

“Voluntary” Approaches to Environmental Regulation: A Survey

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1. Introduction

In the 1970s and 1980s most developed nations created a host of new regulations aimed at curbing environmental degradation. The approach taken was typically one of “command and control,” which specified in law the standards to be met, often in the form of specific technologies that had to be adopted. Industry fought these new regulations vigorously in many cases, and was repeatedly surprised by the political effectiveness of environmental activists. From the beginning, command-and-control regulation had been criticized by economists for its costliness and inflexibility, and by the late 1980s market-based instruments for environmental regulation---especially emissions-trading programs---became increasingly common. One of the most striking environmental developments of the 1990s, however, goes beyond even this type of environmental regulation. Under the emerging “voluntary approach” to pollution abatement, firms make commitments to improve their environmental performance above and beyond the level required by law. The purpose of this survey is to make sense of this new and rapidly spreading phenomenon.

We begin, in section 2, with an overview of the types of voluntary programs in existence throughout the United States and Europe. Even a cursory examination reveals that these programs differ significantly amongst themselves, and that the threat of traditional regulation often lurks nearby. In section 3 we present an intellectual framework in which these plans can be understood without ignoring their considerable variety; in the process we survey the nascent theoretical literature on voluntary programs. Section 4 turns to the modest empirical evidence that is available on the efficacy of voluntary programs, while section 5 identifies some key areas for further research and draws together our conclusions.

2. A Survey of Voluntary Programs

Many terms of art are used to identify voluntary environmental programs, including: business-led environmental strategies, corporate environmentalism, self-regulation, negotiated agreements, environmental covenants, voluntary codes, etc. The European Union Research Network on Market-based Instruments for Sustainable Development offers the following taxonomy of voluntary programs¹:

1. **Unilateral commitments** by industrial firms. Business-led corporate environmental programs come under this heading.
2. **Public voluntary schemes**, in which participating firms agree to standards that have been developed by public bodies such as environmental agencies.

¹ See “Voluntary Approaches,” Environmental Policy Research Brief #1, European Union Research Network on Market-based Instruments for Sustainable Development, undated

3. **Negotiated agreements** created out of a dialogue between government authorities and industry, typically containing a target and a timetable for reaching that target. Such agreements may take on the status of legally binding contracts if legislation empowers executive branches of government to sign them.

We describe these different types of programs in more detail below, and then provide brief overviews of programs that illustrate each type in the above taxonomy.

2.1 A Taxonomy of Voluntary Programs

Unilateral Commitments

Many companies and trade associations have initiated environmental programs in recent years. Examples include the Chemical Manufacturers Association's "Responsible Care" program for reducing chemical hazards, Arco's voluntary introduction of reformulated gasoline, McDonalds' replacement of its styrofoam "clamshell" containers with paper packaging, and the German Industry and Trade Association's plan to reduce carbon dioxide emissions.² While these programs may be developed after consultation with government bodies, the initiative for the programs rests with industry itself.

Public Voluntary Schemes

Self-regulation in the form of voluntary environmental agreements has a much longer history in Europe than in North America. Furthermore, according to the 1997 report on environmental agreement by the European Environmental Agency (EEA 1997) the number of voluntary environmental agreements in Europe has been rising steadily since the late 1980s.³ The report notes that there has been little critical assessment of the effectiveness of European voluntary agreements mainly due to the lack of reliable monitoring data and consistent reporting. The 1997 report was aimed in part to fill that gap. The general conclusion of the report concerning voluntary agreements was that they can be an effective tool in complementing existing regulations, and are most effective when they are used to raise awareness of environmental initiatives and provide a forum for information sharing among various parties. However the report was critical of the fact that many voluntary agreements do not include monitoring and reporting requirements. Clearly, as the report points out, this damages the credibility of the voluntary agreements since it does not allow for accountability, and makes ex post evaluation of the effectiveness of the agreements difficult.

² The first three of these are described in the Appendix. The German program is described in the text below.

³The bulk of the material presented in this subsection, including our discussions of the operation and effectiveness of specific voluntary agreements in Europe is taken from the 1997 report titled "Environmental Agreements: Environmental Effectiveness" authored by the European Environment Agency. The interested reader should consult that report for more detail on the examples we discuss in this section, in addition to more examples of voluntary agreements.

Narrowing the definition of voluntary agreements to include “only those commitments undertaken by firms and sector associations which are the result of negotiations with public authorities, or are explicitly recognized by the authorities,” the EEA reports that every EU member country had at least one voluntary agreement.⁴

Although the United States has fewer public voluntary schemes than does the EU, such schemes do exist, sponsored by such government agencies as the Environmental Protection Agency (EPA), the Department of the Interior, and the Occupational Safety and Health Administration (OSHA). For example, EPA has sponsored the 33/50 Program (discussed in the text below) and the Green Lights program. The Department of Interior has developed a “No Surprises” policy under which it signs agreements with companies or individual landowners committing not to change the rules applying to a particular piece of property for a fixed period of time. In addition, OSHA has developed a variety of “Voluntary Protection” programs.

Negotiated Agreements

The two foregoing categories deal with cases where either business or government, respectively, is the prime mover behind a new program. The third category addresses cases where these two actors are both active participants. Not surprisingly, negotiated agreements are more common in Europe, with its tradition of relatively cooperative business/government relations, than in the United States, where adversarial relations between business and government are the norm. European examples include the French agreement on the treatment of end-of-life vehicles (described more fully below), the Swedish agreement of produce responsibility for packaging, and the Dutch policy on implementing target emissions levels in the chemical industry. There are numerous examples in the U.S. as well, including the EPA's Common Sense Initiative and its Project XL.⁵

2.2 Three Examples

We present below short summaries of three voluntary programs that illustrate the different categories introduced above. A variety of other programs are summarized in the Appendix.

Chemical Associations’ “Responsible Care” Plans: Canada, U.K. and U.S.

In 1984 the worst industrial accident in history killed 2500 people and injured 200,000 more when methyl isocyanate gas leaked from a Union Carbide storage tank in Bhopal, India. In 1985 the Canadian Chemical Producers Association established a program called “Responsible Care” designed to improve the industry's environmental and safety performance, and to communicate the

⁴ Note that this definition rules out voluntary initiatives such as trade associations’ voluntary codes of conduct.

⁵ The Swedish and Dutch cases, as well as the Common Sense Initiative and Project XL, are discussed in the Appendix.

industry's improvements to the public. The U.S. Chemical Manufacturers Association and the British Chemical Industries Association followed with similar programs in 1989. According to Frank Whiteley, President of the Chemical Industries Association (CIA), these initiatives were needed to “help regain society's trust.” (Fischer and Schot, p. 201) Another key objective, according to industry observers, was “limiting state intervention to a level that is acceptable to the industry.” (Fischer and Schot, p. 205.)

Participants in the CIA's Responsible Care program agree to adhere to a set of six guiding principles, all of which aim to ensure that the companies “present an acceptably high level of protection for the health and safety of employees, customers, the public and the environment.” (Fischer and Schot, p. 209) The entire CIA membership of roughly 200 companies has signed onto the program, and new firms must accept its principles if they wish to join the association. In the U.S., the industry's self-regulatory activities have become easier for the public to monitor since the creation of the Toxic Release Inventory (TRI), mandated under the Emergency Planning and Right-to-Know Act, Title III of the Superfund Amendments and Reauthorization Act (SARA Title III). In the U.K., however, “[t]he industry is very cautious about the types of data that it makes available” (Fischer and Schot, p. 213.) According to outside observers in the U.K., “[a]t best, the CIA's performance index can be seen as a transitional step toward a much fuller form of disclosure” (Fischer and Schot, p. 213).⁶

The Responsible Care Programs fit quite neatly into the category of unilateral commitments, since the industries were clearly the originators of the programs.

The EPA's 33/50 Program for Reducing Toxic Chemical Emissions: United States

Starting in 1987, the Environmental Protection Agency (EPA) stepped up its collection of toxics data as a result of Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986, also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). This law mandates that companies report releases of over 400 different toxic chemicals, many of which are otherwise unregulated. It applies to all manufacturing facilities that have 10 or more employees and that manufacture or process more than 25,000 pounds or use more than 10,000 pounds of any of the reportable chemicals. The EPA makes this information available to the public through the Toxic Release Inventory (TRI). The first year for which data are available is 1987; this information was released to the public in June of 1989.

The availability of the TRI data supported the use of a new voluntary regulatory strategy by the EPA. In February 1991, the EPA announced the “33/50 Program,” a voluntary scheme designed to induce firms to cut their emissions of 17 key toxic chemicals 33% by 1992 and 50% by 1995, relative to a 1988 baseline, by providing some favorable publicity and some limited technical

⁶ The above account is taken from Peter Simmons and Brian Wynne, “Responsible Care: Trust, Credibility and Environmental Management,” in Kurt Fischer and Johan Schot, editors, *Environmental Strategies for Industry*, Washington, DC: Island Press, 1993.

assistance. The EPA has been criticized for the program's weak incentives (there are no penalties for failure to participate or failure to achieve the stated goals), and for overstating its results. Nevertheless, the existence of the program may have signalled an increased threat of federal regulation for these chemicals; at any rate, emissions of the 33/50 chemicals fell 42% from 1991 to 1994, while emissions of all other TRI chemicals fell only 22%.

The 33/50 Program fits quite neatly into the category of public voluntary schemes, since the EPA was clearly the originator of the program.

Agreement on the Treatment of End-of-Life Vehicles: France

This program, started in 1993, had the goal of reducing the total weight of each automobile destined for a landfill site to be less than 15% of the original weight by 2002 (with an ultimate goal of 5%). From 2002, new model must allow 90% recovery, reuse, or recycling. The participants in drawing up the agreement were the French Ministries of Industry and the Environment, 2 French car manufacturers, 12 French automobile importers, and 8 trade associations covering dismantlers, shredders and recyclers, material producers and equipment suppliers. The agreement carried no explicit sanctions for failure to meet the targets but there was an implicit threat of legislation should there be a failure to meet the program's goals.

