

The Optimal NGO Chief: Strategic Delegation in Social Advocacy*

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Abstract

Firms face social pressure to behave well. We provide the first formal model in which social penalties for wrong-doing emerge endogenously and are jointly produced between a state regulator and an NGO. Armed with the instruments of coercion the regulator plays the primary role in information provision while through attitude-leadership the NGO manipulates the social atmosphere into which information about misbehavior of firms emerges. The strategies of the regulator and the NGO are classified in a taxonomy of regulatory settings that vary in; (a) the weight that the NGO places on environmental versus business outcomes and (b) community alertness to NGO messaging. In the strategic setting that results an NGO funder will typically want to delegate his bidding to an NGO chief who has values different to his own.

Keywords: Environmental regulation; private politics; strategic delegation; NGOs; social license.

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The use of thugs or sadists for the collection of extortion or the guarding of prisons, or the conspicuous delegation of authority to a military commander of known motivation, exemplifies a common means of making credible a response pattern that the original source of decision might have been expected to shrink from or to find profitless once the threat had failed. (Thomas Schelling, *The Strategy of Conflict*, 1960)

1 Introduction

Firms are subject to social pressure to behave ‘well’. Not polluting, eschewing child labor and exploitative labor practices, treating suppliers fairly, etc. are costly, so profit-motivated firms are tempted to cut corners to save money. However, bad behavior can also be hazardous to a firm’s bottom line. In addition to the legal penalties that may result from breaking laws, firms face social or reputational penalties for being observed to behave in ways that traverse community standards. These penalties can be large which explains the recent focus on ‘social license’, ‘informal regulation’ and ‘beyond compliance behavior’ in academic and practitioner circles.¹

In most settings social pressure is something that is *jointly produced* by the actions of state (regulators) and non-state (NGO) actors. Typically the regulator and NGO can be expected to have different objectives - the former pursuing welfare, the latter more focussed on environmental outcomes - but also access to different instruments. This means that the regulator, NGO and representative firm are in a three-way game, seeking strategically to influence community support to their own ends.

Given this, we ask the following question: If I am an NGO donor with a particular set of preferences - defined over how I weigh environmental versus other outcomes - to an NGO with what sort of values would I want to donate? One that is sensitive to business interests, or one that attaches little or no weight to them? We show that typically I will *not* wish to donate to an NGO with the same values as my own. Rather, in general my ends will be better served by delegating the fighting of the battle - to draw an analogy with the Schelling (1960)

¹*Informal regulation* can be viewed as follows; “When (formal penalties) are weak or absent, communities can often use other channels to force pollution abatement by local factories in a process of informal regulation” (Pargal and Wheeler (1996: 1314)). There is no universally-agreed definition of *social license* in the management literature. Broadly speaking a firm holds social license if it enjoys community or public support for its activities. There are many reasons why a business can perform better financially when community attitudes towards it are positive, implying that loss of support imposes a penalty. Firms - particularly those operating in key sectors where social license is critical - will invest substantially to avoid losing it. In mining, Prno and Solocombe (2012, page 346) note that “a social license exists when a firm is seen as having broad, ongoing approval and acceptance of society of conduct its activities” such that nurturing license is “... one of the most significant challenges that mining companies face”.

quote at the start of the paper - to an NGO whose preferences over environmental and non-environmental outcomes are different from mine. The analysis is consistent with, for example, the observation that many typically mild-mannered and welfare-oriented citizens donate to a rabidly anti-corporate type entity such as Greenpeace. Or why someone with ‘deep green’ tastes might be willing to support WWF, with a reputation for being comparatively balanced and sensitive in how it trades-off business and environmental imperatives in going about its business.

The analysis fits into a wider literature on strategic delegation in other contexts. In Rogoff (1985) a politician with a particular taste in inflation and unemployment delegates control of monetary policy to a central banker more conservative (inflation-hating) than himself. In Vickers (1985) and Fershtman and Judd (1987) a profit-maximising shareholder delegates the running of his firm to a manager whose objective function is not profit-maximisation. In Heyes and Kapur (2011) a welfare-maximising government appoints an EPA chief who is not welfare-oriented. In each case the appointment is instrumental - it makes credible a pattern of responses in a subsequent game that is to the ultimate benefit of the principal. In our setting the donor is the principal, and in giving his dollars to a particular NGO he appoints that entity to do his bidding.

We also contribute to a number of strands of research on the social behaviors of firms. There is a substantial body of theoretical and empirical research on corporate social responsibility (CSR) and behavior that goes beyond compliance (Arora and Gangopadhyay (1995) and Pargal and Wheeler (1996)). Related to this is the recent flurry of work on ‘private politics’ (Baron (2001, 2009), Baron and Diermeier (2007)). A second literature seeks to use formal methods to understand the organization and strategies of the social advocacy sector (Heyes and Martin (2015, 2016), Aldashev and Verdier (2009)). With particular focus on community pressure, Heyes and Kapur (2012) develop a model in which a firm engages in CSR in order to maintain community support and/or to regain the support of the community once it has been lost (which they refer to as ‘retentive’ and ‘redemptive’ CSR respectively), going on to characterize how these incentives interact with formal regulatory interventions. Aldashev and Verdier (2013) analyze the effect of NGO pressure on industry equilibrium (intensity of competition, market structure, and the share of socially responsible firms) and characterize the impact of industry-level changes (market size, consumer tastes) on NGO activism. Heyes and Maxwell (2004) model the interplay of a hypothetical World Environmental Organization and an NGO and find that private citizen suits crowd in public monitoring but crowd out public sanctions. And with an empirical focus Langpap and Shimshack (2010) present empirical evidence on the extent to which private environmental prosecutions crowd out - or crowd in - public monitoring and public enforcement efforts.

1.1 Joint production of social pressure: Some motivation and model preview

The starting point for the analysis that follows is the recognition that the pressure on firms to behave well - informal regulatory pressure - is *jointly produced* by governmental and non-governmental actors.

For the purposes of formal modeling we will treat these as single entities and refer to them generically as an Environmental Protection Agency (EPA) and a Non-governmental Organization (NGO). The EPA and NGO can be expected to have different objectives - the former pursuing welfare, the latter more interested in environmental outcomes - but also different levers that they can use to further their aims.

A central assumption that we will make is that the EPA has primary control over the *information* setting in which community attitudes evolve, reflecting the coercive powers associated with its status as a state actor.² In particular it can control the likelihood that bad behavior on the part of a firm will come to be known by the community. This it can influence through a variety of channels, for example: (1) publication of inspection reports (NGOs do not have the same rights to access plants and conduct inspections that regulators do); (2) requiring submission of data from polluters and then disseminating it; (3) mandating direct disclosure by firms of information about various elements of their social impact (sometimes with a requirement that they be verified by a third party).

The NGO can most naturally be thought as being able to influence community attitudes to wrongdoing - the degree of hostility or the social ‘atmosphere’ into which news of wrongdoing emerges.³ This will be key in determining the size of the social penalty that a firm will suffer *IF* bad behavior on its part comes to be public knowledge. If the NGO manages to persuade a broad set of the community that poisoning the local watershed is a particularly egregious thing, by for example educating the local population about the health impacts of such spillages on their children, then a firm revealed to have done such can expect the backlash to be correspondingly severe.⁴

In the model we formalize this partition of roles starkly. Of course it does not map

²The EPA will typically also have the power to levy financial penalties, though those penalties are often quite restricted (Heyes (2001)). For simplicity we ignore formal penalties here, concentrating on the contribution of the EPA to informal regulatory incentives.

³Gunningham et al (2004: 321) report that: “Managers at BC4 told us that the sanction they feared most for breaching regulations were not legal but informal sanctions imposed by the public and the media, they were motivated less by avoiding regulatory violations per se than by avoiding ‘anything that could give you a bad name’”. Econometric evidence of the substantial size of social penalties is provided by Badrinath and Bolster (1996), Pargal and Wheeler (1996) amongst others.

⁴A social penalty might take various forms (product boycotts, letter writing campaigns, blockading of offending plants, etc.). The precise form is not important to us here.

exactly to the real world, but is a good approximation in many cases - the state does most of the naming, the NGO most of the shaming. This is the case even under authoritarian regimes where the public influence of NGOs is typically more restricted. For example, a 2014 news article entitled ‘China’s Biggest Polluting Public Companies Named and Shamed by Green Groups’ reports how a prominent Chinese environmental group shamed around 200 big contributors to the country’s smog crisis “... using data published by government agencies” (Jing (2014:1)).⁵ It is certainly consistent with the division of roles noted by researchers and practitioners in this field. As the 2005 compilation *Making Law Work* by the International Network for Environmental Compliance and Enforcement (INECE) observes:

Regulators are learning the value of incorporating the energy of NGOs to help achieve environmental goals. Information regulation strategies, for example, are explicitly designed to empower NGOs (give them the information they need) to impose informal sanctions on firms based on their environmental record. NGOs have become a significant force in the effort to ensure that firms are following environmental regulations. NGOs have proven to be determined ... in their efforts to ensure that firms that violate environmental laws are sanctioned. [..]

