobbying activity undertaken in the US and disclosed to the Secretary of the Senate's Office of Public Records as required by the 1995 Lobbying Disclosure Act. We use the Center for Responsive Politics' calculation of annual lobbying expenditures from 2002 to 2014, expressed in current dollars, and aggregated by industrial sector: agribusiness; communication and electronics; construction; defense; energy and natural resources; finance, insurance, and real estate; health; miscellaneous business; transportation.

Between 2002 and 2014, the mean value of the above sectors' lobbying expenditures was \$268 million per sector per year. Their standard deviation was \$157 million.

The time series of industrial sectors' total expenditures in lobbying is represented in Figure IX. Their annual average was \$2.4 billion. They were minimum in 2002 and 2004 with about \$1.5 billion and reached their maximum in 2010 with nearly \$3 billion.

Figure X represents the absolute annual increase in total lobbying expenditures. Over the period 2002-2014, they increased by an average of \$106 million per year. While they increased most years, their annual change exhibited high variations; their standard deviation was \$29 million.

Figure XI shows total lobbying expenditures per sector over the period 2002-2014. The "health" and "finance, insurance and real estate" sectors made the highest expenditures

24. Available at `https://www.opensecrets.org/lobby`. Data on lobbying expenditures from the Senate's Office of Public Records has been previously employed in a few papers. See, for example, Bertrand et al. (2014), and the references therein.

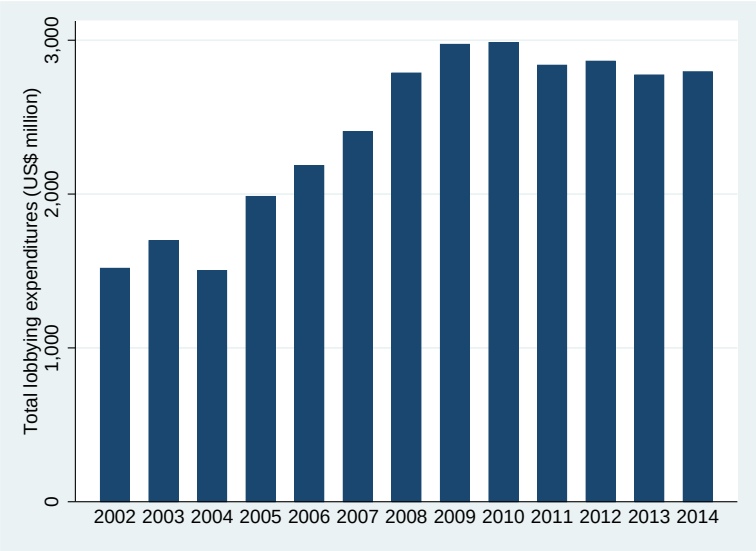


Figure IX: Total lobbying expenditures per year

around $5.5 billion, followed by "communication and electronics." The "construction" sector made the lowest expenditures, with $600 million.

NGO Negative Reports. To capture NGOs' opposition, we use the number of negative reports that NGOs publish on their websites against firms' projects and practices, as recorded by *Covalence Ethical Quote*. We extract all 5004 negative reports published by US-based NGOs—i.e., 268 NGOs—against US-based companies—i.e., 738 companies.[25]

For example, the data include reports published by Rainforest Action Network in 2004 against Citigroup and by Alternet in 2013 against Starbucks—two conflicts mentioned earlier in the main text. Another entry, for example, shows the mobilization that took place in 2003 against the poor fuel efficiency of Ford cars. It reports a letter written by Rainforest Action Network and Global Exchange calling on Ford CEO to dramatically increase fuel efficiency: "Right now, a patriotic American seeking to embrace energy independence by purchasing a high efficiency hybrid must turn to Japanese automakers. Ford is years behind the curve." "If America is to have good jobs, a cleaner planet and a safer country, Bill Ford Jr. needs to take bold measures to kick the oil habit." This mobilization was successfully followed by Ford's decision in 2007 to develop hybrid vehicles.[26]

Finally, to assemble our panel dataset, we have matched each company targeted by

25. Data on NGOs' reports recorded by *Covalence Ethical Quote* have been used in a very small number of papers. See, for example, Couttenier and Hatte (2015).