Two important initiatives influenced the negotiation of the this voluntary agreement. The first was the EC's (European Commission's) Priority Waste Streams Work on end-of-life vehicles (ELVs), and the threat of stringent legislation concerning such vehicles in Germany. The French government took the lead in coordinating the EC's Priority Waste Streams work. This involved collection and sharing of information on the issue of ELVs at the EU level. While the work on priority waste streams was being undertaken there were moves in Germany to introduce regulation on ELVs. By 1992 this legislative threat by the German Environment Ministry was introduced in draft form. According to the EEA report "The French Environment Ministry, in an attempt to pre-empt German legislation, began preparing a decree on ELVs. The threat of legislation, and the need to address the threat posed by the German approach led car manufacturers to push for discussions on a [voluntary agreement] with the French government."

One major problem with voluntary agreements highlighted by this case involved monitoring and reporting. Initially the agreement was being monitored by a committee, made up representatives of the agreement's signatories. After criticism over lack of public scrutiny a number of NGOs were invited to attend certain meetings as observers. Initially monitoring provisions were quite poor, with the 1996 progress report containing little comprehensive quantitative data. There are now attempts to improve monitoring and reporting by including progress indicators such as the proportion of ELVs being recycled and the recyclability of new models. To date these provision have not yielded any comprehensive quantitative information.

The French program is a good example of a negotiated agreement, with the government a very active player, but with industry taking an active role as well.

3. Alternative Theories of Self-Regulation

Corporate environmental initiatives have been attributed to a variety of different motives, including cost-cutting, marketing to “green” consumers willing to pay extra for environmentally-friendly products, and pre-empting government regulation. Understanding what really motivates corporate environmentalism is important for policymakers, since the effectiveness of government environmental policies depends in large part on how corporations will respond to them. It is also important for businesspeople thinking about jumping on the environmental bandwagon, for otherwise they may not obtain the results they hope for. In this section we discuss three general “models” of corporate environmental activity, and consider the social welfare implications of corporate actions within each model. In addition, we attempt to identify the empirical implications of each model, setting up a framework within which we will survey the empirical literature on voluntary environmental activity in the next section. The three hypotheses we consider are:

1. Corporations may have improved the efficiency of their manufacturing processes, generating environmental improvements as a happy byproduct.
2. Shifts in the demand and supply of environmentally friendly products, through the actions of “green” consumers and investors, may be driving changes in corporate behavior.
3. Companies may be taking proactive measures to shape regulatory decisions. They may preempt or mitigate the effects of future government regulations, or alternatively “raise rivals' costs” by signalling that new regulations are inexpensive for firms to implement, and hence should be implemented.

As in many areas of life, more than one of these factors may play a role in motivating corporate behavior in any given situation. We discuss each of them in turn.

3.1 Improving corporate productivity

Many writers have argued that companies can cut their costs and improve their environmental performance simultaneously by improving the efficiency of manufacturing processes.⁷ Probably the most frequently cited example is 3M Corporation's “Pollution Prevention Pays” program, begun in 1975. For the first time, line workers were involved in identifying opportunities for waste reduction, and between 1975 and 1990, 3M cuts its total emissions of pollution by 50% (530,000 tons). At the same time, the company claims to have saved over \$500 million by cutting the costs of raw material, compliance, disposal and liability. Results of this sort, if replicable by other firms, provide support for a “win-win” perspective in which environmental performance and corporate

⁷ Smart (1992) provides a number of examples along these lines. Groenewegen *et al.* offer an extensive guide to the literature on corporate environmental activity.

profits walk hand in hand.

From an economic perspective, of course, the puzzle is why there should be any sudden surge in opportunities for making money by cleaning up. Were companies previously sloppy in ignoring internal profit-making opportunities? Has technological change presented new opportunities for reducing the use of raw materials, thereby lowering costs and environmental effluents simultaneously? Has global competition intensified to the point where formerly marginal projects now look attractive? Have workers' attitudes shifted, so that employee morale now depends heavily on corporate environmental performance? None of these questions, to our knowledge, has been satisfactorily answered. In fact, Walley and Whitehead (1994) argue that the opportunities for painless pollution prevention are rapidly being exhausted. Furthermore, Boyd (1998) offers in-depth case studies of three widely-discussed "failures" to adopt pollution prevention, and finds that straightforward economic considerations explain all three.

From the perspective of social welfare, of course, corporate actions that lower costs and also improve the environment are surely beneficial.

3.2 Responding to "green" consumers and investors

Another common explanation for corporate environmentalism is that there have been shifts on the demand and supply sides of the marketplace that make environmental activity more profitable. Increasing numbers of consumers, at least in the developed nations of the world, have achieved income levels at which they are willing to pay a premium for environmentally-friendly products.⁸ Companies want to appeal to these "green" consumers, and to do so are willing to go above and beyond the levels of care required by environmental regulations. Examples of such environmentally friendly products include organic produce, tuna caught with dolphin-safe nets, biodegradable plastic bags, reformulated gasoline, and McDonalds Corporation's substitution of paper wrapping for styrofoam "clamshell" sandwich containers. The basic notion here is that firms can differentiate their products by improving their environmental qualities, and thereby charge a higher price to high-income consumers.

There is a small but growing economic literature that studies theoretical models of the "green" consumer phenomenon. These models typically build on the basic model of "vertical" product differentiation developed by Gabszewicz and Thisse (1979) and Shaked and Sutton (1982).⁹ In this setup, consumers have identical preferences, but income differences lead to differences in the

⁸ The existence of an "environmental Kuznets curve" showing the connection between income growth and demand for environmental improvement has been well documented. See, for example, Grossman and Kruger (199*).

⁹ Vertical differentiation refers to a situation where all consumers agree on what constitutes higher quality, *e.g.*, most consumers agree that a Mercedes-Benz is preferable to a Yugo. Horizontal differentiation, in contrast, refers to a case where consumers differ in their preferences over a set of similar products, *e.g.* some bicyclists prefer mountain bikes while others prefer touring bikes.

willingness to pay for product quality. In the standard duopolistic model, two firms offer products of different qualities in one market. The firms bear convex quality-dependent fixed costs and compete in qualities and prices in a two-stage industry game. Since greater product differentiation reduces substitutability and price competition, even firms with identical cost functions will offer distinct qualities in the resulting market equilibrium. In fact, a standard characteristic of such models is that the firms---in their attempts to avoid price competition---engage in “too much” differentiation from the perspective of social welfare.

In the typical version of this model, the consumption of a particular product of a certain quality only affects the utility of the individual consumer. This can be interpreted in two ways. Either individual consumption does not create any externalities, or externalities created by consumption are fully internalized in the utility of the buyer. Some products, such as professional services, generate few externalities. Products involving safety or environmental standards, in contrast, typically create at least some external impacts, and here the assumption of full internalization is less natural, so care must be taken in interpreting the models' results.

Arora and Gangopadhyay (1995) study a standard vertical product quality model where higher quality attracts high-income consumers who internalize the benefits of environmentally friendly products. They replicate some of Ronnen's (1991) results on minimum quality standards, in particular the notion that a minimum quality standard (MQS), if set appropriately, is welfare-improving. The rationale for a standard is that without a standard the firms, in their zeal to avoid price competition, engage in excessive product differentiation. An MQS forces up the quality of the low-quality firm, making it a closer substitute for the product of the high-quality firm, and intensifying price competition. While the high-quality firm responds to an MQS by further raising its quality, this is not enough to offset the effect of the standard, and the quality of the two firms' products moves closer together while prices are forced down.¹⁰

Bagnoli and Watts (1995) study several vertical differentiation models where environmental friendliness is only partially internalized by consumers, thereby allowing for a formal analysis of externalities in the context of a “green consumer” model. Their focus is on whether unregulated market forces lead to the socially optimal level of environmental friendliness. They find that in some but not most cases unregulated competition for “green” consumers can provide the socially optimal level of the environmental public good. In particular, when the firms compete by setting prices (“Bertrand competition”), the public good is always underprovided. If firms compete by choosing quantities (“Cournot competition”), then for some parameter values the efficient level of public good provision can be obtained, but only if the public good involves the elimination of a detrimental activity (rather than the expansion of a beneficial activity) and only if all costs of provision are fixed costs as opposed to variable costs.

There appear to be two main lessons to be learned from these models. First, a clear and coherent

¹⁰ Arora and Gangopadhyay also consider the effects of government taxes and tradeable permits, but since our focus is on voluntary approaches to environmental regulation we do not detail those results here.

theory can indeed be developed around the notion that firms may voluntarily make their products more environmentally friendly in order to attract high-income “green” consumers. Second, voluntary action by corporations is unlikely to provide socially optimal results. Government action, at least in principle, can improve the workings of the market. This suggests that a full understanding of corporate environmentalism requires models that combine firms' strategic choices of environmental quality with regulators' strategic choices of environmental standards. We turn to models of this sort later in this section. First, however, we consider another marketplace shift that may also be fueling the move toward corporate environmental activity.

In recent years there has been growth in “socially responsible” mutual funds, which avoid investing in companies deemed irresponsible. Examples of stocks that may be avoided are tobacco, firms with high levels of certain types of pollution, nuclear power, etc. “Green investors” who participate in such funds reduce the supply of capital to the excluded firms, raising capital costs to these firms and shifting the supply curve for the industry upwards. As we discuss below, there is some empirical evidence that stock prices do respond to unfavorable news about corporate pollution, so green investors may be an increasingly important factor determining corporate environmental activity. The theoretical issues here are fairly straightforward; the more important question is the empirical one regarding the relative importance of green investors as a driver of corporate environmentalism.

3.3 Optimizing corporate regulatory strategy

A third explanation for the rise of corporate environmentalism is that corporations are acting strategically in the political and regulatory arenas to influence the actions of regulators. This is a rich area of inquiry, and a number of different corporate strategies have been identified in the academic literature. We discuss four such strategies here: 1) Preempting tougher government regulations, 2) Weakening forthcoming regulations, in situations where full preemption is impossible, 3) Reducing the extent of monitoring by regulatory agencies, and 4) Signalling regulators to persuade them to raise rivals' costs. We address each of these in turn.