Indeed the desire to give advocacy groups and local communities the ‘ammunition’ that they need to bring pressure to bear on recalcitrant polluters is the typical *raison d’etre* for public disclosure requirements.⁶

Note that while the NGO relies on the EPA for information, the EPA equally ‘uses’ the NGO sector to promote its own objectives - their relationship is symbiotic. A number of scholars have observed how the regulator can leverage the role of the NGO in this way:

“Community groups and nongovernmental organizations have come to play a key role in pressuring corporations to curb their social impacts. Corporate

⁵Sometimes these roles are reversed. For example in the recent VW emissions scandal it was an NGO that conducted the testing that brought the wrongdoing to light. Couttenier et al (2016) develop a model in which an NGO is selective in the information it passes on to citizens. In such a pure disclosure game the NGO does not expend effort generating primary information, so presumably it often obtains the information that it has from governmental or other publicly available sources. For example, the International Council of Clean Transportation (ICCT) Ranking of Transatlantic Airline Fuel Efficiency, that the authors use as a motivating example in that paper, combines data from publicly available travel web-sites with data on fuel use and traffic occupancy rates reported to the US Department of Transportation (see ICCT (2015)).

⁶We use the term ‘bad behavior’ loosely - it may or may not correspond to a firm’s failure to satisfy a formal legal requirement. The literature on community right-to-know provisions in general and the US Toxic Release Inventory in particular demonstrates the potential power of information provision in this context. In Canada, the “environmental scorecard” published by the BC provincial government outlining environmental performance indicators was, according to one mill manager “a pretty effective tool. If you have recurring environmental problems you come up on the list. That keeps you in compliance because public pressure is more demanding than the regulatory agencies” (Gunningham et al (2004: 330))

executives increasingly talk about the importance of operating in accordance with their social license [...] The regulator often extends the reach of the social license by giving social licensors (NGOs) access to information which they can then use to pressure target enterprises.” (Gunningham et al (2004: 329)).

The regulator in the model that we develop is an arm of government and assumed to maximize welfare (sum of compliance and operating costs and environmental damage) while the NGO usually *over-weights* environmental outcomes. This implies that there is tension between the two; they are not aligned in their preferred outcomes. The strategic interaction between the regulator and NGO in this set-up, and the properties of the resulting pattern of incentives that they jointly-produce is our focus.

The rest of the paper is set out as follows.

In Section 2 we develop and solve a stylised model of the game between EPA and NGO. The key assumptions embedded in the model are; (a) formal penalties are limited (in fact zero) so that the state regulator must rely on social penalties (social disapproval) to discourage polluting behavior;⁷ (b) the primary tool available to the regulator is information provision; (c) the hostility of the social atmosphere into which evidence of wrong-doing is published can be influenced by attitude-leadership by an NGO; (d) the EPA and NGO may have different objectives - in particular the latter over-weights environmental outcomes over industry interests - and are strategic in how they behave.

An insight of the model is that in making decisions about how much effort to invest in a hostile social atmosphere the strategic NGO will have regard not just to the direct effect on firms, but also induced changes in the actions of the EPA - it's partner in the creation of social pressure. The efficacy of its own actions to whip-up a more hostile social atmosphere may be off-set if the EPA responds by scaling back the intensity of its own information-provision efforts.⁸ In other circumstances the EPA may be induced to *expand* that intensity, and the NGO will be motivated to push *even harder* to exploit such crowding-in effects. In parallel the EPA, as a strategic actor in its own right, will realize that the intensity of the information provision program that it operates will influence the incentive that the NGO has to invest in a hostile community atmosphere.

We characterize the reaction functions in the game between EPA and NGO. As in Fu-

⁷Reputation here, however, is a social construct rather than something that emerges from a Bayesian updating process. This parallels Abito, Besanko and Diermeier (2015: 5): “Our notion of reputation is consistent with that employed in the sociology and management literatures - it is a social construct reflecting the public's subjective attitudes towards a company (Bermiss, Zajac and King (2013). It is not a posterior belief about hidden information as in a model with informed and uninformed players”.

⁸EPA thought process: “If the social atmosphere is such that every revealed wrong-doer faces an enormous social penalty, then to maximise welfare we only need to catch and reveal wrong-doing with small probability”.

denberg and Tirole (1984), and as the discussion in the last paragraph suggests, critical to incentives in any given context turn out to be whether EPA and NGO intensity choices are strategic complements or substitutes. This depends in turn on a constellation of parameters. Taxonomic in character the model generates numerous new insights that are inevitably missing from analyses (the whole existing literature) that fail to recognize that social pressures are *jointly-produced* by state and non-governmental actors.

While the taxonomy is an important contribution in its own right, providing as it does the first rigorous treatment of the joint production of social pressure, in Section 3 we consider strategic delegation within this framework. In particular we treat the NGO's objective function - the weight that the NGO places on environmental as opposed to non-environmental outcomes - as an institution-design parameter that it can choose in a pre-game. We caricature this as appointing an NGO 'chief' of a particular disposition, but the weight can equally be thought of as embedded in the practices and protocols within an NGO that determine its advocacy choices. Major environmental advocacy groups are widely-understood to vary in how sensitive they are to business interests, which in turn shapes their demands (Yaziji and Doh (2009)). Knowing the environment in which it is going to operate we ask whether an NGO founder with a particular set of values would want to strategically delegate decision-making discretion to an NGO chief with different tastes.

In contrast to existing modeling exercises - which invariably bestow upon the NGO an objective function - we endogenise and provide a strategic rationale for NGO objectives.

Section 4 concludes.

2 Model

2.1 Setup

Consider an industry made up of a large number of firms. Each firm makes a binary decision to engage in behavior that is either 'good' ($a = 1$) or 'bad' ($a = 0$). For convenience we will use the terms compliance ($a = 1$) and non-compliance ($a = 0$) as equivalents, but that should be understood to have wider interpretation than satisfaction of some formal legal requirement. Compliance is costly for the firms with cost represented by c . Firms are heterogenous - they vary in how costly they find it to behave well - and c is distributed according to distribution function F with corresponding density function f . The firm knows the realized value c , but others know only the distribution F from which it is drawn. For simplicity we restrict attention to the case in which c is uniformly distributed on $[0, 1]$. The taxonomy that we develop turns out to be very rich, so it is unlikely that allowing for a more general distribution would deliver

more insight. We ignore formal penalties, but instead acknowledge - consistent with the literature cited in the introduction - that if a firm decides not to comply with the standard, it is at risk of detection followed by some ‘social penalty’ or costly tarnishing of its social license.

There are two entities that between them determine the incentives facing firms to comply: an EPA and an NGO. These two “regulators” have different instruments and different objectives. Social penalties are jointly-produced by their actions. In general, the coercive tools available to it mean that the EPA has a comparative advantage in information gathering (through inspection programs, mandatory disclosure requirements, and so on) and NGOs in influencing community attitudes towards bad behavior. The relationship between the EPA and NGO is symbiotic. The NGO relies on the EPA to identify badly behaving firms. The EPA needs the NGO to use its influence to ‘whip-up’ public anger towards this particular type of bad behavior. The EPA and NGO understand that they are strategically interdependent and interact non-cooperatively.

The EPA operates an information regime - which for shorthand we will call an inspection policy - which detects non-compliance with probability p . Inspection is costly for the EPA, with an associated cost function $v(p)$, where v is increasing and convex in p and $v'(0) = 0$. To generate closed-form solutions of the game we will adopt a quadratic cost assumption; $v(p) = 1/2\alpha p^2$, with $0 < \alpha < 1$. In some settings if the EPA detects non-compliance the firm may have to pay a formal penalty or fine ψ . However these fines are very often small and not in themselves sufficient to create enough “audit pressure” to motivate compliance among all firms. In order to focus on social or informal penalties, and the strategic interaction between the EPA and the NGO, we set $\psi = 0$, *i.e.* there is no penalty for non-compliance from the EPA.

