

Environmental Governance: An Economic Perspective

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1. Introduction

From an economic perspective, it is natural to think of the “demand” for and “supply” of environmental governance. The demand for governance comes from individuals concerned about the quality of the environment. They may express this demand in their roles as citizens, consumers, investors, or members of non-governmental organizations (NGOs). The supply of governance is generally thought of as coming from government in the form of legislation and regulation, outcomes of the political process. However, as pointed out in Chapter 1, it may also come from direct negotiations between non-governmental organizations (NGOs) and corporations, a process sometimes referred to as “private politics.” In addition, environmental governance may come about through the workings of the marketplace, as consumers demand environmentally-friendly products or investors show a preference for environmentally-friendly companies. Some of the most intriguing forms of modern environmental governance result from the interplay of all three of these processes, as will be illustrated throughout the course of this volume.

The conventional wisdom of neoclassical economics had little to say about environmental governance. “Externalities” arose when market transactions affected third parties, and led to “market failure.” It was the job of government to “internalize the externalities” through the imposition of Pigouvian taxes set equal to marginal external cost. Although this was a reasonable prescription for a Platonic philosopher king, it completely obscured the processes by which governance might be achieved in the absence of such a convenient being.

As in many fields of economics, the seeds of a new perspective on environmental governance were sown by Ronald Coase. His 1960 paper, “The Problem of Social Cost,” argued that externalities could be internalized through direct negotiation in a world without transaction costs. Since neoclassical economics implicitly assumed transaction costs were zero, its prescription of Pigouvian taxation was internally inconsistent. The way forward lay in a new form of economic analysis that explicitly recognized the presence of positive transaction costs.

The “New Institutional Economics” (NIE) that has arisen in the wake of Coase’s insights has gone a long way toward developing a new research approach to industrial organization and public utility regulation (Williamson 1985), public choice (Mueller 1989), and economic history (North 1990). However, for the most part the NIE has not focused on environmental governance. Exceptions to this rule include Elinor Ostrom’s work on common pool resources (Ostrom 1990) and Oran Young’s work on international environmental governance (Young 2002).

This is a propitious time for building a unified theory of environmental governance. Although the NIE has been surprisingly slow to expand into environmental governance, it and several other strands of economic research provide valuable tools that can be applied to the task. This chapter attempts to provide an overview of economic research that is relevant to environmental governance, and to point the way towards a more unified theory. The remainder of the chapter is organized as follows. The next section gives a brief overview of “the economic approach” to research, designed for scholars from other disciplines, such as political science and sociology. Section 3 surveys the relevant portions of mainstream environmental economics, focusing on the literatures on instrument choice and monitoring and enforcement. Section 4 turns to the rapidly growing field of political economy, and section 5 reviews the relatively recent literature on “voluntary approaches” to environmental protection. Section 6 briefly discusses the work of Ostrom and her colleagues on small-scale common-pool resources, and the work of Young and his colleagues on international regimes. Section 7 summarizes and suggests some directions for future research.

2. The Economic Approach to Environmental Governance

Economics is often thought of as “the study of the allocation of scarce resources,” but this gives hardly more insight than the smug insiders’ definition that “economics is what economists do.” Gary Becker has provided a more helpful perspective, defining economics by its approach to understanding social phenomena, rather than its content. According to Becker (1978, p. 5), “The combined assumptions of maximizing behavior, market equilibrium, and stable preferences, used relentlessly and unflinchingly, form the heart of the economic approach as I see it.”

Applying “methodological individualism,” economists typically begin their analyses with individual entities (either individual people or individual organizations such as firms), which are assumed to have objectives they set out to achieve.¹ The traditional assumption that individuals maximize their utility is so broad as to be adaptable to almost any situation. It does not require that people are purely selfish, nor that they are perfectly informed, have infinite cognitive capacities, or never make mistakes. It is an approach, rather than a falsifiable hypothesis. It parallels the assumption that corporations act to maximize shareholder value, a hypothesis that is testable, and for which there is substantial evidence.

In the political domain, identifying objectives is more challenging. It is common for political economists to model politicians as maximizing the probability of re-election. In the literature on public utility regulation, regulators are often modeled as maximizing a weighted average of consumer surplus and producer surplus. Which of the two they favor may depend upon whether they seek a job in the regulated industry after leaving the regulatory commission, or instead seek to run for public office. In environmental economics, less attention has been paid to the objectives of regulators. Environmental regulators are often modeled as maximizing environmental quality with no concern for the prices consumers pay for products or for the value of firms. This is an assumption that makes sense only in a political setting where the regulator has been delegated a strict environmental mandate and is well insulated from any other political pressures.

¹ There is a large and fascinating literature on the theory of the firm, which probes the inner structure of corporations, but it is beyond the scope of this chapter. For an introduction, see Holmstrom and Tirole (1989).

The objectives of NGOs are poorly understood, compared to those of individuals, firms, or politicians. It does not seem unreasonable to model NGOs as desiring to maximize environmental quality, subject to the need to raise funds and maintain membership. Their attempts to obtain the required resources, however, may lead them to adopt strategies that conflict with environmental protection. Indeed, there is a growing chorus of criticism of large environmental NGOs, who are accused of devoting themselves to currying favor with the wealthy and powerful, rather than focusing on their own missions.² This is an area where further research is clearly needed.

Some imagination is needed to generalize the notion of market equilibrium---as Becker has done---to such areas of human behavior as the family, crime, and politics. However, John Nash's (1954) concept of equilibrium in non-cooperative games is general enough to be applicable to virtually any social situation, properly formulated. Much research in political economics takes a game-theoretic approach in which each player maximizes her objective function, given what all the other players are doing---in other words, Nash equilibrium is used as the solution concept.