3.3.1 Preempting Tougher Regulations

In this section we discuss three theoretical models in which voluntary environmental improvements serve to preempt mandatory legislative requirements. The three models correspond to the three elements of the taxonomy we introduced in section 2 above.

Unilateral commitments

As environmental regulation has become an established institution over the past 25 years, corporations increasingly have become able to predict the outcomes of future legislative and

regulatory battles. Sophisticated corporate strategists can look ahead to the next wave of likely regulations, and attempt to take proactive steps to shape future laws, rather than passively waiting for regulations to be imposed upon them. If they are sharp enough, firms may be able to preempt future regulations altogether by “self-regulating” with just enough stringency to placate environmentalists and head off the demand for government regulation.

Although it is difficult for outside observers to infer the motives for particular corporate programs, there are many corporate actions that could potentially be interpreted as preemptive. America’s “Big Three” automakers’ Vehicle Recycling Partnership is limited to creating labeling standards for plastic components, and falls well short of the German program of comprehensive automotive disassembly and reuse. Selective cutting in old growth forests is more environmentally friendly than clear cutting, but many argue that such forests should not be cut at all. The “Responsible Care” program initiated by the Chemical Manufacturers Association (CMA) may be used as a rationale for refusing to adopt more stringent environmental practices; according to Barnard (1990, p. 5), at least one CMA member---Union Carbide---has already done just that. Such examples raise questions about how social welfare is affected when self-regulation preempts government action. This concern is likely to become increasingly important, since “win-win” situations---in which pollution prevention raises both corporate profits and consumer well-being---seem increasingly difficult to find.

Maxwell, Lyon and Hackett (1998) present a model of preemptive self-regulation in which political action is costly for consumers to undertake. Individuals must inform themselves of the implications of pollution control for their well-being, and of the efficacy of various feasible policy remedies. Individuals of similar interests must then coordinate on a mutual strategy for gaining political influence. These various costs are collectively referred to as organizing costs. Even after individuals are organized, they must incur expenses to wield political influence, which might be attained through a variety of means, including lobbying activities, election campaign contributions, and tolerated forms of bribery such as revolving-door arrangements, junkets, and honoraria. Costs that are required after consumers are organized are referred to as influence costs or lobbying costs.¹¹

The political costs faced by consumers drive a wedge between the consumer benefits of voluntary abatement and the benefits of mandatory abatement, and firms can take advantage of this wedge to preempt regulation. Naturally, if consumers’ costs of political action are too high then consumers are effectively “blockaded” from the political process and self-regulation becomes an unnecessary expenditure and will not be observed. As consumer costs of gaining political influence fall, however, the model predicts that corporate self-regulation will intensify. In other words, an increasing threat of government regulation induces firms to voluntarily reduce pollution

¹¹ Firms face similar tasks, but their organizing costs are typically less than those of consumers, since assessing the costs of regulation to the firm is usually much easier than assessing the health and aesthetic benefits to consumers, and the number of firms in an industry is typically very small relative to the number of consumers. Without loss of generality, then, one can normalize firms’ cost of organizing to zero, although they still must incur influence costs to persuade politicians to support corporate positions.

emissions.¹² The theory predicts that government actions which significantly lower the information costs faced by consumer and environmental groups would thereby increase the threat of regulation faced by firms and increase the incentives for self-regulation. We discuss some empirical evidence on this hypothesis in section 4.

Maxwell, Lyon and Hackett (1998) investigate whether voluntary abatement raises social welfare. When consumer organizing costs are high, firms may be able to preempt regulation with a very modest amount of voluntary abatement, which might be much less than would have been imposed by government. Poorer environmental performance, however, must be weighed against the reductions in regulatory and legislative costs when abatement is voluntary rather than mandatory. The authors show that the regulatory savings more than outweigh any reduced environmental performance.¹³ The key idea is that giving consumers some abatement for “free” strengthens consumers' position in the influence game, if it is actually played: they obtain a higher level of total abatement at a lower political cost. Hence, if consumers allow themselves to be preempted, they must be *even better off* than they would have been had they fought the influence game. Thus, if preemption occurs, one can presume that both firms and consumers are better off than if consumers had fought to impose standards on an industry that undertook no voluntary abatement.¹⁴

Maxwell, Lyon and Hackett employ a very general model that builds on the Chicago-style model of interest group pressures developed by Stigler (1971), Peltzman (1976) and Becker (1983). Under this approach, the details of political structure are suppressed in order to focus on the incentives of interest groups, who are viewed as the primary actors. This modeling approach is thus particularly well suited to the analysis of business-led environmental initiatives. The approach could readily be extended to consider a world where it is more costly for interest groups to initiate legislation than to influence the actions of regulatory officials. One could then create a model where firms and consumer/environmental groups press for *regulatory* actions that may preempt future *legislation*. All interest groups will then have incentives to preempt legislation whenever

¹² In theory, the cost of preemption may be prohibitive if the threat of regulation is too high. Thus, government policies that subsidize consumer involvement in the political process could paradoxically reduce the level of voluntary environmental improvement.

¹³ This conclusion holds as long as corporate political lobbying does not directly interfere with the production of political influence by consumer groups. Of course, greater corporate lobbying further offsets consumer lobbying, but welfare reductions only arise if corporate lobbying directly and negatively enters the “production function” by which consumers produce political pressure.

¹⁴ The model of Maxwell, Lyon and Hackett (1998) can be interpreted as a model of entry deterrence, since the firms invest in pollution control to deter “entry” by consumers into the political influence game. Unlike standard entry deterrence models, however, here the “fat cat” strategy—under which investment raises the rival's welfare in the event entry occurs—is effective in preempting entry. (See Tirole (1989), p. 325, for a discussion of “fat cat” and other entry-deterrence strategies.) The reason is that in ordinary deterrence games staying out yields the potential entrant a fixed reservation level of profits. Here, in contrast, consumers' utility of staying out of the influence game rises as firms invest. Welfare-enhancing preemption is possible because as voluntary abatement increases, consumers' utility of staying out rises faster than the utility of entering.

possible. The models we discuss next place more emphasis on the separation between legislators and regulators, and are more specifically tailored to study public voluntary schemes or negotiated agreements.

Public Voluntary Programs

Segerson and Miceli (1998) present a model in which legislation is threatened if corporations do not produce satisfactory results "voluntarily." In their model, a new piece of environmental legislation mandating pollution reductions is forthcoming with probability $p \in (0,1)$. The welfare-maximizing regulator cannot unilaterally impose new binding regulations, but is delegated authority to offer the firm a voluntary agreement calling for a greater level of pollution reduction; if the firm accepts the offer, the background threat of legislation is assumed to be removed. Both the physical and the transaction costs of compliance on the part of the firm are assumed to be lower under a voluntary agreement; in addition, the transaction costs faced by the regulator are lower under the voluntary agreement. The costs of legislation are not modeled explicitly.

Given the substantial savings associated with voluntary agreements, Segerson and Miceli show that the equilibrium of this game is for the regulator to offer a voluntary agreement and for the firm to accept. Depending on the parameters of the problem, the voluntary agreement may or may not embody the first-best level of abatement. The first-best level is feasible when the probability of legislation is high and voluntary compliance is much cheaper than mandatory compliance. Segerson and Miceli also discuss the case of multiple firms, and show the importance of clear rules regarding what happens if only a subset of all firms sign the agreement. When firms are homogeneous, the regulator obtains better results by requiring all firms to sign the voluntary agreement if the legislative threat is to be removed; otherwise firms have incentives to free-ride and let their rivals be the ones to shoulder the burden of voluntary abatement. When firms have differing costs of abatement, matters are more complex. Requiring all firms to sign may mean that voluntary agreement is never reached because high-cost firms are unwilling to participate. The regulator must craft the terms of the agreement carefully to balance the benefits of getting more firms to participate against the risk that the agreement will be vetoed by high-cost firms.

In the model of Segerson and Miceli, voluntary agreements always improve welfare if firms are homogeneous due to the cost savings they offer. When firms are heterogeneous, it is possible that voluntary agreements are not socially desirable. On one hand, a voluntary agreement to which only a single firm is party may be less valuable than mandatory requirements imposed on all firms. On the other hand, obtaining a voluntary agreement from all firms---even those with high compliance costs---may require such a weak abatement requirement that again legislation is preferred. In the model of Segerson and Miceli, the regulator is a welfare-maximizer, so welfare-reducing voluntary agreements will not be observed. In a political economic model, however, one can imagine cases where the regulator may have incentives to implement a welfare-reducing voluntary agreement. The model we describe next focuses on just such situations.

Negotiated Agreements

Hansen (1996) presents a model in which voluntary agreements involve direct negotiation between industry and a regulatory body, thereby bypassing the legislative process. Like the papers discussed earlier, Hansen's model views voluntary agreements as supported by the threat of mandatory regulation. However, Hansen's regulator (which he terms Government) and legislator (Congress) differ in the relative weights they place on firm profitability, revenues from a pollution tax, and environmental improvement. The utility function of Congress is taken to represent social welfare throughout most of the paper, and Government's divergent interests may lead it to take actions that reduce social welfare. Voluntary agreements produce no tax revenue, and compliance with them may be more or less costly than compliance with legislative requirements. Such agreements come about through Nash bargaining between firms and the Government, each of whom aims to achieve higher utility by preempting Congressional legislation.

It is easy to show that if Congress and Government have the same utility functions, then voluntary agreements only improve social welfare if they lower compliance costs. Conversely, if Congress and Government have different preferences it is easy to come up with cases where voluntary agreements reduce welfare. For example, if Government is sufficiently pro-firm then it can gain by weakening environmental standards and lowering tax revenues, while Congress (and society at large) is worse off. This problem can be alleviated by granting Congress the power to veto any voluntary agreement, thereby assuring that such an agreement must improve social welfare.