The NGO has no capacity to audit firms - it relies on information from the information-gathering endeavours of the EPA. However it is able to influence public opinion, that is create a negative reaction by social-minded citizens if the firm is shown to be out of compliance. This results in a negative payoff or social penalty to the firm denoted by θ . That social penalty is the financial value associated with the diminution of social license. But influencing public attitudes is costly for the NGO - it may have to run adverts, print leaflets, engage in educative and persuasive campaigns to sensitize people to the issue at hand. The size of the social penalty depends on the costly efforts by the NGO, reflected by cost function $\kappa(p)$, where κ is increasing and convex in θ and $\kappa'(0) = 0$. We will use the following quadratic cost function $\kappa(p) = 1/2\beta\theta^2$, with $0 < \beta < 1$, to ensure closed-form solutions.

Firms and regulators move in sequence. At *stage one*, firms decide whether or not to comply with the standard. You can think of this as a firm making investment or product design decisions, adopting management practices, that are either good or bad for society. At

stage two, EPA and NGO choose simultaneously the inspection probability and the social atmosphere into which the audit reports are published.

Industry Consider a firm of type c . The payoff when complying with the standard is $\Pi(a = 1) = -c$, while the firm's payoff for non-compliance and instead facing the expected social penalty in case of detection is $\Pi(a = 0) = -p\theta$. Hence, a firm does comply if:

$$c \leq p\theta.$$

Figure 1 shows the cumulative distribution function $F(c)$ and the fraction of firms that will comply and those that will not comply with the standard. Given the uniform distribution of c , the probability that a firm complies is $\Pr(c \leq p\theta)$, i.e.: $F(p\theta) = p\theta$. Hence, the expected fraction of firms that comply is $p\theta$ and the expected fraction of firms that do not comply is $(1 - p\theta)$.⁹

*** Figure 1 here ***

EPA The EPA's objective is to minimize a social loss function W which comprises firms' compliance costs, the environmental damage associated with cases of non-compliance, the costs of the NGO and the costs of inspections.

Note, the costs c of all complying firms are in the interval $[0, p\theta]$ so that the firms' expected cost of compliance is the expected value of c in $[0, p\theta]$. That is,

$$\int_0^{p\theta} cf(c)dc.$$

The fraction of firms that do not comply $(1 - p\theta)$ cause social damage $D(\cdot)$ which is increasing and convex. For tractability we assume quadratic damages; $D(\cdot) = 1/2\gamma(1 - p\theta)^2$, with $0 < \gamma < 1$.

⁹Lyon (2012) writes "Perhaps the most important reward offered by NGOs is public endorsement of a corporation's environmental actions through a partnership with that company. [...] Perhaps the most important harms wielded by NGOs are the threat of a consumer boycott of a firm's products and, more generally, the sullyng of a firm's reputation in the media." In essence the model at hand captures the second, but not the first effect. However, consider the following extension: If audited and found to be in compliance, the firm benefits because the NGO has directed the public atmosphere accordingly. Thus, while θ represents the social penalty created by an NGO, a fraction of θ is added to the firm's profits in case to be found in compliance such as $\zeta\theta$, where $\zeta < 1$. The key inequality $c \leq p\theta$ describing industry behaviour would change to $c + p\zeta\theta \leq p\theta$ or $c \leq p\theta(1 + \zeta)$. The current model concentrates on the special case in which $\zeta = 0$.

Putting all this together, the EPA chooses p to minimize the social loss function W :

$$\min_p W = - \int_0^{p\theta} cf(c)dc - 1/2\gamma(1 - p\theta)^2 - 1/2\beta\theta^2 - 1/2\alpha p^2. \quad (1)$$

In the Nash outcome it will take the social atmosphere θ created by the NGO as given.

In raising p the EPA trades-off the lower damages resulting from the higher number of firms in compliance against higher costs to the industry and higher enforcement cost. In the following, we focus on interior solutions. The first-order condition $\partial W/\partial p = 0$ is given by:

$$-p\theta^2 + \gamma\theta(1 - p\theta) - \alpha p = 0.$$

The first-order condition leads to the best-response function (BRF) for the audit rate p for any given social atmosphere θ chosen by the NGO:

$$p(\theta) = \frac{\theta\gamma}{\alpha + \theta^2(1 + \gamma)}. \quad (2)$$

We note in passing that the second order condition for a cost minimum $\partial^2 W/\partial^2 p < 0$ is satisfied. Inspecting the best-response function of the EPA (2) leads to:

Proposition 1 *The audit rate p selected by the EPA is increasing in the severity of environmental damage γ and decreasing in the cost of inspection α . It is non-monotonic in the prevailing social atmosphere θ : If θ is small, an increase in it induces the EPA to increase inspection intensity (actions are strategic complements). If θ is large, an increase in it induces the EPA to decrease inspection intensity (actions are strategic substitutes).*

The result that p is increasing in γ and it is decreasing in α is intuitive: The more severe the environmental damage associated with non-compliance γ the higher the audit rate p . In contrast, the more costly it is for the EPA to conduct audits, the lower the audit rate.

The impact of θ on p is interesting as it is non-monotonic as described by the Proposition. In fact, $p(\theta)$ has a maximum where $\partial p(\theta)/\partial \theta = 0$ which occurs at:

$$\bar{\theta} = \sqrt{\frac{\alpha}{1 + \gamma}}.$$

That means, if the social penalty is relatively small, i.e.: $\theta < \bar{\theta}$, p is a strategic complement for θ and if the penalty is large, i.e.: $\theta > \bar{\theta}$, p is a strategic substitute for θ . We will see below

that the equilibrium value θ^* can be smaller or larger than $\bar{\theta}$. That means, the equilibrium actions of the EPA to the actions of the NGO can be strategic complements or strategic substitutes.

This non-monotonicity turns out to have important implications for how keen the NGO will be to devote effort to developing a more hostile social atmosphere. Beyond some point it recognizes that its own efforts to generate harder incentives for good behavior are partly- or fully-offset by the induced *decrease* in the inspection intensity chosen by the EPA.

NGO The NGO cares about environmental quality and industry costs to various degrees. Certainly, NGOs vary in how “pure” green they are. Different NGOs place different weights on the bottom line of industries. Some environmental NGOs such as WWF and the Environmental Defense Fund, in designing their campaigns are understood to be sensitive to the business and economic implications of their actions. They emphasize collaboration and solutions that improve the environment and increase profits at the same time. Others such as Greenpeace and the Rainforest Action Network are a deeper green, with little or no regard for the financial implications that their actions might have on polluting sectors (Yaziji and Doh (2009) provide an excellent summary of the revealed operational objectives of a number of the most important environmental NGOs).

We operationalize this by saying that the objective function of an NGO is a weighted sum of environmental damage and compliance costs to the industry, but the NGO always *over-weights* environmental outcomes in comparison to the EPA (this is what makes it an environmental NGO!). Finally, the NGO cares about its own campaigning cost. So for a given audit rate p the problem of the NGO is to choose social penalty θ to minimize the loss function Z :

$$\min_{\theta} Z = -\lambda \int_0^{p\theta} cf(c)dc - (1 - \lambda)(1/2\gamma((1 - p\theta))^2) - 1/2\beta\theta^2.$$

The parameter $\lambda \in [0, 1/2)$ is the weight on industry costs - a lower value of λ is associated with an NGO that places greater weight on environmental quality, is a ‘deeper’ green. For some NGOs, $\lambda = 0$ which is the case when the NGO does not care about industry costs at all. For now we take that value as exogenous, later we explore how an NGO might wish to manipulate it strategically and instrumentally to further progress its goals.

In raising θ the NGO trades-off the reduced damages from the smaller number of firms in non-compliance against higher industry costs and higher enforcement cost. The first-order

condition $\partial Z/\partial\theta = 0$ is given by:

$$-\lambda p^2\theta + (1 - \lambda)\gamma p(1 - p\theta) - \beta\theta = 0.$$

The first-order condition leads to the BRF for the social penalty θ for any given audit rate p chosen by the EPA:

$$\theta(p) = \frac{p(1 - \lambda)\gamma}{\beta + p^2(\lambda + (1 - \lambda)\gamma)} \quad (3)$$

We note in passing that the second order condition for a cost minimum $\partial^2 Z/\partial^2\theta < 0$ is satisfied. Inspecting the best-response function of the NGO (3) leads to the following Proposition:

Proposition 2 *The social atmosphere implemented by the NGO is increasing in the severity of environmental damage γ and decreasing in the cost of inspection β and weight λ . It is non-monotonic in the intensity of the EPA's inspection intensity: If p is small, an increase in it induces the NGO to increase social penalty (actions are strategic complements). If p is large, an increase in it induces the NGO to reduce the social penalty (actions are strategic substitutes).*

These results deliver the best-response function of the NGO. The social penalty θ is increasing in the severity of damage γ and it is decreasing in the cost of auditing β . The intuition is straight-forward: the more costly it is for the NGO to create the social penalty, the lower the penalty. Also, the more severe the damages from non-compliance γ the higher the social penalty θ .