26. See *Reuters*, July 9, 2007, available at `http://www.reuters.com/article/us-ford-edisonintl-hybrid-idUSN0931005820070709.`

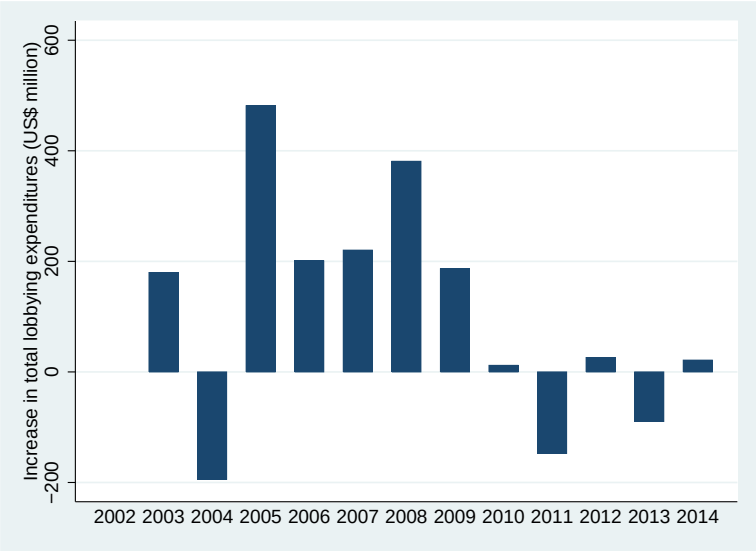


Figure X: Annual increase in lobbying expenditures

an NGO report with its corresponding sector within the list of sectors used in the lobbying expenditures database: agribusiness; communication and electronics; construction; defense; energy and natural resources; finance, insurance, and real estate; health; miscellaneous business; transportation. Therefore, for each of the 5004 negative reports, the obtained data comprise its year of publication, and the sector of the targeted company.

Between 2002 and 2014, the average number of NGOs' negative reports was 43 per year and per sector. Their standard deviation was more than 38 reports.

The time series of NGOs' negative reports is represented in Figure XII. On average, 385 such reports were published per year. Their number was minimum in 2012 with 218 reports and reached a maximum in 2003 with 698 publications.

Figure XIII shows the total number of reports by sector over the period 2002-2014. Put aside the "miscellaneous business" sector, the sectors most targeted by NGOs' negative reports were "agribusiness" and "energy and natural resources" with more than 900 reports, followed by "finance, insurance and real estate." The least targeted sectors were "defense" and "construction."

B. Relationship between NGOs' Negative Reports and Prior Changes in Lobbying Expenditures

Our theory rests on the view that NGO opposition is a response to industry lobbying. Indeed, our model predicts that NGO opposition only takes place in contexts in which lobbying is observed. To support this view, we examine how prior increases in lobbying

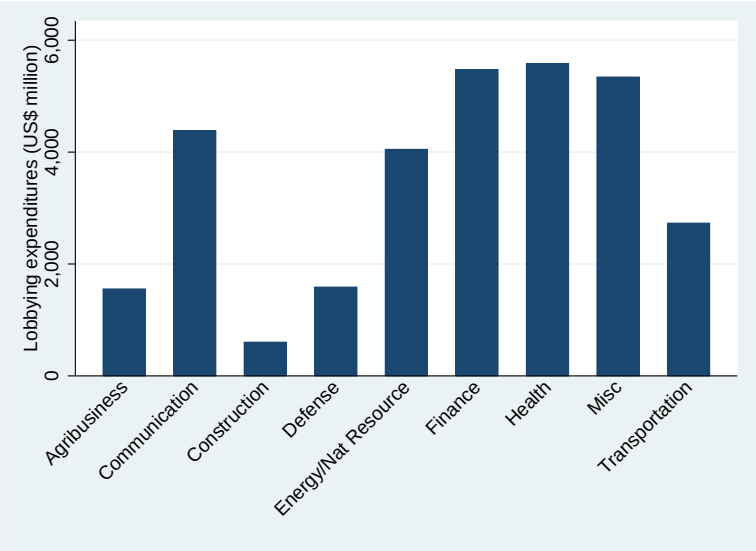


Figure XI: Lobbying expenditures per sector

expenditures affected NGOs' negative reports. We estimate the following linear model:

$$NGOReports_{it} = \kappa + \rho \Delta Lobbying_{it} + FE_i + \epsilon_{it},$$

where the dependent variable $NGOReports_{it}$ and the independent variable $\Delta Lobbying_{it}$ are respectively the numbers of NGOs' negative reports targeting sector i in year t and the increase in lobbying expenditures made by sector i between years $t-1$ and t. FE_i is a time-invariant sector-specific fixed effect which filters out sectoral characteristics that can affect NGO opposition.[27] Indeed, according to our theory, the relatively low number of reports targeting the "defense" and "health" sectors may be due, for example, to low transparency in those sectors. We estimate the scalar coefficients κ and ρ by the method of least squares with robust standard errors, which allow residuals ϵ_{it} to exhibit heteroscedasticity.