Hansen also presents an extension of the model in which various interest groups wield extra influence by applying *ex post* "public criticism" to the actors responsible for a decision, the impact of which is assumed to be a linear function of the actual harm suffered by the interest group. In this setup, both political branches have incentives to avoid responsibility by eschewing action and avoiding criticism. Of course the benefits of avoiding responsibility drive a wedge between the utility function of Congress and social welfare. This opens up new opportunities for welfare-reducing voluntary agreements that weaken environmental standards and lower tax revenue, and allowing Congress veto power over voluntary agreements no longer assures that such agreements will improve welfare. It is easy to see how welfare reductions can result from criticism by corporate interests. Hansen shows that welfare reductions can also follow from environmental group influence. He allows for criticism of both Congressional goals *ex ante* and legislative achievements *ex post*; in this context Congress again benefits from ducking responsibility and welfare may be reduced.

Summary

All three of the foregoing models explain voluntary environmental improvement as an attempt to avoid resorting to the traditional legislative/regulatory process. Furthermore, all of them highlight

the cost savings that come about from voluntary actions, through reduced transaction costs and/or compliance costs. In fact, the similarities between the models suggest that the distinctions between the three different types of voluntary programs are rather blurry. The theoretical work suggests that voluntary abatement is welfare-enhancing in many situations, but it also identifies certain situations in which welfare reductions might occur:

1. Corporate lobbying expenditures significantly reduce the marginal effectiveness of lobbying by consumer and environmental groups, *ceteris paribus*. [Maxwell, Lyon and Hackett]
2. Regulators have political objectives that depart from welfare-maximization *and* are delegated the power to preempt legislation by accepting weak and/or poorly-designed voluntary programs. [Segerson and Miceli, Hansen]
3. Legislators are scared of public criticism, and thereby delegate too much power to regulators who may lack incentives to maximize welfare. [Hansen]

All these situations revolve around the problem of ensuring that politicians are motivated to pursue social welfare. Maxwell, Lyon and Hackett explicitly assume that the legislature is politically motivated by interest group pressures, yet they still find self-regulation to be welfare-improving in a standard interest-group setting. It appears that the primary welfare concern is that Congress may be systematically biased in favor of one particular interest, above and beyond simply responding proportionately to donations and political pressure.¹⁵ Further research is needed on how and when such bias comes about.

3.3.2 Weakening Forthcoming Regulations

In some cases, preemption of government regulations may be impossible, but the voluntary actions of firms may influence the regulations subsequently set by government. For example, the Clean Air Act Amendments of 1990 identified 189 toxic chemicals which will be subjected to Maximum Available Control Technology (MACT) standards by the year 2000.¹⁶ Because the details of the standards were not specified by Congress, firms may be able to influence the standards that are actually set through their own actions.

Lutz, Lyon and Maxwell (1998) study this type of setting using a model that includes both "green" consumers and a welfare-maximizing government regulator who sets environmental standards. Like Arora and Gangopadhyay (1995) and Bagnoli and Watts (1995), Lutz, Lyon and Maxwell (1998) work with a duopolistic model of vertical product differentiation, in which

¹⁵ If legislators delegate the power of preemption to regulatory agencies, then the problem of bias emerges at this level instead.

¹⁶ See US Environmental Protection Agency (1994).

high-income consumers are willing to pay a premium for high-quality, environmentally-friendly products. As a result, one firm chooses to specialize in providing a cleaner product to attract these high-income consumers. Furthermore, like Ronnen (1991) and Arora and Gangopadhyay, Lutz, Lyon and Maxwell consider the effects of minimum quality standards. Where they depart from previous work is in: 1) modeling explicitly the standards that would be chosen by a welfare-maximizing regulator (as opposed to simply considering comparative statics on the level of the standard, as in Ronnen), and 2) allowing the high-quality firm to choose its level of environmental friendliness *before* the government sets its standards.

An apparent example of this sort of strategy is ARCO's introduction of reformulated, cleaner, gasolines under the names "EC-1" (introduced September 1, 1989), "EC-Premium" (September 6, 1990) and "EC-X" (July 1991). The new fuels have garnered ARCO very favorable treatment in the press, and were dubbed the "Product of the Year" by Fortune magazine.¹⁷ Furthermore, according to the Los Angeles Times, the firm's "return on stockholder equity in 1991 was 29.3%, making ARCO the best performer in the oil industry. Its success is due to an unprecedented new-product development strategy, an environmental strategy. ARCO anticipates environmental regulations to gain significant market advantages."¹⁸ Lodwick Cook, ARCO's CEO, clearly believes his own claim that, for firms in the 1990s, "the greatest opportunity for competitive advantage will be in leveraging environmentally improved products and services to differentiate themselves from competitors." However, by "breaking ranks with the majors" and introducing EC-X, Cook not only differentiated his product, he also launched a "frontal assault on those advocating the more expensive vehicles that use methanol fuel."¹⁹

As mentioned earlier, in vertical differentiation models, firms relax price competition by producing products whose quality levels differ greatly from one another. The level of differentiation chosen tends to be excessive from the perspective of social welfare, and regulators can raise welfare with an appropriately chosen minimum quality standard. This standard is binding for the low-quality firm, while the high-quality firm's best response to the standard is to further raise its quality. Lutz, Lyon and Maxwell show how a high-quality firm can profit by wresting first-mover status from the regulator and proactively committing to a quality level before the regulation is promulgated. The firm chooses a quality that is below its best response to the regulator's preferred standard. For any given standard, this lower quality level increases price competition and reduces profits. Because the welfare-maximizing regulator cares about profits as well as consumer surplus, however, he chooses a lower standard, and as a result welfare falls.²⁰

¹⁷ See Schaefer (1993).

¹⁸ See Piasecki (1992)

¹⁹ Ibid.

²⁰ While the analysis is done assuming a welfare-maximizing regulator, the same general results would hold even if the regulator was primarily concerned about consumer surplus. The high-quality firm's action would require the regulator to lower the standard in order to prevent the low-quality firm from going out of business.

It is noteworthy that the Lutz, Lyon and Maxwell result on welfare reduction holds even when all of the benefits of environmental improvement are internalized by “green” consumers. When one allows for *external* benefits from pollution abatement, the welfare reduction from weakened environmental standards becomes all the more pronounced. Their results thus provide a lower bound on the negative effects of corporate environmentalism in a setting with minimum quality standards. These simple but robust results provide a new, and rather disquieting, perspective on the growing popularity of corporate environmental management activities.

The analysis of Lutz, Lyon and Maxwell cautions against uncritical celebration of corporate environmentalism. It also provides a contrast to the sanguine conclusions of the preceding section, in which preemption appears to be welfare-improving unless Congress is systematically biased toward a particular interest group. The models in the two sections are built on somewhat differing foundations, however, and future research that synthesizes the two approaches would clearly be valuable. In particular, it would be useful to add to the Lutz, Lyon and Maxwell framework a depiction of the regulatory process that is based on interest-group pressures, since in such a setting externalities may motivate non-consumers to engage in costly lobbying to influence the standard-setting process. Including consumer organizing costs would also allow for the possibility of preemption, and would allow for predictions about when voluntary abatement will tend to be aimed at regulatory preemption and when it will be aimed at weakening future regulatory standards.

3.3.3 Reducing Regulatory Monitoring

A third way corporate environmentalism can affect regulatory policy is by reducing the stringency with which the firm is treated by regulators. Maxwell and Decker (1998) argue that firm may engage in voluntary environmental investments in order to commit to higher levels of compliance with existing regulations, and may in return, win a lower monitoring rate or laxer permitting scrutiny from regulators. They show that a firm can make an irreversible investment to lower its future costs of complying with environmental standards. If the regulator can observe this investment, then it can infer that the firm is less likely to violate the standards in the future, and will naturally pursue a laxer monitoring policy since the returns to monitoring will have been lowered.²¹ Decker (1998) extends the theory of voluntary investment developed in Maxwell and Decker (1998) to explicitly include multiple firms. He shows that firms can take observable pro-environmental actions that convince regulators to focus their monitoring and enforcement efforts *on other* firms.

²¹ Hemphill (1993) argues that “The implementation of corporate environmental audits and the active amelioration of deficiencies is viewed by federal and state law enforcement agencies in a positive light when they investigate for criminal prosecutions, and may also be helpful in civil and administrative proceedings.” Helland (1998) provides some evidence that firms self-report environmental violations in an attempt to gain more favorable treatment from the EPA.

The welfare effects of corporate environmentalism in both Maxwell and Decker and Decker are ambiguous. In Maxwell and Decker, whether voluntary environmental investments are welfare improving, depends on whether the penalties for non-compliance were excessive relative to the actual social damage caused by a violation of the standard. If the penalties are excessive, the firm has an incentive to *overinvest* in compliance capital. Decker obtains a similar result in the multi-firm case. In Decker the potential for overinvestment is exacerbated by the fact that one firm's investment causes the regulator to monitor other firms more intensively. Each firm's investment thus imposes external costs on other firms, and the firms jointly face a "Prisoners' Dilemma" situation in which the actions that are best from each individual firm's perspective produce results that are collectively bad for the industry as a whole.

3.3.4 Encouraging Anticompetitive Regulations

We turn now to a fourth and final form of corporate environmentalism as strategic response to regulation, namely actions expressly designed to reduce competition. Earlier researchers have argued that firms may have incentives to encourage regulations that raise industry-wide rents or disadvantage competitors.²² Voluntary environmental protection may play a role in such strategies. For example, regulators are typically uncertain of the costs of a particular new regulation at the time it is imposed. If those costs turn out to be high, small firms may be forced to exit the industry. Conversely, large firms may benefit from the exit of rivals, and may try to convince regulators that industry-wide compliance costs are low, so stronger regulations might provide substantial benefits at fairly low cost. One way to help convince regulators of this point is for a large firm to make an investment in voluntary abatement, in an attempt to signal to regulators that the cost of abatement is low.