The impact of p on θ is interesting as it is non-monotonic as described by the Proposition. In fact, $\theta(p)$ has a maximum where $\partial\theta(p)/\partial p = 0$, which is equivalent to:

$$\bar{p} = \sqrt{\frac{\beta}{(\lambda + (1 - \lambda)\gamma)}}.$$

We will see below that the equilibrium value p^* can be smaller or larger than \bar{p} . That means, the equilibrium actions of the EPA can be strategic complements or strategic substitutes. In other words, if the audit rate is relatively small, i.e.: $p < \bar{p}$, θ is a strategic complement for p and if the audit rate is large, i.e.: $p > \bar{p}$, θ is a strategic substitute for p .

2.2 Taxonomy of Strategies

The Nash Equilibrium (NE) occurs where the two best-response functions of the EPA (2) and the best-response function of the NGO (3) intersect, i.e. at the equilibrium, there is no incentive to deviate for either entity.

*** Figure 2 here ***

Figure 2 illustrates the NE p^* and θ^* and the maxima of the two best-response functions \bar{p} and $\bar{\theta}$ respectively. We can anticipate that the signs of the slopes of the respective players' reactions functions are likely to dictate the properties of any particular NE, so it is natural to let the maxima of the best-response functions (which we will denote \bar{p} and $\bar{\theta}$) partition the action set of EPA and NGO into four quadrants. Depending on context - as described by different constellations of parameters - the NE may occur in quadrant *I*, *II* or *III* based on parameter values. We are able to rule out the possibility that it occurs in quadrant *IV*. In section *IV* the EPA actions are strategic complements and the NGO actions are strategic substitutes. However, given that the NGO overweights environmental interests it can never be optimal for the NGO to decrease activities (when EPA increases its own activities) in a situation where EPA would increase activities (when NGO increases its activities). In the case illustrated in Figure 2, for example, the NE is in section *III*. Here, the actions of the NGO are strategic complements in the vicinity of equilibrium. That means, the more the EPA audits the firms (increasing p), the higher the NGO chooses the social penalty θ to be (the more heavily it invests in whipping up community hostility). Equally, if the NGO increases θ , the EPA response with increasing p . Table 1 shows the other possible strategy combinations of EPA and NGO that could occur in equilibrium.

The policy relevance of these segments can be explained through situations of relative strength and/or weakness of NGO and/or EPA. For instance, sections *I* and *II* are reflective of the situation in some developing countries. In these sections, the efforts of a well-funded international NGO outpace governmental enforcement efforts. More efforts by NGOs are responded with less EPA efforts in such circumstances.

Section	EPA Actions	NGO Actions
<i>I</i>	strategic substitutes	strategic complements
<i>II</i>	strategic substitutes	strategic substitutes
<i>III</i>	strategic complements	strategic complements
<i>IV</i>	cannot occur in equilibrium	

Table 1: Taxonomy of Strategies of EPA and NGO

The intuition contained in the taxonomy is relevant for EPA and NGO decision makers alike. Even if they do not have in mind a formal model of the sort presented here, in making its decisions about how much effort to expend on encouraging a hostile social atmosphere a well-functioning NGO should have regard not just to the direct effect on firms, but also the induced effect on the behavior of the EPA. The efficacy of its own actions may be off-set (for example) if the EPA responds by scaling back the intensity of its own information-provision efforts. Indeed, this is the case if the equilibrium occurs in sections *I* and *II*. In other circumstances (section *III*) the EPA will be induced to *expand* that intensity, and the NGO will be motivated to push even harder to exploit such crowding-in effects. In parallel the NGO, as a strategic actor in its own right, will realize that the intensity of the information provision program that it operates will influence the incentive that the NGO has to invest in a hostile community atmosphere.

The taxonomy also allows us to think systematically about the comparative static impacts of changing various parameters. For instance, consider a change in the preferences of the NGO in terms of λ , i.e. how much the NGO cares about environmental costs in comparison to industry cost. We know from the analysis of the best-response functions (BRF) that the NGO's BRF is increasing in λ , while the EPA's BRF is not affected by λ . Referring to Figure 1 we can infer e.g. how the equilibrium outcomes change when the NGO internalizes more/less of industry costs. If the compliance atmosphere is reflected by a NE in quadrant *I* and *II*, the more the NGO cares about industry profit, the less social penalty it will create but the more intensively will the EPA audit in equilibrium. In contrast, if the NE is in quadrant *III*, the more the NGO cares about industry profit, the less social penalty it will create, and the less the EPA will audit.

2.2.1 Equilibrium

In this section, we derive the closed-form solution to the above game between the EPA and the NGO when both regulators behave non-cooperatively. The solution is found by inverting the two best-response functions (2) and (3).

Proposition 3 *The solution to the game between the EPA and the NGO is:*

$$p^* = \sqrt{-\frac{1}{\alpha(\lambda + \gamma - \lambda\gamma)^2} \left(-A(1 - \lambda) + \gamma^2\left(\frac{1}{2} + \lambda^2 - \frac{3}{2}\lambda\right) + \alpha\beta(\lambda + \gamma - \lambda\gamma) \right)},$$

$$\theta^* = \sqrt{\frac{1}{\beta(\gamma + 1)^2} \left(A + \gamma^2\left(\frac{1}{2} - \lambda\right) - \alpha\beta(1 + \gamma) \right)},$$

where

$$A = \gamma\sqrt{\frac{1}{4}\gamma^2 + \lambda^2\gamma^2 - \lambda\gamma^2 + \alpha\beta\gamma^2 + \alpha\beta\lambda + \alpha\beta\gamma - \alpha\beta\lambda\gamma^2}.$$

Special Case For tractability, we restrict our attention to a special case of the general model above. Since our primary focus here is on the characteristics and behaviors of the NGO we will hold constant the level of environmental damages at $\gamma = 1$ and EPA costs at $\alpha = 1/2$. For this special case, the solution becomes

$$p^* = \sqrt{3\lambda - \beta - 2\lambda^2 + B(1 - \lambda) - 1}, \quad (4)$$

$$\theta^* = \frac{1}{2}\sqrt{-\frac{1}{\beta} \left(\beta + \lambda - \frac{1}{2}B - \frac{1}{2} \right)}, \quad (5)$$

where:

$$B = \sqrt{4\lambda^2 - 4\lambda + 4\beta + 1}$$

The maximum points in the respective best-response functions are given by:

$$\bar{p} = \sqrt{\beta}$$

$$\bar{\theta} = 1/2$$

It is important to note that p^* can be larger or smaller than \bar{p} and that θ^* can be larger or smaller than $\bar{\theta}$ depending on parameter values as per our next proposition.

Proposition 4 *We have:*

$$\begin{cases} p^* > \bar{p} & \text{if } \beta < \lambda(1 - \lambda) \text{ and } p^* \leq \bar{p} \text{ otherwise,} \\ \theta^* > \bar{\theta} & \text{if } \beta < 3/4 - \lambda \text{ and } \theta^* \leq \bar{\theta} \text{ otherwise.} \end{cases}$$

We note that $\lambda(1 - \lambda) < \frac{3}{4} - \lambda$ is true for $\lambda < \frac{1}{2}$. Thus, if $\beta < \lambda(1 - \lambda)$, the equilibrium is in section II; if $\lambda(1 - \lambda) < \beta < \frac{3}{4} - \lambda$, the equilibrium is in section I; and if $3/4 - \lambda < \beta$ the equilibrium is in section III of the proposed taxonomy.

In the vicinity of equilibrium the actions of the EPA and NGO can be strategic substitutes or strategic complements. It is interesting to observe how the equilibrium values for auditing p^* and social penalty θ^* change in relation to \bar{p} and $\bar{\theta}$ when varying the exogenous parameters of the model. For instance, for fixed positive λ , when β is small ($\beta < \lambda(1 - \lambda)$), the equilibrium is in section II ($p^* > \bar{p}$ and $\theta^* > \bar{\theta}$). That means, the equilibrium actions of EPA and NGO are both strategic substitutes. As β increases, the equilibrium changes location *counterclockwise* (referring to Figure 2) from section II to section I ($p^* < \bar{p}$ and $\theta^* > \bar{\theta}$) if β is moderate ($\lambda(1 - \lambda) < \beta < \frac{3}{4} - \lambda$) and finally to section III ($p^* < \bar{p}$ and $\theta^* < \bar{\theta}$) for large values of β ($3/4 - \lambda < \beta$). That means, always when β decreases, the use of θ increases which is intuitive. Lower cost to stir-up public anger results in doing so more. The strategic response from the EPA depends on the section the equilibrium is situated in. In Section I and II, increasing θ is responded with decreasing p (the NGO crowds-out EPA activity) and in Section III increasing θ is responded with increasing p (the NGO crowds-in EPA activity). Table 2 summarizes the insights from Proposition 4.