The result is presented in the following table.

27. The addition of year-specific fixed effects proves not to be significant.

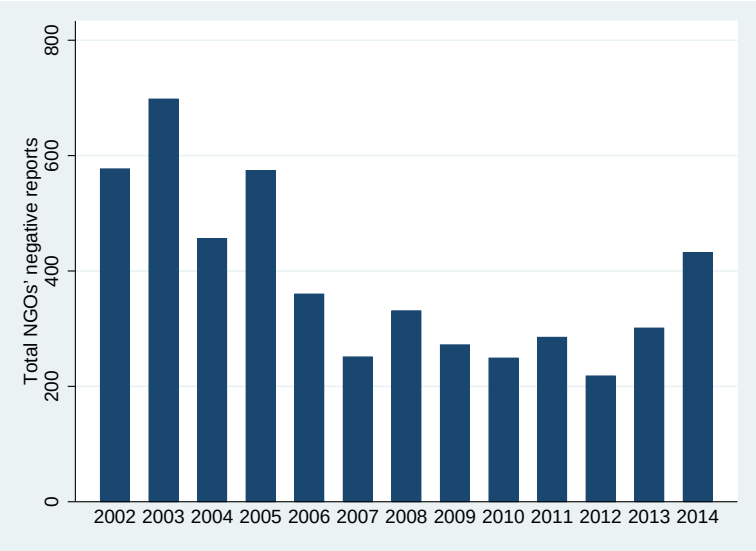


Figure XII: NGOs' negative reports per year

Table I: Relationship between NGOs' Negative Reports and Prior Changes in Lobbying Expenditures

	Reports
Δ*Lobbying*	0.149***
Constant	39.23***
Number of observations	108

Heteroscedasticity-robust standard errors are used.

*** $p < 0.01$

Table I shows that the coefficient ρ is significantly different from zero at the 1% level. Increased lobbying expenditures by $100 million are associated with 15 additional negative reports by NGOs. Note that the relationship established in this subsection involves the increase in, rather than the level of, lobbying expenditures.[28] The role of the increase in lobbying expenditures suggests that industry influence exhibits some persistency—an aspect that is absent from our model.

28. The estimation of the model with prior lobbying expenditures instead of their prior increase implies a less significant relationship.

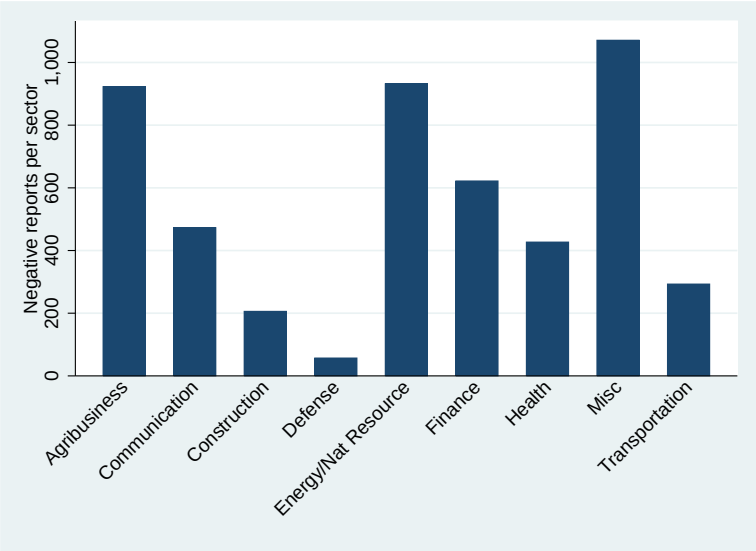


Figure XIII: NGOs' negative reports per sector

C. Relationship between Lobbying Expenditures and Prior NGOs' Negative Reports

Our theory also suggests that NGOs deter industry lobbying. Indeed, our model predicts that in presence of NGOs industry lobbying is less likely. To test this prediction, we examine how prior NGOs' negative reports affected lobbying expenditures over the period 2002-2014. We estimate the following linear model:

$$Lobbying_{it} = \lambda + \varrho NGOReports_{it-1} + FE_i + \epsilon_{it},$$

where the dependent variable $Lobbying_{it}$ and the independent variable $NGOReports_{it-1}$ are respectively the lobbying expenditures made by sector i in year t and the number of NGOs' negative reports against sector i in year $t-1$. FE_i is a time-invariant sector-specific fixed effect which filters out sectoral characteristics that can affect lobbying.[29] According to our theory, for example, the economic size of an industry contributes to explain the occurrence of its lobbying.