Certainly there are anecdotal reports of firm engaging in tactics like those just described to help stifle competition. For example, DuPont's voluntary acceleration of the phaseout of chloroflourocarbons may have encouraged regulators to put additional pressure on other producers of CFCs. Anticompetitive strategies may be especially likely in the international arena. Cairncross (1992) provides numerous anecdotes describing how one nation's environmental regulation has been another nation's trade barrier.

Despite the potential use of such strategies, it may be difficult for firms to signal low abatement costs effectively. Smart regulators can infer that in such a setting, large firms will have an incentive to promulgate such regulations only when they feel it will disadvantage rivals. "Fooling" the regulator may thus require very sophisticated strategies. Further research in this area needs to be undertaken.

3.4 Welfare Effects of Corporate Environmentalism

²² See Bartel and Thomas (1987), Maloney and McCormick (1982), and Pashigian (1985).

Our survey of different theories of corporate environmentalism provides many reasons for optimism with some reasons for concern mixed in. The market pressures created by “green” consumers, investors, and employees are legitimate ways for people to express their preferences, and should be presumed to encourage socially beneficial outcomes. Corporate actions that preempt the emergence of stricter legislation will, except in certain perhaps unlikely cases, provide benefits for both consumers and firms. On the other hand, corporate environmental strategies also may serve to manipulate the regulatory process, possibly inducing regulators to weaken standards to the detriment of consumers and possibly inducing regulators to strengthen standards to the point where competition is attenuated and consumer prices rise unnecessarily. The use of environmental regulation as a trade barrier is a particular worry. Determining which of these stories applies in any given situation is an empirical matter, and it is to the empirical evidence on voluntary environmental amelioration that we now turn.

4. Lessons from Empirical Studies of Self-Regulation

The empirical literature on voluntary environmental amelioration, including self-regulation, is sparse. This is understandable for several reasons. First, corporate voluntary actions in the environmental arena are relatively new. Second, while casual observation suggests that this type of activity is on the rise, it is not yet common. Third, there is a notable paucity of quantitative data due to the fact that many of the existing programs lack data collection and reporting requirements. Finally, there is the familiar econometric problem of the “missing counterfactual,” i.e., the lack of quantifiable data on baseline “business as usual” scenarios. Because voluntary actions necessarily preempt “business as usual”—which might have involved legislated environmental improvements—evaluations of any environmental improvements that do take place under voluntary initiatives are difficult. The few papers that undertake quantitative analyses of corporate environmental actions have generally dealt with discrete choice decisions (either to join a government-proposed pollution-reduction program or to adopt an environmental plan) or continuous decisions regarding the extent of pollution abatement.

Our goal in reviewing the existing literature is to draw out the major findings of each paper and to point to the areas of agreement and disagreement among the papers. This exercise serves two purposes. First, the findings we discuss can be checked against findings arising from future empirical research. These cross-checks are extremely important. As we have mentioned, the existing literature has a very narrow focus, due to data limitations. With a couple of exceptions, the existing literature deals exclusively with toxic chemical emissions in the United States. The main empirical findings arising from the current literature may fail to hold when the focus is broadened to include different corporate environmental acts in different nations. Second, unexplained (or contradictory) findings pose challenges to theoretical researchers, and help focus future empirical research on questions of fact that can aid in the development of future government policies, regulations, and self-regulatory programs.

The following subsection provides a brief review of the empirical methodologies used in the papers we survey. The penultimate subsection summarizes the findings on which the literature is in agreement, and discusses the areas in which the studies disagree. The final subsection offers some suggestions for the advancement and focus of future empirical research.

4.1 An overview of the papers

Papers dealing with discrete choice decisions are Henriques and Sadorsky (1996), Arora and Cason (1995 and 1996), Khanna and Damon (1998) and Karamanos (1998). Each paper estimates the following model

$$y_i = \mathbf{b}x_i + u_i \quad i = 1, \dots, n \text{ firms}$$

using standard probit or logit techniques. The binary variable y_i takes on the value 1 if the i^{th} firm undertakes the action under investigation (such as joining a voluntary program) and zero otherwise. x_i is a vector of explanatory variables (e.g., firm and industry financial characteristics, firm pollution characteristics) and perhaps management characteristics, and u_i is a random error term with mean zero. In these models $E(y_i | x_i) = \mathbf{b} x_i$ and is interpreted as the probability that a firm with characteristics x_i will undertake the action under investigation.

Henriques and Sadorsky (1996) investigate the corporate decision to voluntarily adopt an environmental plan.²³ Data on the dependent variable and most of their independent variables are drawn from the authors' survey of 750 large Canadian corporations. Published financial data on the corporations surveyed are also used as explanatory variables.

Arora and Cason (1995 and 1996) and Khanna and Damon (1998) focus on firms' decisions to join the EPA's 33/50 program.^{24, 25} Arora and Cason (1995) use firm level data from 300 corporations, including financial data, advertising intensity, R&D intensity, firm size and past toxic releases as explanatory variables. In Arora and Cason (1996) the data set is expanded to more than six thousand firms by using industry level data, rather than firm specific data, for some explanatory variables (e.g., industry means of advertising intensity and R&D expenditures are used). Khanna and Damon (1998) draw their data exclusively from corporations categorised

²³ The authors leave the exact definition of an "environmental plan" purposely vague. Thus their dependent variable takes on a value of one whenever the surveyed firm responded positively that it had a formal document describing the plan; had presented the plan to shareholders; had presented a plan to employees; had an environmental, health and safety unit; or had a board or management committee dealing with environmental issues.

²⁴ See section 1.2 for a detailed overview of the 33/50 program.

²⁵ Khanna and Damon (1998) also examine the determinants of observed toxic emissions reductions. We review the analytical techniques they use in this examination below.

under the SIC classification “Chemical and Allied Products.” In addition to using many of the same firm and industry characteristics as Arora and Cason (1995 and 1996), they include membership in industry associations (in this case the Chemical Manufacturers Association) and a measure of “regulatory pressure” as explanatory variables.²⁶

Karamanos (1998) examines firms’ decisions to join voluntarily the US Climate Challenge program. This program is a voluntary initiative by US electric utilities and the US Department of Energy to reduce emissions of greenhouse gases. Karamanos undertakes a probit analysis using data from all major investor-owned utilities in the U.S.(158 firms). His explanatory variables include firm financial variables, firm size, and past environmental performance, and the environmental performance of the state in which the firm operates.

The studies of Maxwell, Lyon and Hackett (1998), Khanna and Damon (1998), Konar and Cohen (1997a 1997b), and Khanna, Quimio, and Bojilova (1998), and move beyond discrete “participation” decisions by firms to examine the factors motivating firm decisions to voluntarily reduce their emissions of pollutants. Each paper focuses on reductions in toxic chemical emissions using data from the EPA’s Toxic Releases Inventory (TRI) . The estimation procedures undertaken in each of these papers are variants of ordinary least squares or basic panel data estimation procedures. Konar and Cohen (1997a) is an exception, and their methodology is discussed below.

Maxwell, Lyon and Hackett probe the general hypothesis that firms are motivated to reduce their toxic emissions in order to avoid (or forestall) future regulation.²⁷ The data they use as explanatory variables include various measures of political pressure collected at the state level, including variables that are likely to reduce the costs of citizen participation in the political process, *e.g.* the percentage of individuals that are members of environmental groups, the median income level in the state, and the percentage of individuals holding a university degree. Since all pressure variables are collected at the state level, toxic emissions data is aggregated to the state level as well. The authors use political pressure variables, as well as control variables (such as value of industry shipments), to examine both the level of toxic emissions and percentage reductions in toxic emissions, using fixed effects regression analyses and linear regression analyses respectively. The authors examine the emissions of 17 key toxic chemicals—those targeted in the EPA’s 33/50 Program---by firms in seven highly-polluting industries (*i.e.*, the top 7 industries emitting the 33/50 chemicals).

Khanna and Damon—in addition to their aforementioned analysis of chemical manufacturers’ decisions to join the 33/50 program---use standard linear regression techniques to examine

²⁶ Their regulatory pressure variable is the ratio of (a) the firm’s aggregate volume releases of 189 toxic chemicals that will be subject to maximum available control technology standards (by the year 2000) to (b) the firm’s total of all TRI chemical releases. Firms with a higher ratio are expected to feel more pressure to reduce toxic emissions.

²⁷ See section 3.3 above for a description of the theoretical model used by Maxwell, Lyon and Hackett.

whether 33/50 membership made a difference in the level of chemical reductions undertaken by firms over the period 1991-1993. To test this hypothesis, the authors include as a right-hand side explanatory variable the predicted probability of participation in the 33/50 program from their first-stage estimation (discussed above). Since the authors also include as right-hand side regressors the variables used to predict participation, the paper allows insight into how firm characteristic variables (other than program participation) affect the likelihood that a firm will reduce its toxic emissions.

Konar and Cohen (1997a and 1997b) and Khanna, Quimio, and Bojilova (1998) examine firms' responses to the public provision of information regarding their TRI emissions. Konar and Cohen (1997a) and Khanna Quimio, Bojilova (1998) specifically examine firms' responses to investor pressure in the form of negative abnormal returns experienced the day following the information release.²⁸ Konar and Cohen (1997b) focus on the financial ability of firms to respond to investor or consumer pressure following the initial release of TRI information. Konar and Cohen (1997a) use a sample of 130 publicly traded companies from various industries, Konar and Cohen (1997b) use a sample of 520 publicly trading firms operating in industries 20-39 of the Standard Industry Classification (SIC) system, and Khanna, Quimio, Bojilova (1998) draw their data from 91 firms in the chemical industry.

