THE PROSPECTS FOR INDUSTRY SELF-REGULATION OF ENVIRONMENTAL EXTERNALITIES

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In an attempt to avoid costly government regulation and other liabilities as a result of environmental externalities, a growing number of firms have promoted industry self-regulation -- the association of firms to voluntarily control their collective behavior. In the last twenty years, environmental self-regulatory programs have proliferated in both the U.S. and abroad (Nash & Ehrenfeld, 1996). Growing environmental regulations in industrialized nations and increasing environmental activism of consumers and the public in general have driven many industries to look for alternative strategies to deal with stakeholders. Industries have attempted to avoid costly government regulation and to placate concerned stakeholders by promising to voluntarily reduce their environmental impacts.

In this chapter, we explore the conditions under which effective industry self-regulation is likely to emerge. Formally, we define "self-regulation" as the provision of public goods beyond that required by law. As opposed to unilateral self-regulation by a single firm, *industry* self-regulation entails collective action by member firms to improve the reputation of the industry as whole. To facilitate collective investment, many industries have relied on trade associates to initiate and coordinate programs. These programs typically entail the adoption of codes of environmental management practice by member firms. Codes of environmental management practice stipulate environmental goals for firms beyond those that are codified into government regulation. They include guidance as to how participating firms are to meet these goals. Trade associations utilize a mix of mechanisms, including trade association oversight, external verification, and peer pressure, to ensure compliance with program goals.

In the sections to follow, we will discuss the incentives for firms to self-regulate and how the costs of failure to self-regulate are often bourn by the collective, e.g. the industry, rather than narrowly by individual firms. Given this collective nature, we will discuss a number of challenges to industry self-regulation, in particular, adverse selection, moral hazard, and free riding. In the latter half of the paper, we will discuss the various strategies firms adopt with regards to self-regulatory efforts and identify potential public policies that may help facilitate industry self-regulation.

Throughout the paper we will reference previous empirical work conducted by the authors. In particular, we will pull from a series of studies examining the American Chemistry Council's (ACC)[1] Responsible Care™ program (King & Lenox, 2000; Lenox, 2006; Lenox & Nash, 2003). The ACC is the primary trade-association of the U.S. chemical industry and consists of many of the largest U.S. chemical producers. Responsible Care was initiated by the ACC in 1989 in response to negative public perception surrounding the chemical industry in the U.S. Participation was required as a condition of membership in the ACC. Members pledged to uphold a set of ten principals and to adopt six codes of management practice. The codes required that firms adopt certain practices, dedicate staff to specific activities, and employ particular techniques. They did not, however, set specific environmental performance criteria.

Initially, compliance to program requirements was self-reported by member firms. Failure to comply with program requirements could result in expulsion from the ACC though in the first few years of the program no firms were expelled. The hope of the chemical firms who made up the American Chemistry Council was that by voluntarily reducing the harmful environmental impacts of chemical manufacturing operations they could improve the chemical

[1] Prior to 2000, The American Chemistry Council was known as the Chemical Manufacturers Association.

industry's reputation and subsequently forestall further government regulation and ease community relations and the citing of new manufacturing facilities.

Incentives for Industry Self-Regulation

Traditionally, the environmental impact of industrial processes has been assumed to be a pure externality. In other words, in the absence of government regulation, the harm caused by environmental degradation as a result of economic activity is bourn by others than those who generate the environmental impacts. For example, a factory polluting a river does not bear the cost of the damages to fisheries downstream. Since there is not a market for water pollution, damaged parties have no recourse against the factory. While the factory may utilize more of a resource (in this case clean water) than is socially optimal, the factory has no incentive to reduce its environmental impact.

In such a world, profit-seeking firms are unlikely to self-regulate. Industry self-regulation may be viewed as corporate philanthropy at best and foolhardy and welfare decreasing at worst (see Friedman, 1970). While purely altruistic-driven self-regulation may be possible, we suspect that it will be rare, idiosyncratic, and ultimately limited due to the disciplinary forces of capital markets.[2] Altruistic managers are likely either to be removed by shareholders or to lead their enterprises to competitive failure and exit.[3] While managers may have some discretion to be altruistic in the presence of weak corporate governance, recent history has shown that managers rarely act on behalf of the public but rather in their own narrow self-interest when discretion is available.