The assumption of stable preferences is not meant to apply to the specific set of goods and services on offer at any particular place and time. Instead, it refers to more "fundamental aspects of life, such as health, prestige, sensual pleasure, benevolence or envy." (Becker, 1978, p. 5) Its primary purpose is to prevent the scholar from explaining puzzling social phenomena by the expedient of positing a convenient change in preferences. As mentioned above, more research is needed to clarify the preferences of various actors in environmental governance, particularly NGOs and environmental regulators.

Taken together, the above building blocks have allowed economists to tackle a very broad range of phenomena using a single basic paradigm. Their strength is in their parsimony, clarity, and generality. They have provided economists with tools for building elegant mathematical theories with interesting, substantive and falsifiable implications. However, they can be difficult to apply to certain topics. For example, social movements are difficult for economists to analyze because they focus on social aggregates whose objectives are difficult to specify. Even in this area, however, economists have made progress by applying their standard tools with the assumption that individuals possess imperfect information, and that mass protests, for example, may be a way of conveying that information to policymakers.³

Economists test their theories in a variety of ways. The most common is through the application of statistical methods to large datasets. Typically, the data are generated not through experiment, but through the processes of daily life. A host of clever techniques have been developed to cope with the limitations of this non-experimental data. A second approach to testing, which has grown enormously more popular in recent years, is the use of laboratory experiments. Pioneered by Vernon Smith and Charles Plott, experimental economics has yielded many insights into collective action, social norms, and the functioning of market mechanisms. A third approach to bringing theory into contact with reality is the use of case studies. These are not well suited to

² See, for example, the concerns raised by Bosso (2005) or Chapin (2004).

³ For a formal model of this theory, see Lohmann (1993).

the direct testing of formal hypotheses, but can be extremely helpful for inductive reasoning and the generation of new theories. If conducted with care, especially as part of a broad attempt to gather representative field data, case studies can also be useful for hypothesis testing, as Ostrom (1990) has shown.

3. Environmental Economics

Mainstream environmental economics is a Hobbesian project, built upon the foundation of a Leviathan that uses its monopoly on coercion to strictly enforce environmental regulations.⁴ This perspective is captured perfectly in Garrett Hardin's famous solution to the Tragedy of the Commons: "mutual coercion, mutually agreed upon."⁵ As mentioned in the Introduction, this neoclassical approach is simplistic and obscures many of the mechanisms of governance. Nevertheless, it provides an excellent starting point for the study of governance. In a sense, it presents an upper bound on society's ability to solve its environmental problems, similar to Becker's (1968) analysis of crime and punishment, in which the efficient solution is to impose the most severe punishment possible. Economists frequently employ similar reasoning when thinking about what could be accomplished by a "boiling in oil" contract, which imposes a punishment severe enough to deter most undesirable behavior, providing it can be imposed with certainty and with accurate knowledge of who committed which actions.⁶

In a sense, the entire field of environmental governance can be conceived as a study in what happens when the conditions for "perfect coercion" fail. Perhaps most important, there may not exist the political will to pass legislation creating the requisite coercive power. This is starkly evident in international relations, where there does not exist an overarching political body granted coercive power. Lacking the "stick," international governance must be conducted solely with "carrots," which vastly reduces what is possible in this domain.⁷ Similar forces are at work in domestic politics. As of this writing, the United States has adamantly refused to pass federal legislation that would impose mandatory limits on greenhouse gas emissions ("sticks"), preferring to offer a collection of voluntary approaches ("carrots") such as funding for research and development, the Department of Energy's voluntary greenhouse gas registry, and the "Climate Leaders" program offered by the Environmental Protection Agency.⁸

The conditions for perfect coercion can fail in other ways, too. First, in most democratic countries, the death penalty and the use of torture are prohibited.⁹ More relevant for environmental policy, penalties for violating environmental laws are often so small as to provide firms little incentive to comply. Second, information about environmental violations is often woefully inadequate. When emissions come from a small number of large polluters, it is possible to monitor them carefully. However, when emissions come from a multitude of small or "non-point sources," as is the case with perchloroethylene emissions from small dry-cleaners

⁴ See Hobbes (1660).

⁵ See Hardin (1968), p. 1247.

⁶ Clearly suicide bombers pose a challenge to this paradigm.

⁷ For a deeply insightful analysis of the optimal use of sticks and carrots in repeated games, see Abreu (1988).

⁸ See Lyon and Maxwell (2003) for a formal model of the role of public voluntary programs when the political will for mandatory programs is lacking.

⁹ The US is relatively unusual in its ongoing use of the death penalty, and the Bush Administration's policy toward enemy combatants is viewed in many other countries as a violation of accepted prohibitions on the use of torture.

or pesticide residues from agricultural runoff, it becomes extremely difficult to determine who is causing environmental degradation. Furthermore, information about the transmission of pollutants through the air or water is often imperfect, as is knowledge of the human health impacts of various contaminants. The net result is that environmental governance must often be conducted under severe informational limitations. Third, the transaction costs of imposing coercive solutions are often so high as to make such solutions impractical. In the U.S., the legal costs of implementing the death penalty through a sequence of court appeals may be greater than the costs of imprisoning a criminal for life. The costs of monitoring and enforcing toxic chemical regulations on small dry cleaners make such a strategy questionable.

In sum, coercive solutions to environmental problems are often constrained by lack of political will, weak penalties, imperfect information, or high transaction costs. When some or all of these conditions are present, other institutions for environmental governance must be developed.

Despite the foregoing caveats, mainstream environmental economics has much to say about environmental governance, especially regarding the most efficient form of regulatory intervention to use for specific environmental problems. The literatures on instrument choice, and monitoring and enforcement, are particularly relevant for building a unified theory of environmental governance. To a large extent, these literatures, like much of environmental economics, retain the traditional neoclassical perspective of the welfare-maximizing regulator. Nevertheless, they provide powerful insights into the problems that arise due to imperfect information, and, to a lesser extent, limitations on available penalties. These literatures will need to be broadened somewhat to play a more useful role in a positive theory of environmental governance, but their basic ideas are quite general and robust.