Konar and Cohen (1997a) compare the relative environmental performance of two groups of firms, subsequent to the initial release of TRI information. The first group is made up of the 40 firms experiencing the largest negative abnormal returns following the information release ("Top 40"), while the second group is a portfolio of the remaining firms balanced such that the weight assigned to each firm in a particular industry group is equal to the percentage of firms in that group belonging to the Top 40. Khanna, Quimio and Bojilova examine firms' reactions to information releases over the three year period 1989 to 1991 (as measured by abnormal returns for each of the three years) using on-site releases and off-site transfers of toxics over the period 1991-93.²⁹ The authors use data on sales, along with research and development, as control variables. Konar and Cohen (1997b) use standard linear regression procedures to examine how both the level and percentage reductions of TRI emissions are affected by firm-level explanatory variables, including various financial characteristics, advertising expenditures, industry concentration, and various environmental characteristics such as TRI emissions and the number of superfund sites the firm owns. The authors also include a dummy variable indicating whether the firm was a member of Konar and Cohen's (1997a) Top 40.

Hart and Ahuja (1996) and Konar and Cohen (1998) use standard linear regression techniques to examine whether good (or bad) environmental performance (measured by reductions in TRI

²⁸ Khanna, Quimio, and Bojilova (1998) examine the impact of both positive and negative abnormal returns and successive TRI information release dates in order to examine the impact of repeated information revelation. Responses to the positive abnormal returns were found to be insignificant. We shall discuss firm responses to the negative returns below.

²⁹ The authors argue for the existence of a two-year lag in reaction time.

emissions) contributes positively (or negatively) to subsequent firm financial performance. Hart and Ahuja examine whether various measures of financial returns (i.e., return on sales, assets and investment) of member firms of the S&P 500 are positively affected by firm reductions in TRI releases. Konar and Cohen (1998) use Tobin's q as a measure of firm value, and examine whether TRI releases and the number of pending environmental law suits diminish firm value. Each paper draws on the existing industrial organization literature on returns as justification for the inclusion of several common control variables (e.g., industry concentration measures, advertising and R&D to sales ratios).³⁰

In the following subsection we summarize the main findings of each of these investigations.

4.2 Empirical findings

The extent to which firms undertake voluntary efforts in the environmental area is determined by their willingness *and* ability to do so. The *willingness* to undertake corporate voluntary action is affected by many factors, both inside and outside the corporation. The action's direct profitability (e.g. adoption of a greener, and less costly, production process) is certainly a consideration. However, it is likely the indirect effects associated with the action will ultimately determine whether it is profitable. In other words, a costly action may be profitable if it preempts tighter (more costly) regulation, if it aids in lobbying for weaker regulations, or if it attracts favourable publicity leading to increased sales. The ultimate impact of these indirect effects is determined by the actions of various internal and external agents, management and employees, government regulators and legislators, environmental groups, industry peers, and concerned citizens. The *ability* to undertake corporate voluntary actions is likely to be constrained by a firm's financial health and its technological know-how.

In the remainder of this section we categorize the major findings of the extant literature, organized according to various factors that may affect the firm's willingness and ability to undertake corporate voluntary actions.

Firm Size and R&D Expenditures

Many of the empirical studies of corporate voluntary actions include, as explanatory variables, measures of firm size and research and development (R&D) expenditures. Sales, the number of employees, and the value of assets are used in different studies to proxy for firm size. Regardless of the measure of size used, the overwhelming conclusion is

Finding 1. Larger firms are more likely to undertake voluntary corporate actions.

Arora and Cason (1995 and 1996), and Khanna and Damon (1998) find statistically significant

³⁰See Schmalensee (1989) for a useful overview of the empirical industrial organization literature on firm financial returns

support for their hypotheses that larger firms were more likely to join the EPA's 33/50 program. Karamanos (1998) finds that larger investor owned utilities were more likely to join the EPA's Climate Challenge program than their smaller counterparts. Konar and Cohen (1997b) found that larger firms were more likely to reduce, in percentage terms, their emissions of TRI chemicals over the period 1989 to 1992.

Explanations for Finding 1 exist in both the formal literature and the popular press. Because of their higher public profiles, larger firms may feel more pressure to act from environmental groups, politicians, regulators and concerned citizens. It is often asserted that the fixed costs associated with environmental compliance are large enough to generate economies of scale that make it relatively cheaper for large firms to comply with regulations. It is reasonable to assume that the same is true for over-compliance. Finally, larger firms may have better access to capital markets and/or may engage in more R&D. Each of these factors implies that larger firms may find voluntary actions less costly, and we review them in more detail below.

Several studies control directly for the impact of R&D expenditure on the likelihood, and extent, of corporate voluntary actions. In total, these studies lend weak support for

Finding 2. Firms with higher R&D intensities are more likely to undertake voluntary environmental initiatives.

Khanna, Quimio, and Bojilova (1998) find weak support for the proposition that greater R&D intensities lead to a reduction in TRI chemical on-site releases and off-site transfers. Arora and Cason (1996) find that firms from industries with greater mean R&D spending intensities were more likely to join the 33/50 program. Khanna and Damon, however, found that within the chemical industry R&D intensity was not a statistically significant factor motivating firms to join the 33/50 program.

Environmental Performance History

How does past environmental performance affect future corporate voluntary actions? On the one hand, poor performance in the past may signal unwillingness or inability to perform well in the future. On the other hand, if environmental performance is measured in percentage-reduction terms (as is often the case) poor past performance may imply lower costs of "performing well" today. In this case, a poor environmental record may actually encourage firms to undertake new voluntary actions, including joining voluntary programs. Finally, firms found to be poor performers are likely to attract the attention of the media and of pressure groups, pushing them towards voluntary action. A careful reading of the empirical literature indicates support for

Finding 3. Firms with poor environmental records are more likely to participate in voluntary programs.

Both studies by Arora and Cason, and the study by Khanna and Damon find that firms with a

history of high toxic emissions were more likely to participate in the EPA's 33/50 program. As we have discussed above there are many possible economically rational interpretations for Finding 3. Finding 4, however, presents an interesting economic puzzle.

Finding 4. In deciding to join voluntary programs, firms do not free-ride on their own past clean-up efforts.

Due to the fact that firm facilities vary in size and type of production, many voluntary programs measure corporate environmental performance as percentage reductions in pollutants from a given base year. The 33/50 program used 1988 as its base year, but firms were not invited to participate until 1991. Thus, firms knew at the time of their participation decision how successful they had been to date in reducing their emissions. A natural assumption, then, would be that a firm that had already been successful at reducing its emissions would be more likely to join the program (to enjoy the free publicity). However, both Arora and Cason (1996) and Khanna and Damon find that firms with larger percentage emission reductions, prior to making their participation decisions, were not more likely to participate.

One possible, but as yet untested, explanation for the result may have to do with the fact that, due to the public nature of the TRI, firms' progress in emissions reduction could be tracked by the public on an annual basis. Firms which undertook substantial emission reductions early may have feared bad publicity if they failed to maintain their outstanding performance, and may have felt that joining the program would only heighten the probability of bad publicity.

External Pressures

Firms will enter voluntary environmental agreements and/or engage in acts of corporate environmentalism when the benefits of the act exceed its associated costs. As mentioned earlier, these benefits and costs arise from the actions of players both internal and external to the firm.³¹ For example, the existence of a large pool of green consumers may raise the benefits of corporate environmental actions through increased sales. At the same time, a large pool of environmentally concerned citizens may raise the costs of *not* engaging in corporate environmental action, because they may threaten costly future regulations. Regarding external pressure, extant empirical evidence suggests

Finding 5. The likelihood, and extent, of corporate voluntary actions are increasing in the perceived level of future government regulation, and the strength of community, environmental, and industry group pressure.

Firms may face pressure to undertake positive environmental initiatives from citizens, who need not be direct consumers. This pressure would normally arise in the form of group pressure either translated through the political process or by direct lobbying of the firm (perhaps with an implicit

³¹ The existing literature focuses exclusively on external players.

threat to follow the legislative path, should the company fail to respond). Maxwell, Lyon and Hackett provide evidence that factors facilitating pressure group formation and lower lobbying costs prompt firms to undertake greater reductions in their toxic chemical releases. Using state-level data, they find that median income, the percentage of population holding college degrees, and the percentage of population with membership in an environmental group, all contribute positively to reductions in toxic chemical emissions. These findings are consistent with the hypothesis that wealthy, well-educated citizens provide a credible threat to use the regulatory process if corporations do not clean up voluntarily; they also underscore the importance of environmental groups as agents for environmental change.

Of course, the most common way citizens express their public policy concerns is by voting in local, state and federal elections. The preferences of electors will eventually be reflected through legislation and regulatory enforcement. As we have discussed, firms may undertake voluntary actions in order to preempt threatened regulations, or to shape regulations they view as unavoidable. Karamanos finds that private electric utilities located in US states that exhibit relatively poor environmental performance were more likely to join the EPA's Climate Challenge program. In their analysis of the US chemical industry's participation in the 33/50 program, Khanna and Damon find that large emitters of certain toxic chemicals slated for future regulation were more likely to join the 33/50 program. Each of these results is in accord with a key finding of Henriques and Sadorsky: the motivation firms cite most for their decision to voluntarily adopt an environmental plan was to deal with existing and future regulations.

Finally, Khanna and Damon find evidence that members of the Chemical Manufacturers Association were more likely to join the 33/50 program than their non-member counterparts, even though association members were larger emitters. This suggests that industry groups may be another source of pressure on member firms to undertake corporate voluntary actions. Association members may pressure each other because coordinated action may be needed to forestall threatened regulations, or it may aid in shaping the form of future regulations and enforcement procedures. Alternatively, poor performance by one association member may be seen to reflect poorly on all members.

As we have discussed previously, green consumerism is a frequently cited motivation for corporate environmental actions. However, the extant empirical literature yields no consensus regarding the impact of green consumerism. Arora and Cason (1996) and Khanna and Damon find some evidence of green consumer pressure. Specifically, Arora and Cason (1996) find that firms operating in *industries* with higher advertising to sales ratios were more likely to join the 33/50 program, while Khanna and Damon find, within the chemical industry, that final-good producers were more likely to join the 33/50 program than were their intermediate-good producing counterparts. Konar and Cohen (1997b), however, could not find support for the hypothesis that heavier advertisers undertook greater emission reductions, after controlling for firm size. Furthermore, Arora and Cason (1995) fail to find support for the hypothesis that *firms* with greater advertising to sales ratios were more likely to join the 33/50 program. Finally, when examining actual releases, Khanna and Damon find no support for the hypothesis that producers

of final goods in the chemical industry exhibited significantly greater reductions in their emissions of TRI chemicals than firms not engaged in final-good production.