The result is presented in the following table.

29. The addition of year-specific fixed effects proves not to be significant.

Table II: Relationship between Lobbying Expenditures and Prior NGOs' Negative Reports

	Lobbying
Lagged *Reports*	-1.392^{***}
Constant	337.6^{***}
Number of observations	108

Heteroscedasticity-robust standard errors are used.

*** $p < 0.01$

Table II shows that the coefficient ϱ is significantly different from zero at the 1% level. 50 negative reports by NGOs in a given year are associated with $65 million less lobbying expenditures in the next year. This negative relationship can be illustrated by the following graph (Figure XIV) in which, for each year, the lagged number of total NGOs' negative reports is associated with total lobbying expenditures. The corresponding correlation coefficient is 0.92.

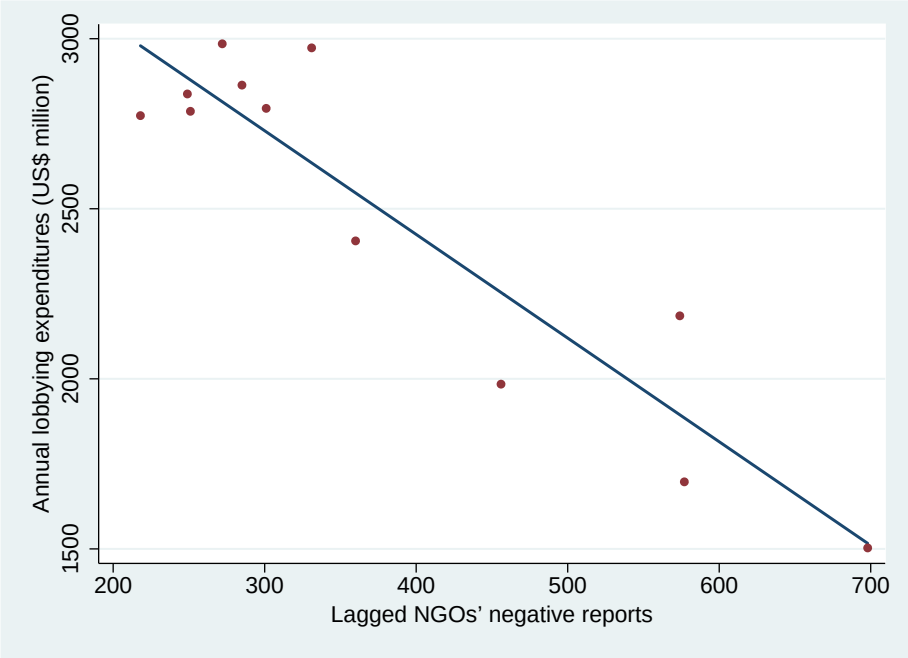


Figure XIV: Lagged NGOs' negative reports and lobbying expenditures

Appendix B (For Online Publication): Proofs

Proof of Proposition 2

This appendix focuses on the activists' choice of the mobilization intensity when $\omega < 1/2$—for $\omega \geq 1/2$, the proof is presented immediately below the proposition.

The NGO seeks to choose its mobilization efforts $m \geq 0$ in such a way as to maximize its objective (14): $\mathcal{X} = \mathbb{E}^N [\mathcal{U} + (1-\beta)\pi] - \gamma m$. When the project is to be undertaken, the activists' biased valuation of the surplus is $\mathbb{E}^N [\mathcal{U} + (1-\beta)\pi] = \left[(1-\beta)v - \mathbb{E}^N(c)\right] q$, where $\mathbb{E}^N(c)$ is their assessment of the project's external cost c. Clearly, if the activists' assessment $\mathbb{E}^N(c)$ falls short of $(1-\beta)v$, no mobilization will improve their objective, so that $m = 0$. Therefore, in the remainder of this proof, we will assume the NGO's benefit from opposing the project is strictly positive:

$$\mathcal{B} \equiv \left[\mathbb{E}^N(c) - (1-\beta)v\right] q > 0, \tag{38}$$

where the new variable $\mathcal{B}$ will turn out to simplify notations shortly below.