A. Instrument Choice

Instrument choice has to do with a government's choice between alternative policy "instruments" such as effluent fees, subsidies, standards, tradable permits, or mandatory information disclosure. Familiar textbook treatments show that in simple, static, deterministic settings of full information, where monitoring and enforcement are not a problem, any of a range of instruments can be used equally effectively to internalize an externality. However, when one relaxes these restrictive assumptions, the choice between alternative policy instruments becomes interesting and important. For example, environmental taxes provide stronger incentives for innovation than do standards, since standards offer no reward for going beyond compliance. Taxes also allow society's environmental goals to be met more cheaply than standards, since a tax induces more abatement from firms with the lowest costs of emissions reduction. Sterner (2003) provides an excellent introduction to the issues.

The seminal paper in this area is Weitzman's (1974) analysis of "prices vs. quantities" as alternative policies when the marginal benefits and/or marginal costs of abatement are not known with certainty. Loosely speaking, Weitzman showed that prices (e.g., effluent taxes) are preferred when marginal benefits are relatively flat, and quantities (e.g., an emission standard) are preferred when marginal costs are relatively flat. Intuitively, if marginal benefits are flat, then errors in setting an emissions tax will lead to small deviations from social efficiency, and if marginal costs are flat then an error in the quantity constraint will also have a small social cost.

Roberts and Spence (1976) showed that a “hybrid” that combines a quantity constraint with a “trigger price” that caps compliance costs performs even better than either policy alone.

An instrument of growing interest is the use of tradable emissions permits. Initially proposed by Dales (1968) and further analyzed by Montgomery (1972), such permits are attractive because they allow the use of a quantity instrument but also allow firms to trade abatement burdens until marginal abatement costs are equalized across emitters, thereby minimizing social costs. Tradable permits are also attractive from a political perspective, since politicians can dole out initial permit allocations to favored constituents, thereby increasing the political acceptability of the policy. Permit trading finally became serious business when the 1990 Clean Air Act Amendments created tradable permits for sulfur dioxide emissions. The success of the SO₂ trading program has led to the use of tradable permits in other contexts, such as nitrogen oxide trading in southern California and carbon trading in the European Union.

Instrument choice becomes increasingly interesting as one introduces additional constraints on the capabilities of the political process. For example, politicians may be unable to commit to future policies, and it may be impossible to prevent regulators from colluding with firms to distort the information that reaches the public. In fact, Boyer and Laffont (1999) show that in certain cases crude command-and-control regulations can perform better than sophisticated incentive regulations. They consider a situation where political majorities may fluctuate over time, leading to instability in policy. Restricting the available instruments reduces policy instability, and can be welfare increasing.

Solving some environmental problems, such as global warming, requires substantial research and development (R&D). It has long been recognized by economists that environmental standards provide poor incentives for innovation, since firms are not rewarded for going beyond the statutory requirement. Environmental taxes perform better in this regard, since firms have direct financial incentives to continuously reduce emissions. Nevertheless, designing policy instruments to induce desired levels of R&D is a challenging task. One reason is that R&D has some of the characteristics of a public good: knowledge can be shared without being used up, and it is hard to exclude rivals from learning one’s latest breakthroughs. As a result, markets will tend to underinvest in R&D, even when environmental taxes internalize externalities. In the area of climate change, Popp (2004) finds that combining R&D subsidies with a carbon tax is better than either policy alone, and that if one can only implement a single policy then a carbon tax is more beneficial than R&D subsidies alone.

When high transaction costs, weak political institutions or a lack of information on pollution damages makes it hard to implement traditional regulations, regulators increasingly turn to mandatory information disclosure programs. The best known of these is perhaps the Toxic Release Inventory (TRI), mandated by the U.S. Emergency Planning and Community Right-to-Know Act of 1986, which requires reporting on releases of hundreds of toxic chemicals. However, similar programs exist in various other countries, including Canada’s National Pollutant Release Inventory. The hope of such programs is that citizens will make use of the reported data to directly pressure toxic emitters to reduce their emissions, avoiding the need for more costly government regulations. Unfortunately, it is difficult to conduct empirical analyses of the impact of information disclosure programs, since there is typically no data on corporate

performance prior to the onset of reporting requirements. Nevertheless, there is some evidence that mandatory disclosure programs can drive environmental improvements. For example, Delmas et al. (2007) find that electric utilities reduced emissions after being forced to report information on their polluting behavior to consumers via monthly bill inserts. Blackman et al. (2004) find that the worst polluters in Indonesia reduced their emissions after the country implemented a program to rate firms' environmental performance. Similarly, Powers et al. (2008) find that the worst polluters in India's pulp and paper industry improved their performance after the Center for Science and the Environment, an environmental NGO, began rating them publicly.

Information disclosure is not always driven by government regulation. As discussed in detail in Chapter 7, NGOs may create certification programs encouraging firms to disclose their environmental performance, as in the Forest Stewardship Council (FSC) program for timber harvesting. In other cases, industry creates its own certification programs, such as the Sustainable Forestry Initiative (SFI), offered as an alternative to FSC certification. These non-governmental programs are especially important in forest products, since this industry engages in much international trade that cannot be controlled by any single nation. Fischer and Lyon (2008) develop an economic model of competing environmental labels, in a setting where consumers cannot determine the environmental quality of individual products on their own. They allow for an NGO to set an environmental standard, and create a certification program for firms wishing to meet its standard, and also allow for industry to do the same. Not surprisingly, they show that an NGO has incentives to create a more environmentally stringent label than does industry. Furthermore, when the two labels co-exist, industry has incentives to weaken its label below the level it would choose if it operated alone. Whether multiple labels help or hurt environmental quality is impossible to determine in general. In some cases, environmental damages can be worse when both labels co-exist than if there were only an NGO label, but in other cases the addition of an industry label can actually improve overall environmental quality.