[2] We define altruistic behavior as strategic choices that benefit external stakeholders such as the general public at the expense of the firm's profit objective.

More likely, industry self-regulation arises as a result of some financial benefit that it provides to firms. In the absence of market imperfections, firms that self-regulate will incur costs with no offsetting financial benefit (Reinhardt, 1999). Such firms will eventually be driven out of the market as lower cost rivals are able to drive market prices to the self-regulating firm's average unit cost. However, there often exist external pressures that, when brought to bear, "internalize" externalities. Costs may be imposed on polluting firms such that they have an incentive to reduce their environmental impacts even in the absence of government regulation.

The most obvious pressure is the *threat* of future government regulation. Industry self-regulation may be a potent strategy by industries to forestall government regulation. By demonstrating to legislators that they can police their own, industries may be able to avoid costly government intervention. This is one of the reasons given by the American Chemistry Council for the creation of the Responsible Care program. According to the trade association, pollution reductions may be achieved at lower cost (both to firms and society) through industry self-regulation than by governmental regulation (Chemical Manufacturers Association, 1991). The implicit assumption being that industry members have better information than regulators about technological opportunities and the efficiency of various solutions. Especially derided by the for-profit sector are command and control regulations that specify specific technological solutions that may not be efficient for every producer in the industry. In addition, self-regulation potentially could reduce the political costs of crafting legislation and regulatory rules and the regulatory cost of monitoring and enforcing rules.

Beyond pressure from the state, non-governmental stakeholders such as consumers, community advocacy groups, and environmental organizations may place substantial pressure to

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[3] It is possible that under some circumstances that altruistic-driven self-regulation may be sustainable. In particular, tightly-held private firms may have owners who are willing to sacrifice returns for the greater

self-regulate directly on firms. Boycotts, lawsuits, and protests by activist stakeholders may be extremely costly to firms. Effective boycotts can have a significant impact on firm revenues. Successful lawsuits can cost firms millions of dollars. Protests may raise operational expenses by making it difficult to get permits or to site new facilities. Each of these stakeholder actions may embolden public sentiment and lead to future government regulation, depress consumer demand, and raise labor costs by making it more difficult to hire and retain quality employees. Furthermore, protests, boycotts, and lawsuits may siphon scarce managerial attention away from other pressing firm endeavors.

The Responsible Care program was started in large part to deal with negative public perceptions of the chemical industry that manifested themselves in the actions of activist stakeholders. However, if stakeholders have good information about the environmental performance of firms, pressure to self-regulate by activists should inspire firms to *unilaterally* reduce their environmental footprint (see Table 1). In other words, firms would not need to coordinate their pollution reduction efforts as in the Responsible Care case. Activists could target polluting firms while ignoring or even rewarding higher quality (i.e. less polluting) firms. In essence, a market for environmentally friendly products and practices would be created. These markets could be further enhanced by general consumer demand for environmentally friendly goods.[4] If such a market exists, self-regulating firms would be able to differentiate their products and services from competitors and command price premiums.

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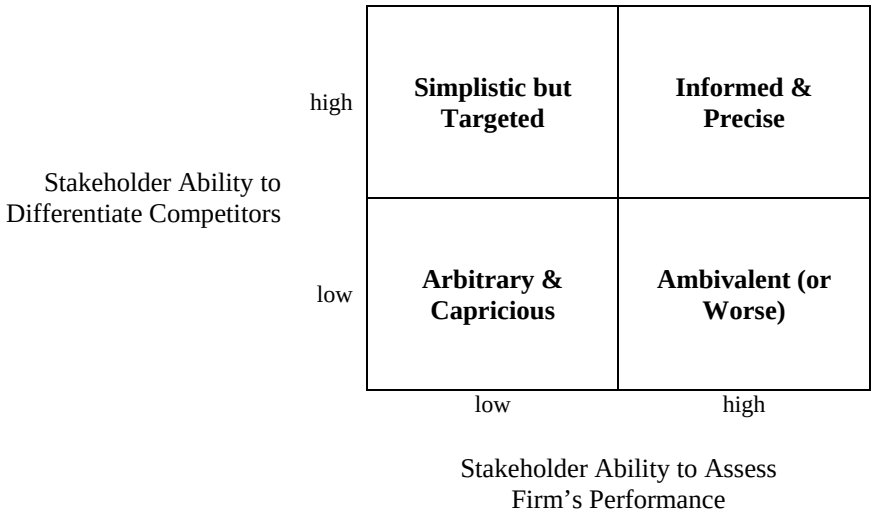
welfare.