Since $\omega < 1/2$ implies $\hat{h} < \hat{m}$, there are three possible cases, as explained in the main text.

($\imath$) $m \leq \hat{h}$: The mobilization is weak in the sense that it does not induce the firm to abandon the project immediately after the mobilization and cannot generate a successful campaign thereafter. In that case, the project is always undertaken, so that the objective of the NGO is the following function of m:

$$\mathcal{X} = -\mathcal{B} - \gamma m.$$

($\imath\imath$) $m \in (\hat{h}, \hat{m})$: Such intermediate intensities do not induce the firm to abandon immediately after the mobilization, but are able to generate successful campaigns $h \geq \hat{h}$. The project is undertaken with probability $\hat{h}/m \in (0,1)$. Therefore, the objective of the NGO takes the following form:

$$\mathcal{X} = -\frac{\hat{h}}{m}\mathcal{B} - \gamma m. \tag{39}$$

($\imath\imath\imath$) $m \geq \hat{m}$: The mobilization is strong in the sense that its intensity is sufficient to induce the firm to abandon immediately. In that case, the NGO's objective writes

$$\mathcal{X} = -\gamma m.$$

$\mathcal{X}$ is strictly decreasing in m on its two extreme sections, when $m \in [0, \hat{h}]$ and $m \in [\hat{m}, +\infty)$. Therefore, $\mathcal{X}$ can only be maximum for the following intensity levels: $m = 0$, $m = \hat{m}$ and, in some cases that remain to be established, some level $m \in (\hat{h}, \hat{m})$. It is also easy to see that $\mathcal{X}$ is continuous at $m = \hat{h}$ and exhibits an upward jump at $m = \hat{m}$. Therefore, a maximum of $\mathcal{X}$ over $m \in (\hat{h}, \hat{m})$ that is not interior cannot be a global maximum—see, for example, the curves labelled (a) and (b) in Figure XV. A maximum of $\mathcal{X}$ over $m \in (\hat{h}, \hat{m})$ may only be global if it is interior—see the curve labelled (c) in the example of Figure XV. In that case, it is uniquely characterized by the first-order condition for the maximization of (39): $\hat{h}\mathcal{B}/m^2 = \gamma$. This condition yields

$$\tilde{m} = \sqrt{\frac{\hat{h}\mathcal{B}}{\gamma}}.$$

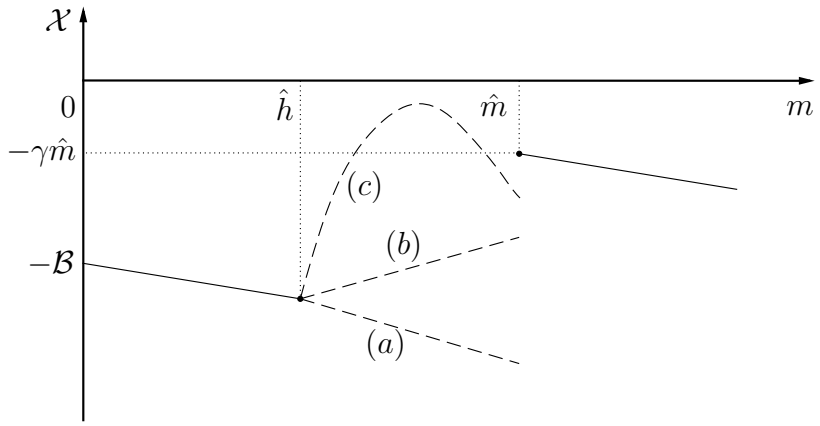


Figure XV: Optimality of intermediate mobilization (examples)

To sum up, there are only three possibilities for the value of m that maximizes $\mathcal{X}$: $m = 0$, $m = \tilde{m} \in (\hat{h}, \hat{m})$, or $m = \hat{m}$, for which the value of $\mathcal{X}$ is, respectively, $\mathcal{X} = -\mathcal{B}$, $\mathcal{X} = -2\sqrt{\gamma\hat{h}\mathcal{B}}$, and $\mathcal{X} = -\gamma\hat{m}$.