Instrument choice in developing countries is an area that is just beginning to attract serious academic attention. Many developing countries have weak political institutions, which render traditional policy instruments ineffective. For example, Bell and Russell (2002) question whether markets for tradable emissions permits make much sense in developing countries, which may lack the political infrastructure to make permit systems viable. Blackman, Lyon and Sisto (2006) argue that voluntary programs may play a useful role in developing countries when regulatory capacity is weak.

B. Monitoring and Enforcement

Corporate compliance with environmental regulations provides an interesting vantage point on environmental governance. Regulatory authorities typically lack the resources to ensure that laws are enforced with full compliance. Indeed, environmental economists have long puzzled over business motivations for compliance with environmental regulations, since it is generally agreed that environmental audits are too infrequent and penalties for noncompliance too small to deter firms from defying environmental regulations. For example, Harrington (1988) pointed out that between 1978 and 1983, the average penalty assessed for water discharge permit violations

in the state of Connecticut was a mere \$363. Yet, compliance rates among regulated entities remain high (Cohen, 1999).¹⁰

Much effort has gone into explaining this apparent contradiction. For instance, Harrington (1988), Russell (1990b), Harford and Harrington (1991), and Harford (1991), have developed dynamic models that illustrate firms' incentives to comply today so as to avoid more aggressive regulatory enforcement (i.e., intensive inspection scrutiny and higher penalties for noncompliance) tomorrow. Indeed, the empirical record suggests that inspections, or at least the threat of inspections, do positively influence firm compliance.¹¹ Other studies have looked for non-regulatory costs to explain high compliance rates. Konar and Cohen (2001) investigated a sample of S&P 500 firms and found that a firm's asset value is reduced by about \$380 million (or 9% of the replacement value of a firm's tangible assets) as a result of poor environmental performance. This finding suggests that investors can serve as an environmental governance mechanism. Further research is needed in this area, however, since financial markets may simply be reflecting the punishments expected to be imposed upon poor environmental performers by other governance devices. Furthermore, in recent years there has been a regulatory shift toward higher fines and holding corporate officers and directors personally liable for environmental damages. Both of these trends may be driving better compliance, and merit detailed empirical investigation.

A good compliance record may pay dividends in a variety of ways. Decker (2003) has shown that a poor compliance record can significantly lengthen the time it takes for a firm to receive a permit to build or permit to discharge pollutants. Boyd, Krupnick, and Mazurek (1998) cite case study evidence that production delays can cost up to one million dollars a day in lost revenues. Such figures can easily swamp any expected regulatory penalties from noncompliance. Considerably more research is needed to deepen our understanding of what really motivates environmental compliance.

Inducing compliance becomes increasingly difficult as the number of firms covered grows. For "non-point sources" of pollution such as agricultural runoff or small sources of greenhouse gases or toxic chemicals, monitoring and enforcement may be prohibitively expensive. In these cases, good environmental governance may need to rely on community norms or so-called "voluntary" methods of environmental protection.

4. The Political Economy of Environmental Policy

As mentioned in the Introduction, economists have long cited market failures as justifications for government regulation, and for years they have offered market-oriented policy prescriptions to regulators. Seldom have economists' incentive-oriented proposals been implemented as proposed, however. Indeed, many critics have argued that environmental regulation in practice is often highly inefficient.¹² In response, economists have devoted more effort toward a positive

¹⁰ Magat and Viscusi (1990), for example, reported that the average level of compliance in the US pulp and paper industry between 1982 and 1985 was on the order of 75%. Harrington (1988) cited US Environmental Protection Agency (EPA) studies that put compliance rates for some sectors at 90% or higher.

¹¹ See, for instance, Laplante and Rilstone (1996), Gray and Deily (1996), Nadeau (1997), and Weil (1996).

¹² See, for example, Peltzman (1991).

understanding of the political economy of environmental protection. Using the economic approach to human behavior, they argue that politicians and bureaucrats have objectives they attempt to maximize, such as getting re-elected. The analysis then seeks to understand the nature of political competition and the resulting equilibrium outcomes.

In the 1960s, led by James Buchanan and Gordon Tullock, economists associated with the Virginia School of public choice developed a body of work that uses economic principles to study collective choice processes. As presented in Buchanan and Tullock (1962), they emphasized the application of competitive market models to understand the supply and demand for policy. Central to their analysis is the idea of “rent seeking” behavior, through which interest groups attempt to capture the economic rents created by the application of the state's monopoly on the legal use of force.

In the 1970s, economists associated with the University of Chicago developed an economic theory of regulation, complementary to that of the Virginia economists, which attempts to provide a general theory of regulatory behavior. In fact, its formulation of political decision-making is so general as to not really distinguish between legislative and regulatory behavior, thereby rendering it what might be called an economic theory of politics. In this literature, political action is driven by interest groups that form to advance their own agendas. The optimizing politician chooses a policy that balances, at the margin, the political support offered by all the different groups.

Political economy sheds new light on topics such as the choice of policy instruments. For example, Buchanan and Tullock (1976) present a positive analysis of the differences between pollution taxes and output restrictions. Output restrictions drive a wedge between price and marginal cost, and induce new firms to enter the industry and incumbents to surreptitiously expand output. Thus, direct regulation imposes a greater enforcement burden on the government. If government successfully enforces the rules, incumbent industry members will prefer the output restriction to a tax, since the latter forces the industry to pay for a resource (the environment) it would otherwise be able to use for free. Even though the rest of the community prefers a tax, since it generates tax revenues, the small, concentrated and intensely interested industry may carry the day politically. Indeed, it may even gain from the output restrictions imposed by the environmental regulation.¹³

The work of the Virginia and Chicago Schools revolutionized the way economists think about political processes, and opened up a vast new area of research. However, much of this work has tended to focus on the demand for policy by pressure groups and rent-seekers. It often glosses over the “details” of how policy is actually supplied through political institutions.