[4] Surveys of U.S. consumers suggest that demand is relatively elastic with regards to environmental impacts. None-the-less environment impacts have been found to be important purchase criteria in at least some segments of the U.S. economy.

Table 1. Typology of Stakeholder Responses to Environmental Externalities



However, the assessment of firm environmental performance by stakeholders is rife with information asymmetries. The environmental behavior and performance of firms are often unobservable. Reliable metrics are few and the ones that do exist are often ambiguous and non-commensurate with other metrics. As a result, firms find themselves in a world where stakeholders have little information on the environmental performance of themselves and their competitors. In such a world, stakeholder actions tend to be arbitrary and capricious. Activist may lash out at a firm, not because it is a relatively poor performer within its industry, but because is it is large and visible. The whole industry may be held responsible for the actions of a handful of laggards. In the absence of credible information, even environmental leaders may find themselves under scrutiny.

In such a situation, leading firms may try to reduce information asymmetries by providing detailed information on their own performance. However, it is exceedingly difficult for high quality firms to make credible claims about their environment performance (and thus appease environment-friendly consumers and avoid the ire of activist stakeholders). Absent additional information from competitors, stakeholders will have difficulty making use of detailed

performance data released by high-quality firms. At best, activist stakeholders may be ambivalent to corporate provided information. At worst, activists may target firms who release information given their ability to scrutinize their performance.

As a result, efforts to unilaterally self-regulate are often insufficient. Ultimately, individual environmental reputations are tied together with other firms within the industry. Fatal accidents, damaging spills, and the emission of toxic pollutants have consequences not only for the offending firm but all firms within an industry. Environmental leaders may find themselves facing the same regulations, activist pressures, and consumer demands as environmental laggards.

Anecdotal evidence suggests this was the case in the U.S. chemical industry. The American Chemistry Council lamented that chemical firms were often all "tarred by the same brush". An accident at one chemical plant had repercussions not only for the owner but for all firms within the industry. A prime example was the accident at a Union Carbide plant in Bhopal, India in 1984 in which thousands died. Analysts observed that not only did Union Carbide suffer financially from the accident, but that other chemical firms also saw their stock devalued in the wake of the accident. Investments by some firms to reduce accidents was insufficient to avoid the negative repercussions of others actions.

Challenges to Industry Self-Regulation

The collective nature of government regulation, activist pressure, and consumer demand forces firms to ban together if they wish to minimize the threat posed by these various stakeholders. Hence, for self-regulation to be beneficial, investments are needed by self-interested firms in the collective reputation of the industry. This creates a "reputation commons" problem (King, Lenox & Barnett, 2001). Like all commons problems, the non-excludability of

contributions to industry reputation creates a collective good. When a collective good is provided, all members of the relevant group benefit regardless of whether they contribute to providing the good or not. Consequently, such goods are subject to free riding, i.e., firms will do nothing while benefiting off the efforts of others. Common examples of collective goods include maintaining public fisheries, rangelands, and aquifers and the provision of basic scientific research and education. In all these cases, the possibility of free riding often leads to under investment in the collective good.

Traditionally, scholars have proposed that the collective good problem can only be solved by an independent governing body (e.g., the state). A sovereign authority is needed to either directly provide the collective good (Piguo, 1912) or to privatize the good so that each user bears the full costs and benefits of his actions and thus will not tend to overuse the resource (Coase, 1960). According to the traditional view, without such a "leviathan", collective goods fall victim to the “remorseless workings of things" (Hobbes, 1960; Hardin, 1968).