Now, let us examine the conditions under which the intermediate intensity $m = \tilde{m}$ dominates the two other candidates, so that it is optimal for activists to mobilize in such a way that campaigns occur. This is only possible if the two following conditions are satisfied:

$$\hat{h} < \tilde{m} < \hat{m}$$

and

$$-2\sqrt{\gamma\hat{h}\mathcal{B}} > \max(-\mathcal{B}, -\gamma\hat{m}). \tag{40}$$

The interested reader can easily verify that the latter implies the former; we focus on condition (40). Taking squares, (40) is equivalent to $4\gamma\hat{h}\mathcal{B} < \min(\mathcal{B}^2, \gamma^2\hat{m}^2)$. This necessary condition can be simplified by using the expressions of $\hat{h}$ and $\hat{m}$ given in (9) and (11). We obtain that the intensity $m = \tilde{m}$ can only dominate if

$$\frac{4\gamma vq}{1-\omega} < \mathcal{B} < \frac{\gamma vq}{4\omega}, \tag{41}$$

which is non empty only when $4/(1-\omega) < 1/(4\omega)$, i.e., equivalently when

$$\omega < \frac{1}{17}.$$

To conclude, our model predicts that campaigns can only occur in equilibrium when the persistency of campaign damages is very low ($\omega < 1/17$) and when (41) is satisfied. The latter means that the activists' assessment of the external cost $\mathbb{E}^N(c)$ takes intermediate values

$$\frac{4\gamma v}{1-\omega} + (1-\beta)v < \mathbb{E}^N(c) < \frac{\gamma v}{4\omega} + (1-\beta)v;$$

the inequality has been obtained by using the definition of $\mathcal{B}$ in (38). In all other cases, the NGO never decides to mobilize with an intermediate intensity that would cause a campaign.

By Assumption 1, for reasons presented in Subsection IV.C, our analysis focuses on sufficiently persistent campaign damages: $\omega \geq 1/17$. When $1/17 \leq \omega < 1/2$, the NGO chooses either not to mobilize at all ($m = 0$), or to make the cost-effective strong mobilization of intensity $m = \hat{m} = vq/\sqrt{\omega(1-\omega)}$, which completes the proof. ■

Proof of Proposition 3

The first two points are shown in the main text that precedes the proposition. We now examine $\Phi_L(\sigma)$ and $\Phi_H(\sigma)$. Consider the latter first. Its definition in (25) implies that $\Phi'_H(\sigma) < 0$ if and only if

$$\hat{s}'(\sigma) + \frac{c_H - \hat{s}(\sigma)}{\sigma} > 0. \tag{42}$$

Thus, we analyze $\hat{s}'(\sigma)$. Rewriting (24) with (22) and (23), and rearranging, we easily

obtain

$$\frac{f\left(\frac{c_L-\hat{s}}{\sigma}\right)}{f\left(\frac{c_H-\hat{s}}{\sigma}\right)} = \frac{p_H(c_H-\bar{s})}{p_L(\bar{s}-c_L)}, \tag{43}$$

which implicitly defines the function $\hat{s}(\sigma)$. In (43), the right-hand side does not depend on σ. Taking the logarithm and the total derivative of both sides with respect to $\hat{s}$ and σ jointly, and rearranging, we obtain

$$\hat{s}'(\sigma) \equiv \frac{d\hat{s}(\sigma)}{d\sigma} = -\frac{\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)\frac{f'\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)} - \left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)\frac{f'\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}}{\frac{f'\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)} - \frac{f'\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}}. \tag{44}$$

Note that the function $\hat{s}(\sigma)$ is differentiable everywhere.

Replacing $c_L - \hat{s}(\sigma)$ by $-(c_H - c_L) + c_H - \hat{s}(\sigma)$ in (44) and rearranging, the equality becomes

$$\hat{s}'(\sigma) + \frac{c_H-\hat{s}(\sigma)}{\sigma} = \left(\frac{c_H-c_L}{\sigma}\right)\frac{\frac{f'\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)}}{\frac{f'\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)} - \frac{f'\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}}.$$

In this equality, $c_H > c_L$ implies that the first term on the right-hand side is strictly positive. It also implies, by the assumption that f is strictly log-concave, that the denominator is strictly positive. Finally, we have noted in the main text preceding Figure IV that, for all σ, $\hat{s}(\sigma) > (c_L + c_H)/2$, so that $\hat{s}(\sigma) > c_L$. This inequality, together with the single-peakedness property of f, implies that $f'\left((c_L - \hat{s}(\sigma))/\sigma\right) > 0$. It follows that (42) is verified for all σ, so that the function Φ_H is strictly decreasing.