¹³ Maloney and McCormick (1982) extend the analysis of Buchanan and Tullock (1976), deriving sufficient conditions for environmental regulation to raise industry profits. They go on to present evidence that two recent regulatory initiatives actually raised industry profits. Similarly, Pashigian (1985) showed that the Clean Air Act’s “prevention of significant deterioration” (PSD) rules benefited northeastern urban areas and harmed southwestern rural areas.

More recently, political economists have begun to develop game theoretic models of political processes and institutions. These include voting models, analyses of campaign contributions, studies of the way interest groups recruit majorities for the passage of desired legislation, empirical analyses of the drivers of regulatory decisions, and sophisticated analyses of how legislators use administrative procedures to constrain the discretion of regulators. Of particular interest for environmental governance is the growing formal theoretical literature on special interest groups (SIGs) and their influence on policy. Grossman and Helpman (2001) provide an outstanding introduction to this body of research. They consider the role of SIGs in voting and elections, in transmitting information to policymakers, and in providing campaign contributions. Although much of the book studies situations with a single SIG, the authors also extend the analysis to the situation of multiple SIGs. This is important in environmental politics, where there are many well-established environmental groups vying for influence.

Somewhat surprisingly, there is little economic work that examines the organization of the spectrum of groups that form the backbone of the environmental movement, such as the Sierra Club, the National Audubon Society, the World Wildlife Federation, Environmental Defense, and Greenpeace. It would appear that many of the tools of industrial organization could be applied to provide new insights into how these groups compete and cooperate. Bosso (2005) provides a descriptive treatment of many of these issues from the perspective of a political scientist, though he does not develop formal models of their behavior, or test hypotheses using statistical techniques.

5. Voluntary Approaches to Environmental Protection

In recent years a new literature has emerged that attempts to explain why corporations engage in environmental protection that goes beyond what is required by law. This literature is positive in nature, and is motivated by the growing number of examples of voluntary initiatives by corporations, industries, and regulators. Large companies such as Dupont and Alcoa have made---and kept---voluntary pledges to reduce their greenhouse gas emissions. Companies like McDonald's and Federal Express have worked with environmental NGOs like Environmental Defense to reduce their packaging waste and the fuel consumption of their vehicle fleets. The chemical industry has created its "Responsible Care" program to encourage companies to reduce their emissions of toxic chemicals. The U.S. EPA has created numerous partnership programs inviting---but not requiring---industry to work with government to reduce environmental impacts. Similarly, as Harrison (2001) describes in detail, Environment Canada has actively promoted voluntary programs, such as the Accelerated Reduction and Elimination of Toxics (ARET) Challenge, which in 1994 invited industry to reduce emissions of 30 key toxic chemicals 90% by the year 2000, and to reduce emissions of another 87 toxics by 50% that same year.

This new emphasis on voluntarism makes little sense within the conventional neoclassical framework. Because pollution control is costly, firms are expected to avoid it whenever possible, and governments must impose penalties large enough to compel compliance. Even from the public choice perspective, voluntary programs are anomalous: while some firms or industries may prefer to become regulated to restrict competition, the strategy works by invoking the coercive power of the state to raise rivals' costs, not by voluntarily raising one's own costs.

The seemingly sudden shift to voluntarism initially seemed puzzling to economists, and begged for further research.

In the last decade, there has been a groundswell of academic interest in voluntary approaches to environmental protection. The topic provides an excellent point of departure for the study of environmental governance, since it encompasses all avenues of governance that go beyond traditional regulation. Chapter 6 provides a detailed assessment of the performance of these new approaches to environmental governance. There have been several previous surveys of this new literature, including those by Khanna (2001), Lyon and Maxwell (2002), and Alberini and Segerson (2002). In addition, Lyon and Maxwell (2004) provide a rigorous book-length treatment of this new field of study. They argue that these alternative approaches to governance cannot be understood in isolation from traditional regulation; indeed, many voluntary actions actually occur under threat of regulation, while others are taken precisely because the threat of regulation is weak. A complete theory of environmental governance must incorporate the economics of instrument choice, and monitoring and enforcement, as well as the political economy of environmental policy.

Most voluntary approaches fall into one of three categories: corporate self-regulation, public voluntary programs, and negotiated agreements. Corporate self-regulation involves firms (often as part of an industry trade association) initiating a public pledge to improve their environmental performance. Under public voluntary programs, participating firms agree to make good faith efforts to meet program goals established by the regulatory agency; in return, they may receive technical assistance and/or favorable publicity from the government. In a negotiated voluntary agreement, the regulator and a firm or industry group jointly set environmental goals and the means of achieving them; such agreements consequently tend to be heterogeneous in nature.

I discuss each of these forms of voluntary environmental activity below.

Self-Regulation

Several rationales have been offered for the recent surge of corporate environmental activity. Perhaps pollution is symptomatic of broader production inefficiencies, and pollution reduction and cost reduction go hand-in-hand to create “win/win” opportunities in today’s economy.¹⁴ Perhaps a new generation of “green” consumers is willing to pay higher prices for clean products, and firms are simply responding to that shift.¹⁵ Both explanations offer hope that markets are gradually supplanting regulation as the driver of environmental improvement. Alternatively, perhaps business has simply become savvier about the workings of the political system, taking pro-active steps to avert political conflict rather than reacting to public pressure after the fact. Each of those theories has some merit, but the evidence suggests the roles of cost-reduction and green marketing are modest.¹⁶ Instead, it is the opportunity to influence public or private politics that makes corporate environmentalism profitable.

¹⁴ For an exposition of this perspective, see Gordon (2005).

¹⁵ For a recent analysis of green electricity programs, see Kotchen and Moore (2006).

¹⁶ For example, Kotchen and Moore (2006) find that when electricity customers are offered the opportunity to pay a modest premium for electricity from green sources, only about 3% elect to do so.