In contrast, recent research suggests that firms may, under certain circumstances, collectively self-regulate their behavior. Examples of successful self-regulation are numerous and diverse. For centuries, certain communities have successfully managed common resources such as water, fish, and land (King, 1995). Examples of successful self-regulation within business include the management of a commodity futures exchange (Abolafia, 1985), safety regulation in the nuclear power industry (Rees, 1997), and shipping rules in the international maritime industry (Furgur, 1997).

Economists have focused on a number of factors that may facilitate self-regulation. Game theoretic treatments propose that credible threats of punishment for non-compliance are necessary for collective self-regulation (Radner, 1981; Kreps & Wilson, 1982; Axelrod, 1986).

Central for such outcomes is the notion of reciprocity acting as a mutual deterrent to deviant behavior. When one firm violates agreed upon rules, mechanisms must be put in place to sanction that firm. In essence, firms must agree to punish one another if one of them deviates.

Scholars have provided a number of specific examples in which reciprocal actions enforced self-regulation. In some New England lobstering communities, lobstermen who over fish have the buoys on their traps cut (Ostrom, 1990). In the Champagne fairs of medieval England, traders who reneged on agreed upon exchanges were forcibly removed from the fair grounds by a collectively appointed judiciary (Milgrom, North, & Weingast, 1990). The Maghribi traders from the eleventh-century Mediterranean enforced a commercial code by ostracizing and retaliating against members found in violation (Grief, 1993).

In the case of modern industry self-regulation, the potential punishments are limited. Civil law prohibits any number of draconian retaliatory responses (such as destroying property). Antitrust law does not allow firms to collectively boycott or to raise prices for competitors. Subsequently, any punishments administered for failure to comply with a self-regulatory program must be accepted by firms who participate voluntarily. Since firms may not force industry members to join into such programs, a firm may avoid punishment by simply exiting the program.

Given that participation in industry self-regulation is voluntary, we would expect such initiatives to be subject to free riding. Unable to force industry members to participate, firms would elect not to participate, enjoying the fruits of the labor of self-regulatory participants while avoiding the costs. For moderate size industries and absent heterogeneity among firms, we might expect that self-regulatory programs would fall apart (Olson, 1965). Segerson & Dawson (2001) demonstrate, however, that fear of such failure might cause some firms to participate so

long as the cost of membership is less than the cost of government regulation or stakeholder sanctions in the absence of industry self-regulation. Presumably these firms disproportionately bear the cost of failure and thus are willing to provide for the collective good. In our studies of Responsible Care, we provide empirical evidence that a critical number of firms may band together to continue the collective effort even though each firm would benefit from free riding off the program (Lenox, 2006).

Hence, we may observe two sets of firms within an industry -- those who self-regulate and those who free ride. Interestingly, whether a firm self-regulates or free rides may provide valuable information to stakeholders. Participation in self-regulatory programs may provide a signal to stakeholders about a firm's quality. Stakeholders make subsequently reward firms for participation. For example, adherence to a standard set of practices may provide evidence of due diligence in legal battles. Even if a firm's environmental performance is below the norm, its adherence to management practices adopted by other firms may demonstrate that it has not been willfully negligent (King & Baerwald, 1998).

To the extent participation in a self-regulatory program provides insurance, some firms who might otherwise not participate will have incentives to participate despite the costs. Troubling, though, is that if there is no mechanism for screening members, these programs may be subject to adverse selection -- bad firms will join to receive the insurance and signaling benefits. While some firms will join to improve the collective reputation others may join to mask their poor performance. This is exactly our finding with respect to Responsible Care (King & Lenox, 2000). In a study of over 3500 U.S. chemical facilities over the time period 1987-1996, we present evidence that a few larger, less polluting firms join Responsible Care but that, in general, dirtier firms tended to join Responsible Care. This is perhaps not surprising given

that over the first decade of its existence, the Responsible Care program allowed self-monitoring by firms and had no history of expelling non-compliant members.