Investor Pressure and Financial Characteristics

A major source of external pressure on the firm not discussed in Finding 5 is investor pressure. In an environmental context we can place investors into one of two categories. The first type, “green” investors, may pressure the firm to sacrifice financial returns in order to enhance its environmental performance. The second type, “traditional” investors, would tend to shun such activity. They would instead pressure the firm to invest in acts of corporate environmentalism only when those acts yield positive financial returns, or help to minimize unavoidable negative returns. Green investors still represent a very small proportion of total investors. It is fruitful, therefore, to look for the effects traditional investors may have on corporate environmental actions.

Is it reasonable to assume that the traditional investor views corporate environmental actions favourably? Several papers study this issue by first examining investor responses to the release of TRI information to the public, and then asking whether firms respond to the signals investors sent them. To gauge investor responses, one could ask whether large emitters of TRI chemicals suffer in the stock market when information of their emissions is released to the public. There is ample evidence that the largest emitters of toxic chemicals did *not* suffer most from the TRI information release. Both Konar and Cohen (1997a) and Khanna, Quimio, and Bojilova (1998) find that firms suffering the greatest negative abnormal stock returns on the day after TRI information was released were not the largest emitters of toxic chemicals. However, as both papers point out, what should matter to investors is not the level of TRI emissions *per se*, but the difference between the *actual* and the *expected* levels of emissions. The work of Hamilton (1995), Konar and Cohen (1997a) and Khanna, Quimio, and Bojilova (1998) allows one to assert

Finding 6. Investors react negatively to information revelation regarding higher than expected levels of toxic emissions.

Both Hamilton (1995), and Konar and Cohen (1997a) find statistically significant evidence of negative abnormal returns for firms with large (but not the largest) emissions of toxic chemicals on the TRI information release day (or the following day). An obvious interpretation of these results is that the largest emitters were expected to be large emitters, so the TRI data provided investors no new information. Further support for this interpretation can be found by noting that in both papers the largest emitters were part of the chemical industry. Khanna, Quimio, and Bojilova (1998) focus on a sample of 91 firms, all of which are from the chemical industry. They found no evidence of abnormal returns on the first day TRI information was released to the public. They found, however, that in subsequent years, releases of TRI information did cause poorly performing firms (*i.e.*, those firms who’s relative performance in terms of TRI releases worsens over time) to experience negative abnormal returns.

Finding 6 supports the argument that the typical investor views pollution as an economic negative. This may occur for several reasons. Investors could link pollution with inefficient production, they could fear that highly-polluting firms will face more intensive regulatory monitoring, or they could fear that large emitters of toxic chemicals face a higher probability of future environmental litigation (even if the releases are legal today). Given these concerns, it is natural to ask whether firms rewarded for improving their environmental performance beyond what is currently required by law. Three papers support the view that

Finding 7. Firms are rewarded for superior environmental performance.

Hart and Ahuja (1996) and Khanna, Quimio, and Bojilova (1998) find evidence that voluntary environmental actions lead to negative short-run, but positive long-run, returns. Hart and Ahuja use various measures of financial returns (i.e., returns on assets, sales, and investment) to show that reductions in TRI emissions hurt returns in the year the reductions took place, but had a positive effect on returns in subsequent years. Khanna, Quimio, and Bojilova show that participation in the 33/50 program lowered chemical firms' current-period return on investment, but increased their market value.³² Konar and Cohen (1998) show that poor environmental performance (as measured by TRI releases and the number of pending environmental lawsuits filed against the firm) reduces a firm's intangible asset value.

Another natural question arising from Finding 6 is whether firms take action to counteract environmentally-driven stock price drops. Konar and Cohen (1997a) and Khanna, Quimio, and Bojilova address this question. Their analyses lead to

Finding 8. Firms respond to environmentally-induced investor pressure by improving their environmental performance.

Konar and Cohen (1997a) find that the 40 firms in their sample suffering the largest negative abnormal returns on the first day of TRI information release (the "Top 40"), subsequently improved their environmental performance (as measured by TRI releases and the amount of chemical spills) more than an industry-weighted counter part. Khanna, Quimio, and Bojilova (1998) find that the firms in their chemical-industry sample, which suffered large abnormal negative returns, subsequently reduced their *releases* of toxic chemicals in favour of off-site transfers.

4.3 Summary

The extant empirical literature suggests that large firms undertake voluntary corporate environmental actions for solid economic reasons. Corporations clearly respond to environmentally-driven investor pressures, though we still know little about the underlying drivers of investor concern. There is some evidence that firms respond to threats of future regulations,

³² The measure they use is "excess value" as defined by [market value - book value of assets]/sales.

but the influence of “green consumers” on large manufacturing firms appears to be weak. Thus, the empirical studies overall lend support to the proposition that self-regulation may be effective in yielding environmental improvements *within* the current regulatory system, rather than as a substitute for that system. Furthermore, the current literature provides little evidence that small firms undertake voluntary environmental improvements. The studies summarized here have focussed almost exclusively on larger firms, and there is evidence that the smaller of these firms are less likely to undertake voluntary corporate actions.

Finally, the paucity of empirical work in this area highlights the urgent need for more work in the area. Almost all the existing papers deal with the release of TRI chemicals in the U.S., and only two official programs, 33/50 and Climate Challenge, have been examined. As we stated at the outset, remedying this situation requires greater transparency in the measurement and reporting of the environmental performance of corporations. Indeed, the empirical literature strongly supports the notion that the public release of such information, even absent formal voluntary programs, often prompts firms to improve their environmental performance.

5. Conclusions

Empirical research shows that superior environmental performance and superior financial performance are intertwined. U.S. financial markets reward firms that go beyond legal mandates for the reduction of toxic emissions, and punish firms that have unexpectedly high levels of toxic releases. Furthermore, firms respond to these financial penalties by improving their environmental performance. Quite simply, voluntary environmental protection appears to make good business sense. What remains unclear, however, are the precise mechanisms that link environmental and financial performance.

While a number of writers argue that pollution reduction cuts costs and improves efficiency, there is no systematic evidence to show how widely this claim might hold true. Nor do the purchasing practices of “green consumers” seem to have much influence on firms’ emissions of toxic chemicals, though these consumers may turn out to have an impact on other environmental concerns. There is, however, modest evidence that the threat of future regulation is a significant factor prompting firms to self-regulate; the threat of future legal liability may well serve the same function. The evidence is even clearer that releasing public information about firms’ environmental performance spurs them on to greater environmental protection.

Policymakers look with interest on voluntary environmental improvement as a low-cost way to achieve environmental goals. The evidence to date, however, suggests that voluntary activity is a *complement* to regulation, not a substitute, as the threat of regulation is an important factor in motivating corporate voluntary actions. The threat of regulation also helps ensure that voluntary actions will enhance social welfare. Indeed, the theoretical literature generally supports a presumption that self-regulation which preempts government regulation is indeed socially beneficial. Still, there can be cases where self-regulation reduces social welfare. For example, problems can arise when legislation mandates the setting of new standards but defers the details of

implementation for an extended period. In this case, firms can weaken the forthcoming standards by voluntarily committing to new technologies offering modest environmental improvements. Once leading firms have adopted new practices, even welfare-maximizing regulators become more reluctant to impose new requirements that will endanger industry profitability. Another concern is that regulators may be delegated excessive powers in cases where they have incentives that diverge from maximizing social welfare. If regulators do not simply balance the political pressures from various interest groups, and instead show systematic bias toward a particular subset of interests, voluntary approaches to environmental protection may fail to serve the public interest.

Despite the foregoing cautions, we believe that voluntary environmental protection is an increasingly important aspect of the corporate landscape, and will produce substantial benefits for both business interests and the public. If nothing else, it provides a way to bypass some costly regulatory proceedings, thereby lowering the transaction costs of achieving society's environmental goals. Further research is important, however, to establish more clearly when self-regulation may be welfare-reducing, and to firm up our understanding of what motivates firms to engage in corporate environmentalism.

Appendix

Agreement of Producer Responsibility for Packaging: Sweden

This agreement (called the REPA scheme) concerns the collection, recycling and material recovery of waste from packaging. The agreement set different percentage targets for re-use or recycling for common packaging materials (e.g., 50% of aluminium and other beverage containers, 95% of standardised glass bottles for beer and soft drinks, 90% of glass bottle for wine and spirits filled in Sweden). These targets were established by the Swedish Ordinance on Producer Responsibility for Packaging, which required they be met by 1997. The agreement began in 1994, has 8,200 corporate signatories and was established through a voluntary industry initiative, recognized by the government. Signatories pay a fee to join REPA and use its recycling and recovery system, or they can set up their own collection and re-use system which will bring them in compliance with the ordinance. The REPA scheme is implemented through the establishment of 5 separate not-for-profit companies which are administered by a general company called Repareistret.

The REPA scheme is actually a voluntary agreement regarding the *implementation* of compliance with the existing Ordinance. Enforcement is essentially set by the Ordinance. The Ordinance requires companies to meet its targets, collect and provide data to the Swedish EPA. The Ordinance is enforced by the municipalities and the EPA.

The REPA scheme was established by representatives of the sectors affected by the Ordinance. The move by the industry to establish REPA was motivated by the legal need to comply with the Ordinance, and the need to control the whole system of collection, re-use and recycling. In

particular, the pre-REPA system of collection, re-use and recycling was administered by municipalities, and the firms involved in establishing REPA were concerned about the lack of control they would have over the cost of establishing a larger system that would be required to meet the targets.