Corporate non-market strategy, which focuses on strategy in the political arena, is a rich area of inquiry.¹⁷ A number of different corporate environmental strategies have been identified in the academic literature. I discuss three such strategies here: 1) Preempting tougher government regulations or NGO boycotts, 2) Influencing forthcoming regulations, in situations where full preemption is impossible, and 3) Reducing the extent of monitoring by regulatory agencies.

Maxwell, Lyon and Hackett (2000) present a model of preemptive self-regulation in which political action is costly for citizen/consumers to undertake.¹⁸ 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. As consumer costs of gaining political influence fall, the model predicts that corporate self-regulation will intensify. In other words, an increasing threat of government regulation induces firms to voluntarily reduce pollution. The authors find empirical support for the theory using data on toxic chemical emissions, and show that emissions reductions were greater in states with high initial levels of emissions and high environmental NGO membership. They also show that regulatory preemption is welfare-enhancing: it reduces political transaction costs, while leaving intact the protective threat that consumers will organize if the preemptive measures are deemed insufficient.

Often preemption requires coordinating the actions of numerous firms within an industry. Maxwell, Lyon and Hackett (2000) show theoretically that free-rider problems make preemption more difficult to achieve the larger is the number of firms in the industry, and they find empirical evidence in support of this prediction. King and Lenox (2000) study the chemical industry's "Responsible Care" program, created in the wake of the Bhopal chemical disaster, allegedly to preempt the emergence of new chemical regulations. They find substantial evidence of free-riding; in fact, Responsible Care did accelerate environmental improvement in the industry, but only among non-members! One theory consistent with this finding is that NGOs naively took Responsible Care membership as a signal of good behavior by a company, and focused their efforts on firms that did not join the program.

Baron and Diermeier (2007) examine preemptive self-regulation in the context of private politics, that is, direct interaction between an NGO and a company, that is not mediated through the legislative or regulatory process. They show that firms have incentives to self-regulate in order to preempt the threat of a consumer boycott initiated by an NGO, and illustrate the theory using the example of Rainforest Action Network's campaign against Home Depot, which convinced Home Depot and other retailers to reduce their procurement of hardwoods that are unsustainably harvested. A key difference between preemption of public and private politics is that in the former, activism is typically aimed at regulating an entire industry while in the latter it targets a specific company.

¹⁷ See Baron (2005) for a thorough introduction to the area of non-market strategy

¹⁸ 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. 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.

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 were to be subjected to Maximum Available Control Technology (MACT) standards by the year 2000. Because the details of the standards were not specified by Congress, firms had the chance to influence the standards that are actually set through their own actions. Similarly, Hoffman (2005) argues that many businesses are undertaking voluntary reductions of greenhouse gas emissions as a way to obtain a “seat at the table” from which they can influence future regulations. Lutz, Lyon and Maxwell (2000) study this type of setting using a model that includes both “green” consumers and a welfare-maximizing government regulator who sets environmental standards. They show that a firm can weaken future regulations (and reduce social welfare) by committing today to a level of environmental performance beyond today’s standards but below what the regulator would desire in the future.

A third way corporate environmentalism interacts with public policy is by reducing the stringency with which the firm is treated by regulators. Maxwell and Decker (2006) argue that a 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. If a firm makes an irreversible investment to lower its future costs of regulatory compliance, and 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 have been reduced.¹⁹

In sum, there are numerous channels through which corporate self-regulation can profitably influence the political behavior of citizens, regulators, and activists. Some of these are welfare-enhancing, and some are welfare-reducing. A robust theory of environmental governance must encompass this full range of channels.

Public Voluntary Programs

An increasingly popular instrument for solving environmental problems, especially in the United States, is the “public voluntary program (PVP),” in which government offers technical assistance and positive publicity to firms that reach certain environmental goals. The US EPA offers dozens of these programs, which it refers to on its website as “partnership programs.”²⁰ Among the better known of these programs are the 33/50 Program, Climate Leaders, and WasteWise.²¹ According to the US EPA, “Governments promote voluntary initiatives for a variety of reasons, including the pilot testing of new approaches and *the absence of legislative authority to establish mandatory programs.*”²² This new generation of regulatory programs has been celebrated by

¹⁹ Decker and Pope (2005) extend this theory of voluntary investment to explicitly include multiple firms. They show that firms can take observable pro-environmental actions that convince regulators to focus their monitoring and enforcement efforts *on other* firms.

²⁰ The EPA’s partnership programs are described in detail at <http://www.epa.gov/partners/>.

²¹ The 33/50 Program, which ended in 1995, encouraged firms to reduce their toxic chemical reductions by 33% in 1992 and 50% in 1995, relative to a 1988 baseline. See Khanna and Damon (1999) for details.

²² EPA (2001, p. 173), emphasis added.

some as a superior, low-cost instrument that can be used in preference to traditional, inefficient, regulation. Alternatively, however, one can see them as weak “carrots” used when political opposition makes the “stick” of environmental regulation infeasible.

Lyon and Maxwell (2003) develop an economic model of PVPs in which a regulator has the option to propose an environmental tax or create a public voluntary program. They show that the tax is inherently a more powerful instrument, and that the regulator is better off imposing a tax rather than a PVP unless political opposition to the tax is high. Their chief normative findings are surprising: PVPs can reduce welfare by increasing industry resistance to socially beneficial tax proposals and by reducing industry incentives to engage in welfare-enhancing self-regulation.

In a sense, self-regulation and PVPs represent opposite ends of a spectrum: the former is adopted by companies when the threat of regulation is strong, while the latter are adopted by regulators when the threat of regulation is weak. Perhaps not surprisingly, the empirical evidence on the effectiveness of PVPs is mixed. Khanna and Damon (1999) find that the EPA’s 33/50 program had a measurable effect in accelerating toxic emissions reductions, but Darnall and Carmin (2005) argue that the design of many PVPs is so lax as to make them ineffective.

