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VOLUNTARY AGREEMENTS TO IMPROVE ENVIRONMENTAL QUALITY: SYMBOLIC AND SUBSTANTIVE COOPERATION

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Within the context of environmental voluntary agreements (VAs), this paper analyzes the determinants of the degree of participation by firms in collective corporate political strategies that aim to shape government policy. We demonstrate that substantive cooperative strategies are more likely to be pursued by firms that enter a VA close to its initiation, while symbolic cooperation is more likely behavior by late joiners. We show that late joiners and early joiners within VAs adopt different cooperative strategies because they face different institutional pressures. Our analysis is based on the strategies of firms participating in the Climate Challenge program (1995–2000) established by the U.S. Department of Energy and representatives of the national electric utilities to reduce greenhouse gas emissions. Our results show that early joiners were subjected to higher levels of political pressure at the state level and were more dependent on local and federal regulatory agencies than late joiners were. Early joiners were also better connected to the trade association and more visible. Late joiners had undertaken significantly less investment in environmental improvements than early joiners. Our paper also illustrates the difficulty involved in using VAs to try to induce improved environmental outcomes when there are no sanctioning mechanisms. Although early entrants reduced their emissions more than nonparticipants, our results show no significant difference overall between participants and nonparticipants in the reduction of their emissions.

INTRODUCTION

The corporate political strategy literature focuses on the strategies firms use to shape government policy (Baron, 1995; Baysinger, 1984; Hillman, Keim, and Schuler, 2004; Keim and Baysinger, 1988; Keim and Zeithaml, 1986). This line of research makes important strides toward explaining firms' rationales for developing political strategies (Baron, 2005; Hillman and Hitt, 1999). Scholars and practitioners take on the major task of determining the degree of participation of firms in corporate political strategies. Corporate political activity represents a classic problem of collective action because legislative and regulatory decisions affect all firms within the pertinent jurisdiction, even if they do so unevenly (Olson, 1965). Therefore, the benefits that firms seek from their corporate political activity will accrue, to some degree, to other firms regardless of each firm's contribution. Because of this, firms may be tempted to behave opportunistically and free ride on the corporate political activity of others (Yoffie, 1987). This is particularly true for collective strategies

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that engage several firms (Hillman and Hitt, 1999). Due to this potential for opportunistic behavior, collective political strategies are risky. If too many firms free ride, the effectiveness of such a strategy might be undermined. It is important for both firms and policy makers to assess the risks and to understand under what conditions collective strategies could be attractive options.

However, this has proven to be a difficult problem both theoretically and empirically (Schuler, 2002). One of the research challenges arises in assessing the degree of firms' contributions to political strategies when the strategies are carried out collectively via coalitions, partnerships, or through trade associations. Collective political action complicates the analysis of a single firm's political action because it is often difficult to identify each firm's contribution (King and Lenox, 2000; Schuler, 2002). Another complicating factor is the possible variation of individual contributions in substance and over time (Lenway and Rehbein, 1991). This paper helps to address these challenges with an analysis of the determinants of the timing and the degree of firms' participation in collective political strategies related to the natural environment.

Our study focuses on collective corporate political strategies through environmental voluntary agreements (VAs) between firms and regulatory agencies. We examine the cooperative strategies of firms within the Climate Challenge program, a VA established in 1995 by the U.S. Department of Energy (DOE) and representatives of the national electric utilities, to reduce greenhouse gas emissions. VAs are designed to link private benefits with the voluntary provision of public goods. They provide an interesting case for the study of collective action mechanisms (Delmas and Terlaak, 2001). Participation in VAs, for example, can reduce the burden of regulation on firms in exchange for higher environmental performance (Lyon and Maxwell, 2004). The last decade has seen an increase in the use of these agreements as supplements to and sometimes replacements for traditional command-and-control regulation. More than 300 VAs are in place in the European Union (Borkey and Leveque, 1998), and around 200 have been launched in the United States (Darnall and Carmin, 2005). Concerns exist, however, that firms may enter these agreements and cooperate only symbolically rather than undertake substantive actions to reduce their impact on the environment (King and Lenox, 2000; Rivera and DeLeon, 2004). Because most VAs lack explicit measures to sanction firms that pursue only symbolic cooperative strategies or sometimes even to identify such firms, under what conditions would firms undertake substantive cooperation rather than symbolic cooperation?

The collective action literature suggests that selective private incentives are necessary to induce firms to participate voluntarily in cooperative arrangements that provide public goods (Olson, 1965). According to the collective action theory, however, members of groups or organizations face only two options: to free ride or participate in cooperative arrangements (Olson, 1965). These options stem from the view of the larger dichotomous choice between 'cooperation' and 'no cooperation' as the only possibility when in reality cooperative behavior is more nuanced. This is because firms can adopt various levels of participation within collective action, and also because behavior may change over time (Lenway and Rehbein, 1991; Yoffie, 1987). For example, firms may decide to participate in a collective strategy and undertake the full cost of participation, or they may decide to participate only symbolically, thereby incurring only part of the costs associated with cooperation. The collective action literature is therefore limited in its ability to identify the factors that trigger different types of collective cooperative behavior and how these evolve over time.