Consider now $\Phi_L(\sigma)$. Its definition in (26) implies that $\Phi'_L(\sigma) > 0$ if and only if

$$\hat{s}'(\sigma) + \frac{c_L-\hat{s}(\sigma)}{\sigma} < 0. \tag{45}$$

Examine $\hat{s}'(\sigma)$ again. Replacing now $c_H - \hat{s}(\sigma)$ by $(c_H - c_L) + c_L - \hat{s}(\sigma)$ in (44) and rearranging, we obtain

$$\hat{s}'(\sigma) + \frac{c_L-\hat{s}(\sigma)}{\sigma} = \left(\frac{c_H-c_L}{\sigma}\right)\frac{\frac{f'\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}}{\frac{f'\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)} - \frac{f'\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}{f\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)}}.$$

In this equality, the first term and the denominator on the right-hand side are both strictly

positive. Therefore, $\hat{s}'(\sigma)+(c_L-\hat{s}(\sigma))/\sigma$ has the same sign as $f'\left((c_H-\hat{s}(\sigma))/\sigma\right)$, which, by the single-peakedness property of f, has the same sign as $\hat{s}(\sigma)-c_H$.

Thus, we now compare $\hat{s}(\sigma)$ with c_H. Remember that $\mathbb{E}(c|s)$ is increasing in s in the definition (24) of $\hat{s}$. Therefore, $\hat{s}(\sigma)<c_H$ is equivalent to $\bar{s}<\mathbb{E}(c|s=c_H)$, which, using (22) and (23), rewrites

$$\frac{f\left(\frac{c_H-c_L}{\sigma}\right)}{f(0)}<\frac{p_H(c_H-\bar{s})}{p_L(\bar{s}-c_L)}. \tag{46}$$

On the one hand, the right-hand side of this inequality is independent of σ. Assumption 2 further implies that $0<p_H(c_H-\bar{s})/\left(p_L(\bar{s}-c_L)\right)<1$. On the other hand, the single-peakedness property of f implies that the left-hand side is continuously increasing in σ, with $\lim_{\sigma\mapsto 0} f\left((c_H-c_L)/\sigma\right)/f(0)=0$ and $\lim_{\sigma\mapsto+\infty} f\left((c_H-c_L)/\sigma\right)/f(0)=1$. It follows that there exists a unique $\tilde{\sigma}>0$ such that (46) is satisfied if and only if $\sigma<\tilde{\sigma}$. In turn, for all $\sigma<\tilde{\sigma}$, $\hat{s}(\sigma)<c_H$ is observed, (45) is satisfied, and $\Phi_L'(\sigma)>0$. Similarly, for all $\sigma>\tilde{\sigma}$, one can show that $\Phi_L'(\sigma)<0$. This concludes the proof of the third point.

Note, moreover, that the Φ_L and Φ_H functions are differentiable everywhere. ■

Proof of Proposition 5

Two parts of the result have been shown in the main text that precedes the proposition. First, the NGO does not enter when industry lobbying never takes place; according to Corollary 1, this is the case when $i/q>(i/q)^R$. Second, the NGO enters when industry lobbying takes place in the absence of the NGO and does not take place otherwise; according to Corollary 1, this is the case when $i/q\leq(i/q)^R$ and $\sigma<\sigma^{RN}(i/q)$.

It remains to be shown that the NGO enters when industry lobbying takes place irrespective of the presence of the NGO—i.e., when $i/q\leq(i/q)^R$ and $\sigma\geq\sigma^{RN}(i/q)$. In that case, expressions (34) and (35) yield

$$\mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R}=p_L\Phi_L(\sigma)\left[c_L-\bar{s}\right]q+p_H\Phi_H(\sigma)\left[c_H-\bar{s}\right]q, \tag{47}$$

where Assumption 2 and Proposition 3 imply that the first term is negative and single peaked while the second term is positive and decreasing.

Using (25) and (26), we obtain the derivative of (47) with respect to σ:

$$\begin{aligned}\frac{d\left(\mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R}\right)}{d\sigma} &= p_L\left(\frac{\bar{s}-c_L}{\sigma}\right)f\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)\left[\hat{s}'(\sigma)+\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)\right] \\ &- p_H\left(\frac{c_H-\bar{s}}{\sigma}\right)f\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)\left[\hat{s}'(\sigma)+\left(\frac{c_H-\hat{s}(\sigma)}{\sigma}\right)\right].\end{aligned} \tag{48}$$

Now, rewriting (24) with (22) and (23), and rearranging, we obtain the equality $p_L\left((\bar{s}-c_L)/\sigma\right) f\left((c_L-\hat{s}(\sigma))/\sigma\right) = p_H\left((c_H-\bar{s})/\sigma\right) f\left((c_H-\hat{s}(\sigma))/\sigma\right)$. With this equality, one can factorize (48), and simplify it to

$$\frac{d\left(\mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R}\right)}{d\sigma} = -p_L\left(\frac{\bar{s}-c_L}{\sigma}\right) f\left(\frac{c_L-\hat{s}(\sigma)}{\sigma}\right)\left(\frac{c_H-c_L}{\sigma}\right), \tag{49}$$

which is strictly negative because $c_H > c_L$ and because $\bar{s} > c_L$ by Assumption 2.