Negotiated Agreements

Negotiated agreements are more common in Europe and Japan than in the U.S., perhaps because of the corporatist structure of many of these countries, which allows industry to negotiate as a unit with government. In addition, the parliamentary structure of the democracies of Europe and Japan ensures that the legislative and executive branches of government are of the same political party, potentially making legislative threats more credible.

Segerson and Miceli (1998) present a model of negotiated agreements. In their model, a new piece of environmental legislation mandating pollution reductions is forthcoming with some probability. 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 regulator can eliminate the background threat of legislation. Both the firm and the regulator face lower transaction costs under a voluntary agreement, so the unique equilibrium of the 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 significantly cheaper than mandatory compliance. Glachant (2003) extends this model to the case where the probability that proposed legislation will pass is determined by a rent-seeking competition between industry and a green lobbying group. Recognizing that passage of the bill becomes more difficult when the bill's requirements are tighter, the regulator strategically weakens the legislative proposal to increase the chance that it will pass.

Like self-regulation, negotiated agreements raise issues of industry coordination and free-riding. Negotiated agreements are typically negotiated by an industry trade association, which then implements the agreement by allocating the burden of abatement across its members. When all firms in the industry are identical, this allocation process is simple. When firms differ in their

size or their cost of abatement, however, allocation becomes a more delicate task. The efficient outcome would be for firms that can abate cheaply to do a larger share of overall abatement, perhaps with some form of side payments from other industry members. If side payments are impossible, though, it will be more difficult to convince efficient firms to shoulder what may seem to them an unfair share of the overall burden, and free-riding may become a serious problem.

Voluntary Approaches: A Summary

The literature on voluntary approaches to environmental protection has generated a number of new insights for the study of environmental governance. First, it demonstrates that a theory of environmental governance is inherently political: even in the absence of environmental regulation, corporate environmental behavior is strongly influenced by political forces, perhaps most importantly by the perceived threat of regulation. Second, it shows that government as well as industry can benefit from devising alternatives to traditional regulation, although the value of voluntary programs to government depends upon the background threat of regulation. Voluntary agreements reached under a strong threat of regulation may reduce the transaction costs of governance, and hence be more efficient than regulation. However, voluntary programs also may be instituted because the threat of regulation is weak, in which case voluntary programs are likely to be relatively ineffective. In this regard, the work of Harrison and Antweiler (2003) offers a cautionary tale: they find that most of the toxic emissions reductions reported through Canada's National Pollutant Discharge inventory were due to conventional regulation of a small number of very dirty facilities, and that voluntary reductions have played a minor role. Third, the literature shows that corporate environmental strategy can influence public policy through a variety of channels, some welfare-enhancing and some welfare-reducing; all of these alternative forms of influence need to be understood in order to develop a satisfactory theory of environmental governance.

6. The New Institutional Economics of the Environment

As mentioned earlier, the New Institutional Economics has not focused on issues of environmental governance, with the exceptions of the work of Elinor Ostrom and her colleagues on small-scale common-pool resources, and the work of Oran Young and his colleagues on international environmental regimes. This section briefly reviews these streams of work.

Arguably the most systematic work to date on environmental governance is that of Elinor Ostrom and her colleagues at Indiana University's Workshop in Political Theory and Policy Analysis. The books by Ostrom (1990) and Ostrom, Gardner, and Walker (1994) are probably the best known presentations of this work. Through a unique combination of game theory, economic experiments, and field case studies, Ostrom's research program has provided a rich theory of the governance of common-pool resources such as fisheries, pastures, and groundwater reservoirs. In sharp contrast to Hardin's view that government coercion is needed to solve the "tragedy of the commons," Ostrom finds numerous examples of common-pool resources that have been successfully governed by local people without reliance on government policy.

By combining theory, experiment, and field research, Ostrom has laid the foundations for a theory of environmental governance that includes such elements as bounded rationality, altruism, and social capital, topics that are on the frontiers of economic research today.

Economic experiments have forced scholars to recognize that individuals deviate systematically from the stark predictions of simple models of *homo economicus*. For example, in the “ultimatum game,” one player proposes to another how they should divide a fixed sum of money, and the second has only the option to accept or reject the proposal. Standard game theory predicts that the first player will claim effectively all of the pie, and that the second player will accept any crumbs he may be offered. In the laboratory, however, it is common for the second player to reject offers that are viewed as manifestly unfair. Such observations have led experimental economists and game theorists to begin introducing social norms into their models. Ostrom (2000) provides an overview of the evolution of social norms and how they enable collective action.

Research on social norms has led to a deeper recognition of the importance of “social capital” for solving environmental governance problems. Pretty (2003) presents a concise overview of this topic. In recent years, economists have become quite interested in social capital, and it remains a research area that is growing rapidly. For a skeptical perspective, see Sobel (2002).

While Ostrom and her colleagues have focused on small-scale environmental systems, Oran Young (e.g., 1999, 2002) and his colleagues have focused on large-scale systems, with a primary emphasis on international environmental regimes. They have considered environmental “problem sets” such as the tropospheric ozone layer, tropical forests, the Arctic, and global climate change. Young has emphasized that the effectiveness of international environmental governance varies wildly from one problem to the next. This is well illustrated by comparing the Montreal and Kyoto Protocols, which represent classic efforts at creating international agreements between nation-states. Perhaps the most successful international agreement ever created is the Montreal Protocol for the reduction of ozone-depleting compounds, signed on September 16, 1987, which has been documented in detail by Parson (2003). By 2007, 191 nations had ratified the Protocol, and production of chloroflourocarbons had been essentially eliminated. In contrast, the Kyoto Protocol on greenhouse gas emissions, which came into force on October 22, 2004, with Russia’s ratification, attempts to address a global challenge that will endure for centuries with a treaty that extends only until 2012 and that has not been ratified by the U.S. or China, the world’s largest emitters.