	$\beta > \lambda(1 - \lambda)$	$\beta < \lambda(1 - \lambda)$
$\beta < 3/4 - \lambda$	Section I $p^* < \bar{p}$ $\theta^* > \bar{\theta}$	Section II $p^* > \bar{p}$ $\theta^* > \bar{\theta}$
$\beta > 3/4 - \lambda$	Section III $p^* < \bar{p}$ $\theta^* < \bar{\theta}$	not feasible

Table 2: Possible equilibria depending on β and λ .

There are three distinct regulatory environments based on how costly the NGO finds it to stir-up public anger given the social atmosphere towards the particular issue (captured by parameter $\beta \in (0, 1)$) and by how much the NGO cares about the bottom line of firms (captured by parameter $\lambda \in [0, 1/2)$). Small β means it is rather easy for the NGO to motivate society to levy a public penalty to a non-complying firm. We call such a society “alert”. On the contrary, large β means it is rather difficult for the NGO to motivate society to levy a public penalty to a non-complying firm. We call such a society “inattentive”. In a stylized way the reader may think of how likely a recipient of a leaflet or other message from an NGO is to read it, and therefore how intensive a communication program the NGO has to mount in order to ‘get its message across’. Furthermore, we call the NGO to be “green” if λ is relatively small, that is the NGO cares very little about the bottom line of firms but instead it is only concerned with the cause. We call the NGO “brown” if λ is relatively large, that is the NGO cares about the bottom line of firms and about the cause. The previous proposition informs the taxonomy of regulatory environments illustrated in Figure 3.

*** Figure 3 here ***

Our taxonomy delivers several new insights, as “real-world” regulatory contexts can plausibly be sorted into the taxonomy outlined in Figure 3.

For instance, if society is sufficiently inattentive ($\beta > 3/4$), the equilibrium is necessarily situated in section III, where more EPA activity is responded by more NGO activity and vice versa more NGO activity induces more EPA activity. This is reflective of “real-world” situations where EPAs and NGOs are “partners for the cause”. Partners for the cause support

each others missions and activities to further whichever cause in question. Section III is relevant when regulators say “we may set up a more rigorous disclosure program because we know there is a lot of thirst from NGOs to know who the wrong-doers are and this will increase social welfare”. If society is indifferent about the cause (neither alert nor inattentive) and the NGO is sufficiently brown, the equilibrium is again in section III where EPA and NGO are “partners for the cause”. The EPA finds the activities by the “tempered” NGO desirable to increase welfare, that is to make more firms comply with the cause.

If society is indifferent about the issue and the NGO is green, the equilibrium tends towards section I, where more EPA activity induces more NGO activity, but more NGO activity causes a diminution of EPA activity. This is reflective of “real-world” situations where EPAs and NGOs are “opponents” in that the EPA would rather hinder the work of the more “radical” (hostile to business) NGO. Anecdotal evidence suggests that sometimes EPAs may want to make the work of NGOs harder. For instance, in some developing countries, the efforts of a well-funded international NGO may outpace governmental enforcement efforts. More efforts by NGOs may be responded with less EPA efforts in such circumstances.

If society is alert and the NGO is green, the equilibrium tends to be in section I, where the EPA and the NGO are opponents; if society is alert and the NGO is brown, the equilibrium tends to be in section II where more EPA activity is responded by less NGO activity and more NGO activity is responded by less EPA activity. This is reflective of “real-world” situations where EPAs and NGOs are “partners against the cause” by which we mean that both entities would slow down building enforcement pressure if the other regulator expands their level of activity.

3 Strategic delegation: The optimal NGO chief

An interesting feature that the taxonomy makes transparent is that outcomes - both environmental, but also in terms of the equilibrium effort applied by both state and non-state actor - are sensitive to the NGOs objective function. In particular to λ , the relative weight placed on environmental versus economic cost impacts, or how business-burden-sensitive the NGO is in it’s decision-making.

This leads naturally to the following question: If I am to delegate my advocacy bidding to an NGO (say through donation), what sort of objective function would I want it to have in order to best progress my preferred outcomes?

The leadership of NGOs include former CEOs of companies or global civic leaders - perhaps in executive functions, or perhaps on boards of control. In exercising discretion they can be expected to vary in how they trade-off business and economic interests against environmental

outcomes. That is the leadership of an NGO can vary in how deep a shade of green it is in the way in which it makes operational decisions. Up to now we have treated λ as exogenously determined. We have just observed, however, that the outcome to the game between NGO and EPA is sensitive to the value of λ . This leads to the potential that an NGO founder may wish to appoint an NGO manager with a λ *different* to his or her own ‘true’ tastes. Equivalently, an NGO that has “designed into” its processes and practices something that embodies a particular weighting of business interests. We could think of a single large founder (Bill Gates) about to give a million dollars to a green foundation but setting the rules/byelaws/board composition of the foundation first. Or by extension an NGO entrepreneur designing an NGO to be appealing to a large number of small prospective contributors.¹⁰

If the true tastes or objectives of the founder (Bill Gates, say) are described by λ^{true} , what sort of manager would he want running his NGO, given that the characteristics of equilibrium depend on the delegated type which we will denote λ^{del} ? Our model can readily rationalize strategic delegation, that is delegation to a type with tastes divergent to the founder’s.

From this perspective λ^{del} can be thought of as an institution-design variable committed to by the NGO founder in the pre-game stage of the model. The objective of a founder with true objective captured by λ^{true} is to choose λ^{del} to maximize

$$Z(\lambda^{del}|\lambda^{true}, \beta, p^*(\lambda^{del}), \theta^*(\lambda^{del})) = -\lambda^{true}(1/2)p^2\theta^2 - (1 - \lambda^{true})1/2(1 - p\theta)^2 - 1/2\beta\theta^2$$

with equilibrium actions of EPA p^* and NGO θ^* themselves depending on λ^{del} .

Using $p^*(\lambda^{del})$ from (4) and $\theta^*(\lambda^{del})$ from (5) and deriving $\partial Z/\partial \lambda^{del} = 0$ given λ^{true} defines implicitly the mapping from λ^{true} to λ^{del} . The resulting function $\lambda^{del}(\lambda^{true})$ is complex and we investigate some relevant of its characteristics in the Appendix. Based on this investigation, we gain the following insights.

Recall first, that a truly green NGO features $\lambda^{true} = 0$. The next proposition establishes the link between λ^{true} and λ^{del} for a green NGO.

Proposition 5 *A deep green donor (one with tastes described by $\lambda^{true} = 0$) will delegate to an NGO manager with the same tastes as herself ($\lambda^{del} = 0$) if society is sufficiently inattentive,*

¹⁰The strategic delegation story is most associated with the conservative central banker analysis of Rogoff (1985). In a setting in which society - or the government in power - attached particular weights to inflation versus employment outcomes he noted that “Society can often make itself better off by appointing a central banker who does not share the social objective function, but instead places ‘too large’ a weight on inflation relative to unemployment” (Rogoff (1985: 1169)). In the spirit of Rogoff’s conclusion, a single or population of donors to green causes may find their objectives better served by donating to an NGO that attached different weights to the environment/business trade-off than they do themselves.

in particular if $\beta \geq 3/4$. She delegates to one less green than himself ($\lambda^{del} > 0$) if society is sufficiently alert ($\beta < 3/4$).

When a green founder ($\lambda^{true} = 0$) truthfully delegates $\lambda^{del} = 0$ and society is sufficiently alert ($\beta < 3/4$), the equilibrium occurs in Section I of the Taxonomy of Strategies of EPA and NGO. In Section I the EPA actions are strategic substitutes: *less* NGO activity induces *more* EPA activity. In this situation, it is optimal for the founder to delegate to an NGO manager who is more business-friendly than he is himself, $\lambda^{del} > 0$. This is because the best-response function of the NGO $\theta(p)$ is decreasing in λ^{del} which is strategically responded by the EPA with increasing p (which in turn helps to achieve the objective of the green NGO). Thus, the increase in EPA efforts partially offsets the decrease in NGO efforts while the NGO saves costly resources. Put differently, the NGO founder exploits the strategic set-up in Section I: it delegates to be more business friendly and subsequently lowers θ which saves costly resources while the EPA helps to achieve the true objective of the NGO founder.