It follows that the difference $\mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R}$ is strictly decreasing with σ. Moreover, its limit is zero when σ tends to infinity because $\lim_{\sigma\mapsto+\infty}\Phi_L(\sigma) = \lim_{\sigma\mapsto+\infty}\Phi_H(\sigma) = 0$ by Assumption 2. It follows that $\mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R} > 0$ for all $\sigma > 0$, which concludes the proof. ■

Proof of Proposition 6

The first point is shown in the main text that precedes the proposition. The second point remains to be shown. It concerns the situation in which industry lobbying takes place regardless of whether there is an NGO or not. In that case, the comparison of (6) with (31) yields

$$\mathbb{E}\mathcal{W}_{LH}^{RN}-\mathbb{E}\mathcal{W}_{LH}^{R} = p_L\Phi_L(\sigma)\left[c_L-(1+2\gamma)v\right]q + p_H\Phi_H(\sigma)\left[c_H-(1+2\gamma)v\right]q. \tag{50}$$

Since lobbying expenditures are identical in $\mathbb{E}\mathcal{W}_{LH}^{RN}$ and $\mathbb{E}\mathcal{W}_{LH}^{R}$, they cancel out in (50). Therefore, $\mathbb{E}\mathcal{W}_{LH}^{RN}-\mathbb{E}\mathcal{W}_{LH}^{R}$ differs from the change in activists' valuation $\mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R}$ only by the intervention of the bias $\beta \geq 0$. If $\beta = 0$, $\mathbb{E}\mathcal{W}_{LH}^{RN}-\mathbb{E}\mathcal{W}_{LH}^{R} = \mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R}$ and it follows that the NGO's entry, as per Proposition 5, improves social welfare. If $\beta > 0$, $\mathbb{E}\mathcal{W}_{LH}^{RN}-\mathbb{E}\mathcal{W}_{LH}^{R} < \mathbb{E}\mathcal{X}_{LH}^{RN}-\mathbb{E}\mathcal{X}_{LH}^{R}$, and the NGO's entry is not necessarily optimal. However, since the Φ_L and Φ_H functions do not depend on γ, as per (25) and (26)—and in the light of (22), (23) and (24)—$\mathbb{E}\mathcal{W}_{LH}^{RN}-\mathbb{E}\mathcal{W}_{LH}^{R}$ is strictly decreasing in γ.

In (50), the first term is negative as a consequence of Assumption 2. As far as the second term is concerned, there are two possibilities. Assume first that $\gamma \geq \frac{c_H-v}{2v}$, which implies that the second term in (50) is nonpositive. In that case, $\mathbb{E}\mathcal{W}_{LH}^{RN}-\mathbb{E}\mathcal{W}_{LH}^{R} < 0$ for all values of σ. The NGO's entry cannot be optimal in that case.

Assume now that $\gamma < \frac{c_H-v}{2v}$, implying that the second term in (50) is strictly positive. The NGO's entry may be optimal in that case. Assumption 2 implies that when σ tends to zero, $\Phi_L(\sigma)$ tends to zero and $\Phi_H(\sigma)$ tends to one, so that the first negative term in (50) vanishes. By continuity of the Φ_L and Φ_H functions, therefore, $\mathbb{E}\mathcal{W}_{LH}^{RN}-\mathbb{E}\mathcal{W}_{LH}^{R}$ is strictly

positive if σ is sufficiently small. Formally, there exists $\sigma^* > 0$ such $\mathbb{E}\mathcal{W}_{LH}^{RN} - \mathbb{E}\mathcal{W}_{LH}^{R} > 0$ for all $\sigma < \sigma^*$. Since, furthermore, $\mathbb{E}\mathcal{W}_{LH}^{RN} - \mathbb{E}\mathcal{W}_{LH}^{R}$ is strictly decreasing in γ, the threshold σ^* is a decreasing function of γ: $\sigma^* = \sigma^*(\gamma)$. ■

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