The REPA was successful in registering companies which accounted for 85% (by weight) of all packaging used in Sweden. Progress towards targets was mixed: while some targets were exceeded (reusable glass bottles both for beer and spirits, and corrugated paper), progress towards many of the targets was negligible (including aluminum and plastics). In the latter cases, a well developed collection system was not in place prior to the Ordinance, and thus the time line may be viewed as ambitious.³³

It is difficult to tell whether the establishment of REPA aided in the attainment of the goals of the Ordinance. The companies involved feel that REPA was a more cost-effective means of meeting the goals of the Ordinance. However, some aspects of REPA are troubling. For example, aluminum and steel collection and recycling are done by a single company for one fee, thereby limiting competition between these two metals as sources of packaging.

This case study also highlights the importance of monitoring, enforcement and goal setting in the ultimate success of voluntary initiatives. In this case the Ordinance *guaranteed* regulatory action if goals were not met.³⁴

Declaration of the Implementation of Environmental Policy in the Chemical Industry: The Netherlands

This declaration---signed by the Association of the Dutch Chemical Industry, 103 individual companies, and various branches of Dutch local and national governments---provides an integrated approach to meeting targets set out in the Integrated Environmental Target Plan (ITEP) for the chemical industry. The ITEP was derived from the National Environmental Policy Plan (NEPP) and its successor (NEPP Plus) developed by the Federal government and published in 1989 (1990 respectively), which set out a strategy aimed at achieving sustainable development by the year 2010.

The NEPP and NEPP Plus contain over 200 *quantified* targets as part of an integrated environmental policy program. The two plans cover a wide range of industries and are aimed at sharing the burden across many sectors of society. The ITEP covers many aspects of the chemical industry and in particular defines targeted reductions (e.g. x% reduction from a base line, usually

³³ Personal communication with the Swedish EPA indicated that the agency was generally satisfied with industry performance, and future targets were being revised to reflect the current progress.

³⁴ The above account is taken from the European Environment agency's 1998 report on the effectiveness of voluntary environmental agreements, European Environment Agency (1998).

of 1985) by 1995 with further percentage reductions by 2010, although the 2010 targets are not firm and are currently under review.

The declaration was signed by most major Dutch chemical companies. Some foreign chemical companies operating in the Netherlands (notably US companies) did not sign the declaration, but appear to be altering their operations so as to meet the targets set out in the declaration. Some domestic SMEs also did not sign the declaration, but it is estimated that the declaration covers 97% of total emissions from the Dutch chemical industry.

Each signatory of the declaration is required to submit a Company Environmental Plan—which must be made available to the public—documenting how the company is progressing towards its targets.³⁵ Also, it is stipulated that signatories must apply best available control technologies. Once the CEP is accepted, it serves as the basis for the company's operating license and in this sense serves as a substitute for the traditional operating license which non-signatories are still required to obtain. The CEP allows the possibility of greater flexibility in operations as long as targets are met. While corporate progress towards targets is set forth in the environmental plan, and self-monitoring is therefore used, the companies are still subject to inspection by regulators who verify the information reported in the CEP.

As of 1997, two years of quantitative data were available. The European Environment Agency (EEA) claims that tangible progress towards stated goals has been made, and it speculates that this progress goes beyond what would have been achieved in the business as usual scenario.³⁶ Generally speaking, the voluntary agreement is seen as a success, granting companies increased flexibility in their investment planning and consequently inducing costs savings, while at the same time producing tangible progress towards the stipulated environmental goals. Once again, it is clear that target setting, monitoring and reporting are critical to program success.³⁷

Declaration by German Industry and Trade Associations on Global Warming: Germany

The declaration by German Industry and Trade Associations signed in 1995 and extended in 1996 pledged a 20% reduction in CO₂ emissions or specific energy consumption by 2005 (from a 1990 base year) for aggregated industry sectors, with separate targets for each association. Nineteen trade associations signed the 1996 agreement, along with the Ministries of Economics and the Environment, and RWI (Rhine-Westphalian Economics Research Institute) in an independent monitoring role. No individual companies were signatories to the agreement.

³⁵The CEP must be drawn up every 4 years, and must have an 8 year horizon.

³⁶This speculation arises from comparing trends in chemical reductions before the declaration was implemented (1985, 1986, 1989, and 1992) with the two years of available data since the declaration was signed. Given the paucity of data, it is unclear how much environmental improvement can be attributed directly to the declaration.

³⁷The above account is taken from the European Environment agency's 1998 report on the effectiveness of voluntary environmental agreements, European Environment Agency (1998).

The agreement had its origins in early discussions between the German government and industry associations representing the electricity, energy and power, and chemicals industries to develop an agreement to address the climate change problem. The associations represented the main energy suppliers who had the most to lose if the discussed carbon/energy tax was to be introduced. As discussions evolved and it became apparent that an agreement could be reached, other parties were brought in, notably the BDI, an association representing most of German industry. The BDI was eventually given overall control of the development and negotiation of the voluntary agreement.

The main motivations for industries to join the voluntary agreement were that signing the agreement would (1) pre-empt a pending heat and waste ordinance, (2) pre-empt the proposed carbon/energy tax, and (3) increase their influence over government policy decisions. Government was interested in entering into the agreement because it wanted an instrument to demonstrate its commitment to meeting national CO₂ targets, while at the same time not increasing regulations on industries already burdened by existing regulation, high energy costs and tax rates (including the unification tax).

In the original 1995 agreement there was no provision for monitoring and reporting. Following public criticism, however, the 1996 agreement did include some monitoring initiatives, including detailed reporting of CO₂ emissions from fossil fuels (to be verified by the RWI).³⁸ Other criticisms include: 1) the lack of clarity in the agreement about how intra-industry structural change (as opposed to actual energy savings initiatives) will contribute to meeting the targets; 2) the inability to determine how the industry energy saving initiatives differ from those that would be taken under a business-as-usual approach; 3) the absence of publicly negotiated targets; and 4) some provisions in the agreement may give associations added influence over government environmental policy.

While it is still too early to develop a full assessment of the voluntary agreement, Jochem and Eichenhammer (1997) conduct a critical examination of the agreement's targets and are sceptical whether the targets will induce any special efforts on the part of German industry to reduce CO₂ emissions. These authors argue that observed reductions in CO₂ emissions are instead a result of two major exogenous developments: the collapse of the East German Economy following reunification (which significantly reduced power consumption in the east), coupled with the fact that new capital is more energy efficient.³⁹

³⁸ The actual reports will be derived from calculations of fuel inputs to the power sector (as gathered by statistical offices) rather than having companies report individually.

³⁹ The above account is taken from the European Environment agency's 1998 report on the effectiveness of voluntary environmental agreements, European Environment Agency (1998).

EPA's Common Sense Initiative (CSI) and Project XL: United States

For years companies have complained that the rigid command-and-control orientation of environmental regulations discourages innovations that might produce better environmental performance at lower cost. Furthermore, the piecemeal development of regulatory policy fosters a lack of coordination across various programs that affect particular industries. The Common Sense Initiative (CSI) and Project XL, proposed by the Bush and Clinton administrations, respectively, aim to support companies in achieving superior environmental performance by granting regulatory “flexibility.”

The CSI was motivated out of a desire to coordinate pollution reduction activities across different “media” (land, water and air), and is oriented at the industry level. The pilot phase of the program involved six industries: auto manufacturing, computers and electronics, iron and steel, metal finishing and plating, petroleum refining, and printing. A working group was assembled for each industry, with each group meeting for two-day periods roughly four times per year, usually in Washington, DC. It was hoped that the groups would identify opportunities for regulatory reform and streamlining. Unfortunately, after 16 months of meetings, no regulatory changes have emerged. “By all accounts, CSI has not yet fulfilled its promise to achieve regulatory reform and integration primarily because EPA lacks the statutory authority” to conduct programs on a multi-media basis. (Davies and Mazurek, p. 25.)

Project XL, in contrast to the CSI, is oriented toward individual industrial facilities and their surrounding communities. To provide regulatory flexibility, the EPA agreed to a policy of “discretionary enforcement,” under which the agency would not pursue statutory violations at participating plants in recognition of their ongoing plans to implement improvements. One significant problem has been that EPA has not been granted legal authority to waive enforcement of any regulations, leaving participating firms vulnerable to third-party enforcement actions. As a result, only three proposals had been granted approval as of January 1998, three years after the program's inception. The first and perhaps most interesting of the permits applies to Intel's “Fab 12” plant near Phoenix, Arizona, the company's newest Pentium fabrication facility. The XL permit allows Intel to make routine changes in production processes without specific authorization from the EPA, as long as the total emissions of conventional and hazardous pollutants do not exceed plant-wide caps. Importantly, the caps are more stringent than required by federal law. The company places great value on XL's regulatory flexibility, for even modest delays can be extremely costly in the rapidly-evolving computer industry. While it is too early to assess the effectiveness of the program, its more focused approach may enable it to produce better results than CSI.⁴⁰

McDonalds Waste Reduction Action Plan: United States

⁴⁰ The above accounts are taken from Davies and Mazurek (1996), and from Boyd, Krupnick, and Mazurek (1998).

In the late 1980's the McDonalds corporation came under fire for the amount of post-consumer waste its product packaging created each day. In order to keep its pre-made products warm, McDonalds used a Styrofoam packaging system referred to as a "clamshell." This packaging system came under particular attack from environmental critics when information about the damaging effects of CFC on the ozone layer were discovered (CFCs were used in the production of the clamshell packaging system). In 1990, McDonalds U.S.A. formed a task force with the Environmental Defense Fund (EDF) to:

- S Establish ways to reduce, reuse and recycle materials used and wastes generated by the McDonalds system;
- S Provide recommendations consistent with McDonalds' business practices and future growth; and
- S Create a model approach to waste reduction for other companies to emulate.

In 1991 McDonalds announced a Comprehensive Waste Reduction Action Plan (CWRAP) aimed at reducing the amount of solid waste the company generated. At the same time the company announced its decision to abandon the clamshell system. The system was replaced by light cardboard box packaging and wax paper packaging.

Updated annually the CWRAP now contains "over 100 initiatives, pilot projects and tests to reduce solid waste in all aspects of its business". McDonalds is heavily involved in recycling and reuse of both its packaging and shipping products, and also uses recycled construction and remodeling materials.

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