Even if all members join with the intention to improve the industry's reputation, the absence of mechanisms to monitor and sanction firms who fail to comply with program objectives may lead to moral hazard. In other words, once in receipt of the insurance benefits conferred to program participants, members have an incentive to be more risk seeking and consequently under-invest in environmental improvements. The due-diligence benefits discussed above may lead to a race to the bottom as "best practice" degrades as firms reduce investments. Our research on Responsible Care provides collaborating evidence (King & Lenox, 2000). We found no evidence that Responsible Care firms reduced their toxic emissions any faster than non-participants and, in fact, found weak evidence that they reduced emissions less quickly than comparable non-participants.

Based on our findings, we argue that absent explicit mechanisms for penalizing malfeasance, self-regulatory programs are likely subject to adverse selection and moral hazard. As pointed out earlier, however, self-regulatory programs are limited in the punishments they may administer. Monetary penalties such as fines are likely to raise anti-trust concerns among government regulators. Neo-institutional theorists have claimed that compliance may be achieved through informal mechanisms such as shaming and public exposure (Braithwaite, 1989) and the emergence of new norms and values that change members' preferences for collectively valued actions (Gunningham, 1995; Hoffman, 1997; Rees, 1997; Furger, 1997). According to this perspective increases in interpersonal communication can serve as a "basic ingredient of sustained individual accountability (Furger, 1997: 449)."

While sociologists have argued that subtler coercive, normative, and mimetic means may be evoked, our previous empirical research casts doubt on the power of informal sanctions to prevent adverse selection into industry self-regulatory programs at least in the case of the U.S. chemical industry during the early 1990's (King & Lenox, 2000). Trade associations are nonprofit organizations that rely on the support of voluntary members in order to remain viable. For many trade associations, lobbying government on behalf of members' interest to minimize the costs of regulatory compliance is their major activity. Facilitating industry self-regulatory programs, however, is substantively different than these activities. It is perhaps not surprising that trade association managed self-regulatory programs are only as effective the explicit sanctions brought to bear to insure compliance.

Strategic Implications

An interesting picture begins to emerge when we consider the challenges to industry self-regulation. We identify four generic strategic positions firms may take with respect to self-regulatory efforts within their industries (see Table 2). We suspect that in many cases some firms will free-ride off the efforts of others (Table 2: lower-left quadrant). These firms choose not to participate in industry-led efforts and do not self-regulate unilaterally. They gain the benefits of industry self-regulation without incurring the costs of participating and self-regulating themselves. In the case of Responsible Care, over 70% of U.S. chemical firms choose not to participate (Lenox, 2006). These firms tended to be smaller firms or firms with little production in the chemical industry. We may speculate that their absence from a self-regulatory program would likely not be of major concern to external stakeholders and thus not lead to the collapse of the self-regulatory effort.

Table 2. Typology of Self-Regulatory Strategies

	Do not participate	Participate in program
Self-regulate	**Loners**	**Leaders**
Do not self-regulate	**Free Riders**	**Laggards**

We propose that a second group of firms (Table 2: lower, right quadrant) may join self-regulatory efforts to gain the legitimacy and learning benefits of membership without putting forth the effort to meet the standards specified in the program. In other words, these firms fail to truly self-regulate. (We refer to them as laggards for lack of a better term.) In the case of Responsible Care, these firms tended to be dirtier firms from dirtier industry segments. Conservatively, roughly 10% of ACC members fell into this category. One inference is that companies with high risk for future liability (those in the most polluting sectors) joined for the liability protection that membership provided. These firms were able to avoid meeting the standards because Responsible Care lacked explicit monitoring and sanctioning mechanisms. Absent these mechanisms, firms could join the self-regulatory program without putting forth any real effort, e.g., making changes to their production and management processes.

We may surmise that the liability benefits that laggard firms seek is available despite their lack of effort due to the actions of a set of leading firms (Table 2: upper, right quadrant). In the case of Responsible Care, these leading firms tended to be larger firms, heavily focused in

the chemical industry (e.g., Dow and Dupont). Their exit would likely lead to the collapse of the Responsible Care program. Furthermore, their active participation was necessary to placate concerned stakeholders. These firms likely continued to participate despite the various forms of free-riding taking place because they internalize the benefits from industry self-regulation more than others.