When a truly green NGO founder ($\lambda^{true} = 0$) truthfully delegates $\lambda^{del} = 0$ and faces a society that is inattentive towards the issue ($\beta \geq 3/4$), the equilibrium occurs in Section III of the Taxonomy of Strategies of EPA and NGO. In Section III both the EPA actions and the NGO actions are strategic complements: *less* NGO activity is responded by *less* EPA activity. In this situation, it is optimal for the NGO donor to delegate sincerely (appoint an NGO chief who's tastes replicate his own). In other words $\lambda^{del} = 0$, the NGO chief will not be business-friendly. To see why we can observe that if the founder were instead to delegate some $\lambda^{del} > 0$ the best-response function of the NGO $\theta(p)$ would decrease leading to lower θ and lower p in equilibrium, contrary to the founder's ultimate objective.

Proposition 6 *A brown donor (one with tastes described by $\lambda^{true} \rightarrow 1/2$) will delegate to an NGO manager with the same tastes as herself ($\lambda^{del} \rightarrow 1/2$) if society is sufficiently alert, in particular if $\beta \geq 1/4$. She delegates to one more green than himself ($\lambda^{del} < 0$) if society is sufficiently alert ($\beta < 1/4$).*

Figure 4 illustrates the complete mapping from λ^{true} to λ^{del} , i.e. the function $\lambda^{del}(\lambda^{true})$.

*** Figure 4 here ***

The mapping of the true NGO type into the delegated type $\lambda^{del}(\lambda^{true})$ is insightful. We observe from Figure 4 that a sufficiently green NGO founder (small λ^{true}) who faces an alert or indifferent society (small to medium β) delegate more business friendly missions. The NGO founder does this in order to crowd-in EPA activity as the equilibrium is in sections *I* or *II*. The NGO founder delegates to be more business friendly and subsequently lowers θ which safes the NGO costly resources while the EPA increases its activity which helps to achieve the true objective of the NGO. We note that the smaller β the larger tends to be the difference between λ^{del} and λ^{true} .

*** Figure 5 here ***

The outcomes from the mapping of λ^{true} to λ^{del} can also be illustrated with the help of the framework of our regulatory taxonomy introduced above. Figure 5 shows that all NGO founders which face an inattentive society ($\beta \geq 3/4$) delegate a more green mission. The same is true for brown NGO founders facing an indifferent or inattentive community. The NGO does this in order to crowd-in EPA activity as the equilibrium is in section *III*. The donor delegates in such a way as to be *less* business-friendly and subsequently *increases* θ which cost the NGO resources, but there is some leverage for these resources. This is because the increase in θ encourages the EPA to increase its activity in turn - due to strategic complementarity in this range - which further contributes to the true objective of the NGO founder. In other words, if the NGO has high cost of causing public anger, delegation is always to a deeper green mission. We further find that the larger β the more green is the delegated mission.

Note that there are moderate levels of β (i.e.: $\beta = 1/2$) where a relatively green NGO founder ($\lambda^{true} < 1/4$) delegates to a browner-than-self NGO chief; a relatively brown NGO founder ($\lambda^{true} > 1/4$) delegates to a greener-than-self NGO chief. In each case, the NGO founder uses strategic delegation to commit to being “more moderate” - the NGO founder disguises the extremes.

Another interesting element of Figure 5 is the “truthful-delegation-envelope.” Along this envelope, the NGO founder hires an NGO chief who has tastes that coincide with his own. For instance, a brown NGO founder ($\lambda^{true} \rightarrow 1/2$) hires an equally brown manager ($\lambda^{del} \rightarrow 1/2$) if society is relatively alert ($\beta = 1/4$). Everywhere else, optimal delegation is strategic in character.

4 Conclusions

When a donor - big or small - gives money to an environmental NGO he is in effect delegating his advocacy ‘bidding’ to that NGO. It is therefore natural to ask what sort of surrogate he wants to act in his stead. The answer will not, in general, be one who has values that coincide with his own.

Social pressure upon firms is determined endogenously in the model that we have developed, and is *jointly* produced between a state and non-state actors. Recognizing this coproduction of social pressure by disjoint actors with different instruments but also different objectives, turns out to be critical to understanding the incentives for good corporate behavior that will emerge. In our stylised set-up the interactions between the EPA and civil NGO turn out to be complex and nuanced. Reflecting this we develop a taxonomy of social enforcement settings into which real-world environmental regulatory contexts can in principal be categorized. Central to the analysis is that each player recognizes and anticipates the impact of their own behaviors on the behavior of their coproducer. An NGO will have little interest investing more effort to whip-up public angst, for example, if the EPA responds to that extra effort by scaling back the intensity of its own information-provision. Its pressure-generating efforts would, in that case, be off-set or ‘crowded out’ by the induced reaction. Equally a welfare-motivated public actor will be sensitive to the virulence of the social atmosphere into which it disseminates information.

We illustrate how the presented taxonomy can be used to shed light on the important phenomena of strategic delegation, and the leadership of NGOs that advocacy donors will find attractive.¹¹ In particular, how *hostile to* or *collaborative with* business will a donor want his NGO to be? To coin the terminology that is the organizing theme of Lyon’s (2012) book - should he appoint a good cop, or bad cop?

How should we interpret the model? It is implausible, of course, that those that design NGO working methods, select NGO leaders or decide to which of a set of NGOs to make a donation contemplate first-order conditions and taxonomy diagrams of the sort presented here. However it *is* plausible to think through time those NGOs - or NGO leaders - that best deliver outcomes favorable given the preferences of donors would come to flourish. Indeed it would be straight-forward to develop a model with plausible evolutionary or ‘efficiency-seeking’ properties in which the type of NGO leader with the preferred λ^{del} would ‘rise to the top’. That

¹¹As already noted there is a literature on strategic delegation by profit-motivated firm owners to managers with non-profit-maximising intent (for examples Vickers (1985), Fershtman and Judd (1987)). Research in that area goes further in considering a wider set of ‘personality attributes’ (aggressiveness, resilience, stubbornness, and so on) that the principal might find attractive in his agent. For a seminal empirical examination of this sort see Miller and Toulouse (1986).

preferred λ^{del} for a given underlying or true set of tastes is what we have characterized here. Developing some empirical insight - either from statistical data or case study analyses - is an important ambition of future research. Importantly the solutions have regard to the strategic interdependence that quite obviously exists between the pressure-generating actions of the state agency and that of civil society organizations, which has been ignored in existing work. The analysis provides a framework within which to think about the balance that we might expect to emerge between state and third-sector contributions to the production of incentives for environmental and social good practice, and the strategic considerations underpin it.

5 Appendix

5.1 Proof of Proposition 4

First, $\theta^* > \bar{\theta}$ is equivalent to condition $\frac{\partial p(\theta)}{\partial \theta} < 0$ evaluated at equilibrium. The BRF (with $\alpha = 1/2$ and $\gamma = 1$) is:

$$p(\theta) = 2 \frac{\theta}{4\theta^2 + 1}$$

and the relevant derivative is:

$$\frac{\partial p(\theta)}{\partial \theta} = -2 \frac{4\theta^2 - 1}{(4\theta^2 + 1)^2}.$$

Condition $\frac{\partial p(\theta)}{\partial \theta} < 0$ can only hold if $4\theta^2 - 1 > 0$ which is equivalent to:

$$\begin{aligned} -\frac{1}{2\beta} \left(4\beta + 2\lambda - \sqrt{4\lambda^2 - 4\lambda + 4\beta + 1} - 1 \right) &> 0 \\ 4\beta + 2\lambda - \sqrt{4\lambda^2 - 4\lambda + 4\beta + 1} - 1 &< 0 \\ 4\beta + 2\lambda - 1 &< \sqrt{4\lambda^2 - 4\lambda + 4\beta + 1} \\ (4\beta + 2\lambda - 1)^2 &< 4\lambda^2 - 4\lambda + 4\beta + 1 \\ 16\beta^2 + 2(4\beta)(2\lambda - 1) + (2\lambda - 1)^2 &< 4\lambda^2 - 4\lambda + 4\beta + 1 \\ 16\beta^2 + 2(4\beta)(2\lambda - 1) + (2\lambda - 1)^2 - 4\lambda^2 + 4\lambda - 4\beta - 1 &< 0 \\ 4\beta(4\beta + 4\lambda - 3) &< 0 \\ 4\beta + 4\lambda - 3 &< 0 \\ \beta + \lambda &< 3/4 \\ \beta &< 3/4 - \lambda. \end{aligned}$$

Second, $p^* > \bar{p}$ is equivalent to condition $\frac{\partial \theta(p)}{\partial p} < 0$ evaluated at equilibrium. The BRF is:

$$\theta(p) = \frac{p(1 - \lambda)}{p^2 + \beta}$$

and the relevant derivative is:

$$\frac{\partial \theta(p)}{\partial p} = (\beta - p^2) \frac{(1 - \lambda)}{(p^2 + \beta)^2}.$$