In light of the manifest limitations of formal governments in dealing with environmental problems, Young has argued strongly for the importance of other forms of international environmental governance, which provide complements (or possibly substitutes) to formal international agreements. Among these are environmental management systems such as ISO 14001, discussed in detail in Chapter 4, and environmental certification programs such as the Forest Stewardship Council (FSC) and the Marine Stewardship Council (MSC), discussed in detail in Chapter 7. Environmental management systems are especially interesting in the international context, since multinational corporations increasingly require their upstream suppliers in developing countries to certify with ISO 14001. This provides a mechanism through which the environmental standards of rich countries can be transferred to developing countries,

even if the developing countries lack strong capabilities for regulatory enforcement. In a related vein, certification programs such as FSC and MSC allow the environmental preferences of “green” consumers in wealthy countries to translate into environmental performance on the ground in developing countries. These varying forms of certification offer valuable complements to formal agreements between nation-states, and offer excellent examples of the hybrid forms of environmental governance that are emerging around the world.

Unfortunately, there has been surprisingly little cross-pollination between groups working on micro- and macro-scale environmental governance. Dietz, Ostrom and Stern (2003) identify a set of factors that are required for successful environmental governance at any scale: providing information, dealing with conflict, inducing rule compliance, providing infrastructure, and being prepared for change. As described in earlier sections, most of these factors have been the subject of considerable economic research, but they have not yet been combined into a full theory of environmental governance, even for small-scale common-pool resources, much less for global environmental problems such as climate change. Young (2005) issues an urgent plea for greater efforts to bridge the gap between micro- and macro-level research, and makes a series of concrete proposals that might improve matters.

The research programs of Ostrom and Young and their colleagues provide valuable cornerstones for building out a more complete theory of environmental governance. This work will require careful attention to the roles of communities, corporations, NGOs, nation-states, and international agreements, with particular emphasis on the many interesting hybrid forms of governance that are possible. The following section offers a number of suggestions for ways to proceed with this task.

7. Directions for Future Research

Although significant progress has made in the economics of environmental governance in recent years, many questions remain. In this concluding section, I mention just a few of the topics needing further work.

First, although the commitment power of government shapes the effectiveness of voluntary programs, this dimension has not yet received adequate research attention, either from a theoretical or an empirical perspective. Lyon and Maxwell (2005) present a model that unifies the negotiated agreement model of Segerson and Miceli (1998) and the self-regulation model of Maxwell, Lyon and Hackett (2000). They show that the key difference between the two models is that the negotiated agreement is assumed to remove the threat of future legislative action, while self-regulation does not. The most striking implication of this difference is in how the two approaches respond as the regulatory threat (i.e., the probability of legislation) increases. The level of abatement under the negotiated agreement rises smoothly with the probability of legislation. Self-regulation, however, displays a non-linear pattern, with voluntary abatement at low and high levels of legislative likelihood, and no action for intermediate levels. It remains to be seen whether these predictions are borne out in empirical data. In addition, more research is needed into how the political structure of different countries affects their commitment powers, and the effectiveness of their voluntary agreements.

Second, there is a need for much more research into the performance of voluntary approaches when information is imperfect. Government information disclosure programs such as the US Toxic Release Inventory bring governance issues to the forefront, as shown in work by Bui (2006), but we are far from having a good understanding of how these programs produce results. Concerns are frequently voiced that voluntary programs are mere “greenwash,” but this epithet is often used in a vague and sloppy manner, and it has received little academic study. Lyon and Maxwell (2006) build on the literature on financial disclosure to build an economic model of greenwash and examine the efficacy of NGO strategies that attempt to eliminate it. Lyon and Kim (2006) find empirical support for the theory in the participation behavior of electric utilities in the US Department of Energy’s Voluntary Greenhouse Gas Registry, but far more research is needed in this area. The role of the media more generally also warrants much more economic research. Baron (2004a) presents a model in which an activist and an industry compete to influence public sentiment by providing information to the media, and Baron (2004b) shows how such competition can result in persistent media bias. Dyck and Zingales (2002) provide empirical analysis of the effects of media coverage on corporate social responsibility, but again more research is needed.

Third, the impact of socially responsible investors on business decisions is often alluded to, but there is little empirical evidence upon which to ground such assertions. Margolis and Walsh (2003) review the academic research on the correlation between financial and social performance, concluding that while most writers find a positive performance between the two, nobody has been able to establish the direction of causality. Do high-performing firms have the luxury of indulging in environmental protection, or does environmental protection lead to improved profits? Research that answered this question with some degree of finality would be highly worthwhile.

Fourth, we need a better understanding of how environmental NGOs target corporations in the domain of private politics, and how these groups decide when to cooperate and when to compete. This new research area might be thought of as the “industrial organization” of NGOs. Despite some initial theoretical work by Baron and Diermeier (2007), and some intriguing empirical work by Easley and Lenox (2006) and Sam and Innes (2005), much more remains to be done. The descriptive work by political scientists such as Bosso (2005) may provide a helpful point of departure for those interested in building more formal models. Work that links private and public politics would be particularly interesting. I believe it is important to join the insights of sociologists studying social movements, political scientists studying interest group mobilization, and economists studying non-market strategy in order to produce a robust theory.

Fifth, environmental governance in developing countries with weak political institutions is an important area that needs more work. Pargal and Wheeler (1996) present intriguing empirical evidence of “informal regulation” in Indonesia, and show there is less pollution in areas where residents are wealthier and have higher levels of education, but they provide no theory of how this process works. The role of social capital, e.g. norms of behavior and social networks, may be particularly important in the developing country context. Woolcock (1998) provides a useful point of entry into this line of research. Blackman, Afsah and Ratunanda (2004) use survey research to probe how the Indonesian PROPER program of pollution disclosure has achieved its results, linking the literatures on developing countries and on information disclosure programs.

In summary, environmental governance is an exciting area of scholarly work that draws upon a variety of strands of economic research. The time is ripe for an interdisciplinary dialogue that brings these insights together with those from political science, law, sociology, and strategy.