Finally, there may exist a small set of loner firms (Table 2: upper, left quadrant) who chose to not participate in industry self-regulatory efforts but that unilaterally self-regulate none the less. These firms have private incentives to improve environmental performance regardless of the actions of others. These may be highly visible firms or foreign firms who find themselves under greater stakeholder pressures (King & Shaver, 2001). These firms may elect not to participate in industry self-regulatory efforts because these non-members use alternative management programs that would be disrupted by participation. For some firms, participation may even damage their reputation. Due to adverse selection, Responsible Care members tended to be more polluting and more slowly improving than non-members on average (King & Lenox, 2000). Responsible Care members also have a reputation for overly conservative management among some Wall Street analysts (Anonymous, 1999). Thus small, clean, and aggressive firms may have harmed their reputation if they choose to participate in Responsible Care.

The presence of loners suggest that the value created by the self-regulatory efforts of leading firms is degraded by the presence of laggards and, to a lesser extent, free-riders. The marginal improvement in industry reputation due to self-regulation by leading firms is less given laggards and free-riders. In addition, the ability of leading firms to differentiate themselves from others in the industry is undermined by the presence of laggards. From the leading firms' perspective, the existence of laggards and free-riders may be tolerated but is obviously not

desirable. Thus, leading firms may pursue a number of actions to narrow the scope of these two groups. We will consider each in turn.

We propose that the most viable way to eliminate laggards is to simply expel non-compliant firms from the program. This means that self-regulatory organizations must a) establish structures to monitor individual firm compliance with program objectives and b) establish procedures for removal of firms from the program. Otherwise, industry self-regulatory programs will attract poor performers who may benefit from participation without putting forth any real effort. Only when rigid monitoring and sanctioning mechanisms are in place, may poor performers be dissuaded from joining the self-regulatory program in the first place.

Empirical work of ours comparing across four trade association sponsored programs in different industries provides evidence consistent with this proposition (Lenox & Nash, 2003). Using a sample of over 4000 U.S. firms in the chemical, textile, and pulp and paper industries, we find evidence that, in at least one program, more polluting firms tended to join, while in another, cleaner firms were more likely to join. We speculate that differences in the structure of the programs drive these findings. In particular, the self-regulatory programs that were able to avoid adverse selection had a history of expelling non-compliant members while the less successful programs had not.

The elimination of free-riders is more difficult. As mentioned earlier, antitrust law prohibits firms from forcing compliance with standards on non-participant firms through various retaliatory measures. Since firms can only voluntarily participate in industry self-regulatory efforts, their only recourse to leading firms is to expel non-compliant members. One potential solution for leading firms is to lobby government to impose the standard on the industry. Of course, this ceases to be “self” regulation and simply reflects lobbying by firms to impose

government regulations that create favorable barriers to entry in the industry. In fact, some antitrust experts have expressed concern that industry self-regulation is really an attempt by leading firms to force out lower cost rivals.

Another potential solution to the free rider problem is for leading firms to differentiate program participants from non-participants in such a way that the value created by the self-regulatory effort is appropriated solely by participants. To the extent that participation in self-regulation may serve as a signal of superior environmental performance, external stakeholders may differentiate between firms and direct their environmental externality "internalization" efforts to poor performers. Referring back to Table 1, participation in industry self-regulatory efforts may be a way to move from the "arbitrary and capricious" world due to rampant information asymmetries to the "informed and precise" world where environmental laggards are punished and environmental leaders are rewarded. In other words, leading firms may be able to privatize the reputation commons.

Policy Implications

To the extent that industry self-regulation is socially desirable, the state may wish to aid industry efforts to self-regulate. There are a number of actions that the state may feasibly take to help promote industry self-regulation and mitigate some of the challenges to self-regulation. For one, the state could use the threat of future regulation to coerce industry self-regulation. Yet, as discussed above, the mere presence of collective incentives may not be sufficient to establish industry self-regulation given the organizational challenges to success. An alternative approach is for the state to require firms to abide by industry standards using the government regulatory apparatus. While this would solve the free-rider problem, such compliance requirements

resemble traditional government regulation and likely provide few of the efficiency benefits of "self" regulation.