Condition $\frac{\partial \theta(p)}{\partial p} < 0$ can only hold if $\beta - p^2 < 0$ which is equivalent to

$$\begin{aligned}
\beta - (3\lambda - \beta - 2\lambda^2 + B(1 - \lambda) - 1) &< 0 \\
2\beta - 3\lambda + 2\lambda^2 - B(1 - \lambda) + 1 &< 0 \\
2\beta - 3\lambda + 2\lambda^2 + 1 &< B(1 - \lambda) \\
(2\beta - 3\lambda + 2\lambda^2 + 1)^2 &< B^2(1 - \lambda)^2 \\
(2\beta - 3\lambda + 2\lambda^2 + 1)^2 &< (4\lambda^2 - 4\lambda + 4\beta + 1)(1 - \lambda)^2 \\
(2\beta - 3\lambda + 2\lambda^2 + 1)^2 - (4\lambda^2 - 4\lambda + 4\beta + 1)(1 - \lambda)^2 &< 0 \\
4\beta(\lambda^2 - \lambda + \beta) &< 0 \\
\lambda^2 - \lambda + \beta &< 0 \\
\lambda(1 - \lambda) &> \beta
\end{aligned}$$

Third, we note that $\frac{3}{4} - \lambda > \lambda(1 - \lambda)$ is true for $\lambda < \frac{1}{2}$ because

$$\begin{aligned}
\frac{3}{4} - \lambda - \lambda(1 - \lambda) &> 0 \\
\lambda^2 - 2\lambda + \frac{3}{4} &> 0
\end{aligned}$$

only holds for $1/2 < \lambda < 3/2$ which is excluded by the assumption that $\lambda < \frac{1}{2}$.

5.2 Proof of Proposition 5 and Proposition 6

The objective of a founder with true objective captured by λ^{true} is to choose λ^{del} to maximize:

$$Z(\lambda^{del} | \lambda^{true}, \beta, p^*(\lambda^{del}), \theta^*(\lambda^{del})) = -\lambda^{true}(1/2)p^2\theta^2 - (1 - \lambda^{true})1/2(1 - p\theta)^2 - 1/2\beta\theta^2$$

with equilibrium actions of EPA p^* and NGO θ^* themselves depending on λ^{del} .

Using $p^*(\lambda^{del})$ from (4) and $\theta^*(\lambda^{del})$ from (5) and deriving $\partial Z / \partial \lambda^{del} = 0$ given λ^{true} implicitly defines the mapping from λ^{true} to λ^{del} . The resulting function $\lambda^{del}(\lambda^{true})$ is complex and we investigate some of its characteristics in two main steps effectively proofing Proposition 5 and Proposition 6.

First, we note that it is not possible to isolate $\partial Z / \partial \lambda^{del} = 0$ for λ^{del} depending on λ^{true} , but alternatively it is possible to isolate for λ^{true} depending on λ^{del} , that is $\lambda^{true}(\lambda^{del})$, which is the inverse of the function of interest. The next Figure illustrates this inverse function $\lambda^{true}(\lambda^{del})$

for some example values of β : for $\beta \rightarrow 0$ (lower envelope), for $\beta \rightarrow 1$ (upper envelope) and also for $\beta = \{1/4, 1/2, 3/4\}$.

*** Figure 6 here ***

Second, we investigate function $\lambda^{del}(\lambda^{true})$ more generally (β not specified) at particular values for λ^{true} : (a) at $\lambda^{true} = 0$ and (b) at $\lambda^{true} = 1/2$.

(a) We evaluate condition $\partial Z/\partial \lambda = 0$ restricted for $\lambda^{true} = \lambda^{del} = 0$. We find that this condition is solely solved by $\beta = 3/4$. From the examples above we know that $\lambda^{del}(\lambda^{true}) > 0$ if $\beta < 3/4$ and that $\lambda^{del}(\lambda^{true}) < 0$ if $\beta > 3/4$. Thus, a green NGO founder ($\lambda^{true} = 0$) truthfully delegates to be green ($\lambda^{del} = 0$) if NGO costs are relatively high ($\beta \geq 3/4$). And the same NGO founder delegates to be more brown ($\lambda^{del} > 0$) if NGO costs are relatively low ($\beta < 3/4$).

(b) We evaluate condition $\partial Z/\partial \lambda = 0$ restricted for $\lambda^{true} = \lambda^{del} = 1/2$. We find that this condition is solely solved by $\beta = 1/4$. From the examples above we know that $\lambda^{del}(\lambda^{true}) > 0$ if $\beta < 1/4$ and that $\lambda^{del}(\lambda^{true}) < 0$ if $\beta > 1/4$. Thus, a brown NGO founder ($\lambda^{true} \rightarrow 1/2$) truthfully delegates to be brown ($\lambda^{del} \rightarrow 1/2$) if NGO costs are relatively high ($\beta \geq 1/4$). And the same NGO founder delegates to be more green ($\lambda^{del} > 0$) if NGO costs are relatively low ($\beta < 1/4$).

The insights above allow to derive the general figure for $\lambda^{del}(\lambda^{true})$ and the related Propositions 5 and 6 in the main paper.

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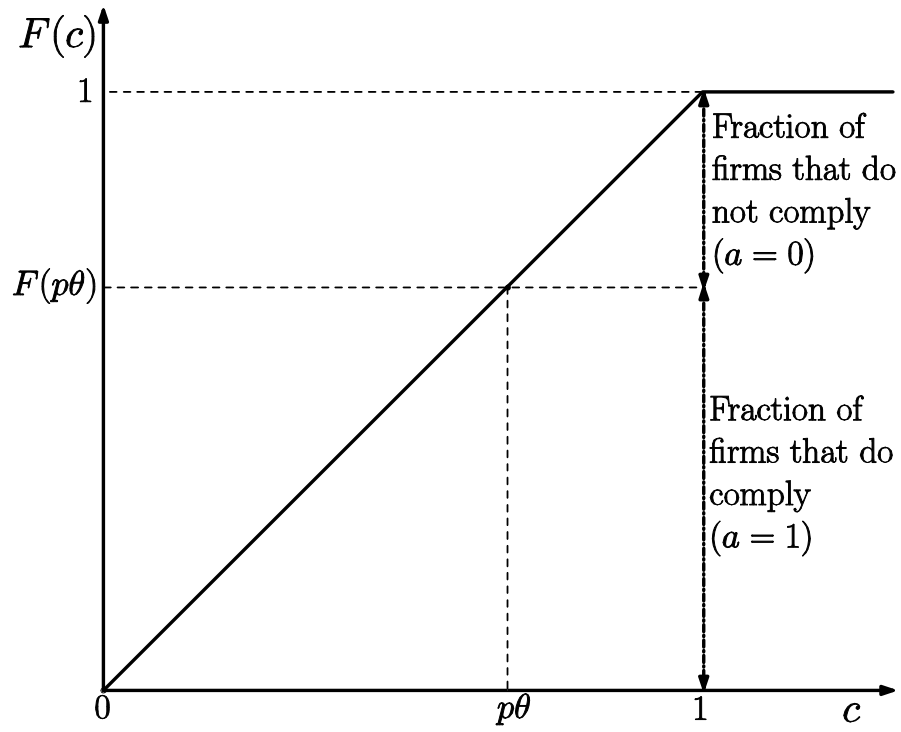


Figure 1: Cumulative distribution function of c

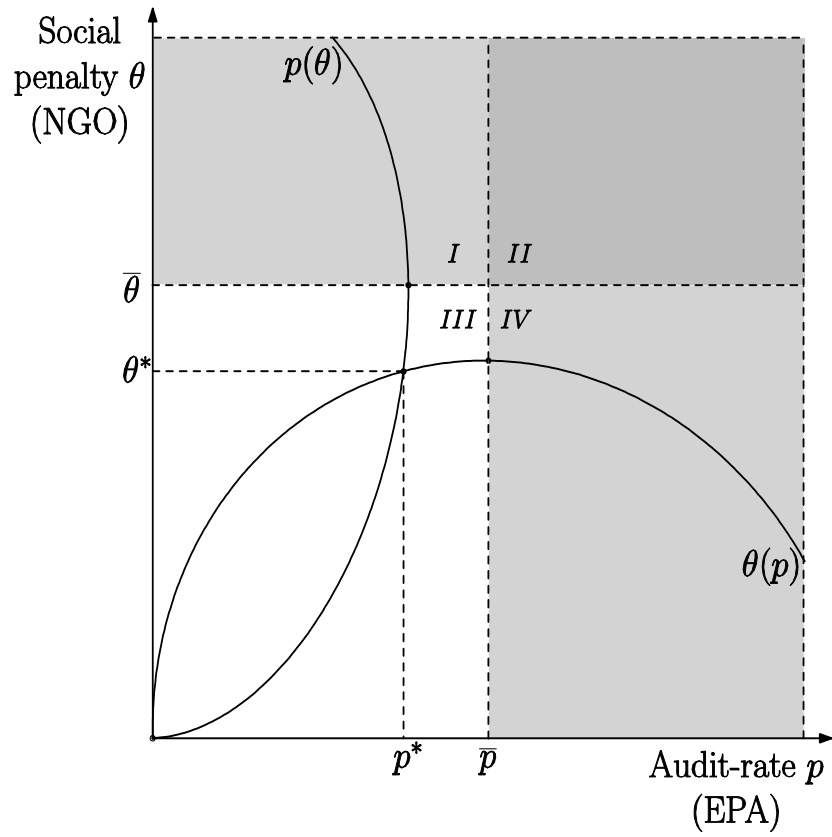


Figure 2: Best-response functions and Nash Equilibrium

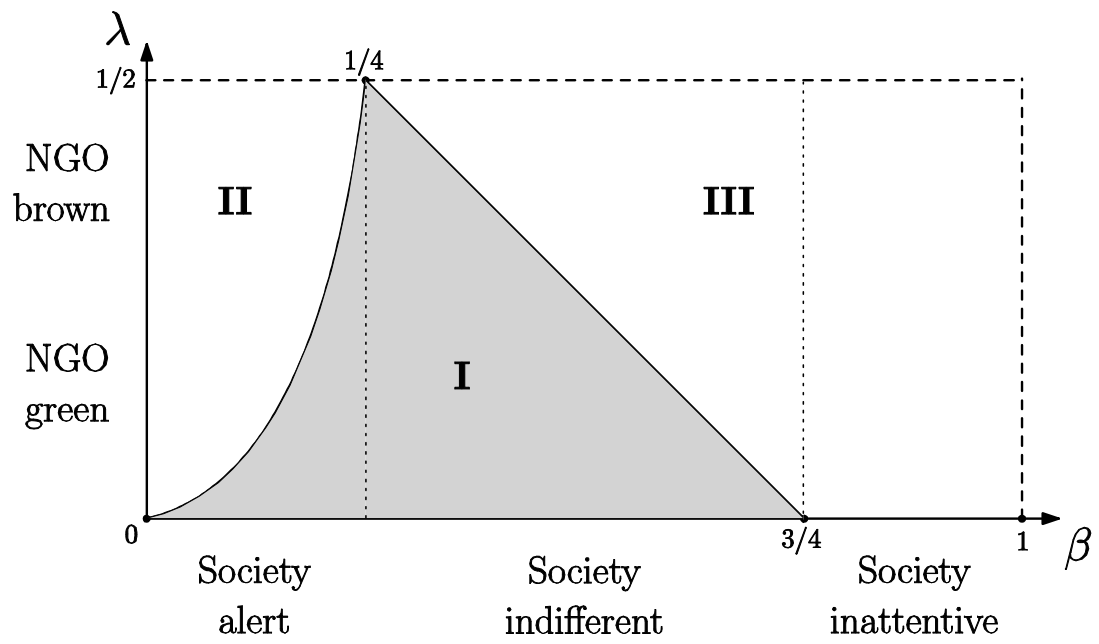


Figure 3: Taxonomy of regulatory environments

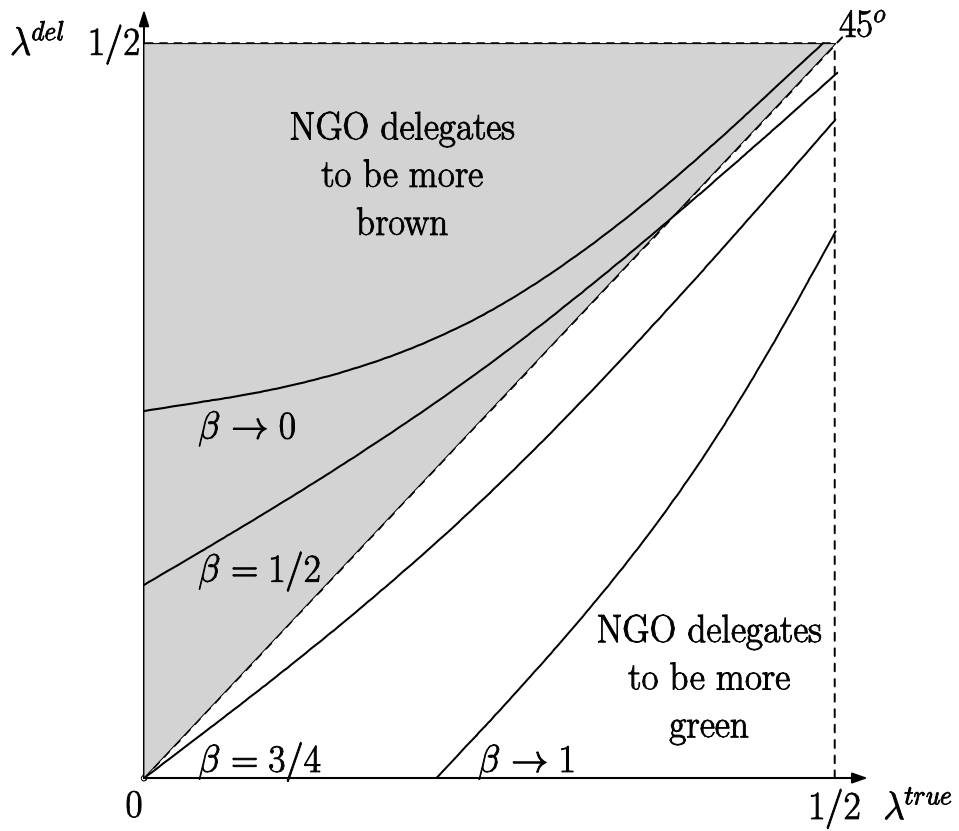


Figure 4: Function $\lambda^{del}(\lambda^{true})$ for various β , which maps NGO's true types λ^{true} into NGO's delegated types λ^{del} .

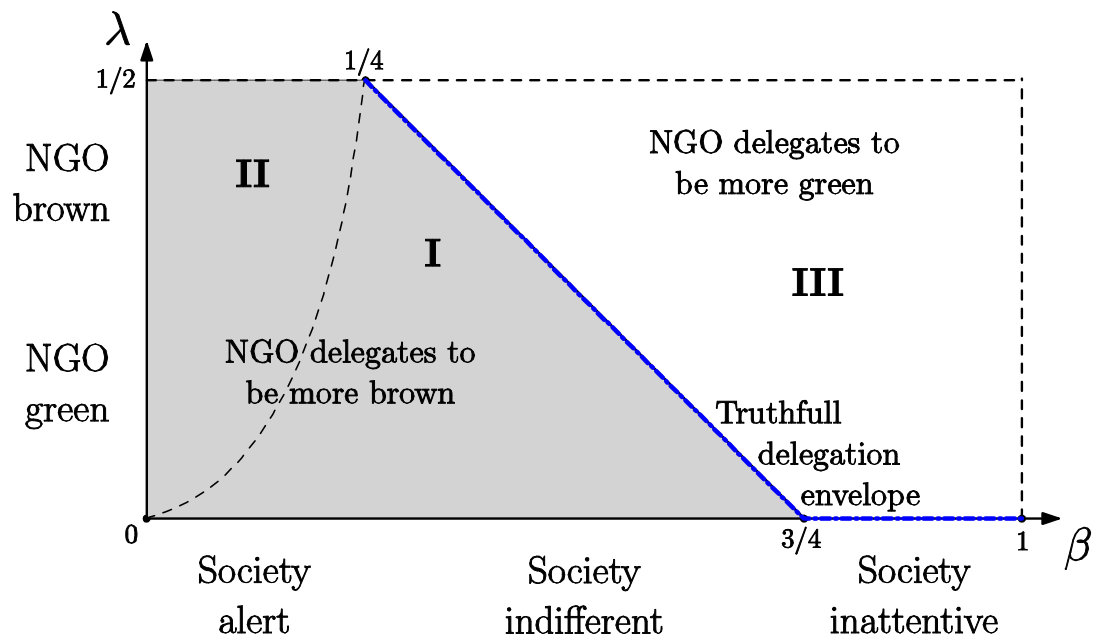


Figure 5: NGO delegation