A third possibility is for the state to allow various forms of collusion that otherwise may be prevented by antitrust law. For example, leading firms may be given permission to punish those firms who fail to comply with industry self-regulatory efforts. In the chemical industry, it has been suggested that self-regulating firms could raise the factor prices of non-participating firms because of the dense vertical exchanges that occur within the industry. This is a potentially powerful way to address the free-rider problem. However, the state would need to balance the welfare gains from reducing environmental externalities with the threats of potential price collusion and exercise of market power to limit entry as a result of allowing such coordination.

Another possibility is for the state to reward firms who participate in industry self-regulatory efforts. This would help address the free-rider problem by providing incentives directly to those who self-regulate. Potential rewards include favorable treatment in permit and review processes, preference in government procurement contracts, and reduced fines in light of regulatory violations. Of course, from the state's perspective, any attempt to reward self-regulation participants is contingent that they are able to achieve their self-regulatory goals, i.e. that they have adopted structures which avoid the adverse selection and moral hazard problems.

Finally, the state may take actions to help solve the information asymmetry problem between stakeholders and firms. In other words, the state could help eliminate the reputation commons problem. In doing so, stakeholders could directly punish polluting firms and provide incentives for unilateral self-regulation – thus avoiding the free-riding, adverse selection and moral hazard problems associated with industry self-regulation. Potential actions by the state include various forms of standard setting and reporting requirements. For example, the U.S

Environmental Protection Agency's Toxic Release Inventory – a database of annual toxic emissions of U.S. manufacturing facilities – is one such attempt to provide accurate, unbiased environmental performance data for use by non-governmental stakeholders.

Conclusions

Industry self-regulation has the potential to offer an efficient and effective complement to traditionally government regulation. Industry-led efforts to self-regulate may reduce the costs of achieving environmental impact reductions and avoid the political and regulatory costs associated with regulation by the state. Increasingly, society is dealing with environmental issues on a global scale – atmospheric warming, the creation of the ozone hole, the loss of biodiversity. As the scale of these problems has increased, so has the scale of the necessary political coordination needed to address these concerns. Given the absence of a single state to enforce regulation in the global context, we suspect that industry self-regulation will become increasingly important in efforts to address global environmental impacts.

Given industry self-regulation's growing importance, it is critical to consider the incentives motivating firms to self-regulate and the challenges to collective action that industry self-regulatory efforts face. We propose that industry self-regulation arises in response to threats of future government regulation and to pressure from external stakeholders such as consumers and activists. Response to such pressures often requires collective action on the part of industry members since information asymmetries prevent the accurate assignment of individual firm performance. In other words, industry reputation is a collective good in which the poor behavior of some firms has negative repercussions for all within the industry.

As a result of the collective nature of industry self-regulatory, industry efforts are subject to free-riding, i.e., some firms will fail to self-regulate while gaining benefits from those who do. When participants in self-regulatory efforts fail to install viable monitoring and sanctioning mechanisms, industry self-regulatory programs will be subject to adverse selection and moral hazard in addition. Polluting firms will join to receive the insurance benefits of membership while failing to put forth the effort required.

There are a number of strategies that may help mitigate these problems. Adverse selection and moral hazard may be avoided by installing explicit procedures for reviewing firm compliance with program goals and for removing those firms who fail to comply thus ensuring that participants in self-regulatory initiatives truly self-regulate. While free-riders are difficult to eliminate completely, leading firms may reduce the benefits to free-riding by attempting to differentiate themselves through their participation in the self-regulatory program. The state may play an active role by helping reducing information asymmetries between firms and their stakeholders and by rewarding self-regulating firms.

In the end, while our research suggests that industry self-regulation faces a number of important challenges, our conclusion is that when structured properly industry self-regulation holds promise as a valuable approach to address global environmental concerns.

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