The institutional sociology literature provides a useful framework to complement collective action theory in order to understand the drivers of symbolic cooperative behavior. The institutional perspective has gained prominence in explaining the importance of social and cultural influences on strategic decisions (Ingram and Silverman, 2002). The institutional approach suggests that firms obtain legitimacy by conforming to the dominant practices within their organizational field (DiMaggio and Powell, 1983; Scott, 1992). In this area of research, studies consider symbolic management as a mechanism to enhance organizational legitimacy while leaving the internal organization largely unchanged (Meyer and Rowan, 1977). Legitimacy can thus be achieved by actions that appear to demonstrate compliance while they actually fail to comply with the stipulations of constituents of the institutional environment (Edelman, 1992; Elsbach and Sutton, 1992). Institutionalists

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contend that symbolic adoption, or decoupling of formal organizational structures from actual practices in the organization, is more likely in the presence of institutional pressures and when a practice is adopted for legitimacy rather than efficiency reasons (Fiss and Zajac, 2006; Meyer and Rowan, 1977; Westphal and Zajac, 2001). Such pressures can emanate from various constituents of the organizational field such as regulatory agencies or other firms that produce similar services or products (DiMaggio and Powell, 1983). Furthermore, the institutional theory literature links institutional pressures to symbolic behavior by showing that early and late adopters of technological and administrative innovations face differing levels of institutional pressure, and that late adopters may be more prone to adopt symbolic behavior (DiMaggio and Powell, 1983; Tolbert and Zucker, 1983; Westphal and Zajac, 1994; Zajac and Westphal, 1995).

In this paper, we argue further that because early and late participants in collective political strategies face different institutional pressures and incentives, they are likely to adopt different types of cooperative behavior. Our study bridges the literature on corporate political strategies to the institutional literature. By focusing on how institutional mechanisms work to frame selective incentives, our study combines previously separate theoretical perspectives to provide an explanation of various firm behaviors within collective corporate actions, as well as how these vary over time. Our approach differs significantly from previous analyses and yields new findings on the effects of institutional pressures on corporate political strategies.

In our study, we find that substantive cooperation was more likely to be pursued by firms that entered the Climate Challenge program close to its initiation, while symbolic cooperation was more likely to be adopted by late joiners. Early joiners of the Climate Challenge program reduced their emissions significantly more than nonparticipants, while there was no significant difference between late joiners and nonparticipants. We argue that these differences in cooperative behavior can be explained by differences in levels of institutional pressures and by firms' ability to sustain collective action. Early joiners were subjected to stronger political, peer, and social pressures than late joiners, and they also had undertaken environmental efforts prior to their participation in the program. Through an analysis of levels of cooperation within the program, this study contributes to the corporate political strategy literature by expanding the understanding of symbolic participation within collective political strategies. Our analysis also shows how differences in firms' social context can explain differences in cooperative behavior within corporate political strategies.

The corporate political strategy literature provides many insights into the drivers of corporations' proactive political strategies such as the provision of financial support to political decision makers or political parties, information strategies toward government officials, and constituency-building strategies (Baron, 2005; Hillman and Hitt, 1999). The literature has barely begun, however, to investigate collective strategies such as cooperative arrangements that engage firms and regulatory agencies, and the pros and cons of such arrangements (Hillman *et al.*, 2004). Voluntary corporate initiatives in the environmental arena in particular have become an important element in the mix of public policies and corporate strategies for managing industrial impacts on the environment, but considerable uncertainty exists concerning the effectiveness of voluntary programs relative to other policy instruments (Khanna and Brouhle, 2009). Because VAs are a relatively recent phenomenon, 'there are relatively few empirical studies assessing the specific impacts of VAs on emissions reductions, compared to business-as-usual emissions abatement' (Baranzini and Thalmann, 2004: 28). Indeed, the analyses investigating whether firms participating in these programs actually meet the requirements of the programs are rare (Arora and Cason, 1996; Bjorner and Jensen, 2002; Khanna and Damon, 1999; King and Lenox, 2000; Rivera, 2002; Rivera and DeLeon, 2004; Welch, Mazur, and Bretschneider, 2000). Most importantly, these studies seldom investigate differences in cooperative behavior within VAs, making it difficult to design VAs that maximize their potential for success.

In the section below, we review the institutional literature on symbolic management and institutional pressures. We follow with a review of environmental voluntary agreements, particularly the Climate Challenge program. We then develop our hypotheses concerning the factors that trigger differences in cooperative behaviors between early and late joiners. The third section explains the

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methodology and the results. A concluding discussion follows.

INSTITUTIONAL THEORY AND COLLECTIVE POLITICAL STRATEGIES

Building on collective action theory, the corporate political strategy literature argues that firms participate in collective corporate strategies primarily for material rewards rather than for the collective or public goods that are at issue (Lenway and Rehbein, 1991; Yoffie, 1987). For example, Lenway and Rehbein use a cost benefit framework to predict a firm's involvement (Lenway and Rehbein, 1991). Research of this kind has shown the primary motive for participation to be economic. The corporate political strategy literature has also identified how differences in national institutional environments across countries drive differences in firms' political action. This stream of research, however, still pays little attention to the social context in which firms operate and to the importance of changes over time (Bonardi and Keim, 2005; Hillman, 2003).

Other scholars have identified additional types of rewards for acting collectively. These can include social rewards (such as enhanced reputation) and purposive rewards (doing the right thing) (Wilson, 1973). For instance, firms acting collectively in the context of the natural environment want to convince regulators that their voluntary practices can be legitimately considered within 'a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions' (Suchman, 1995: 574). Therefore, the rewards that firms are seeking may be influenced by the social context in which the collective action initiative is implemented, a context that may vary geographically and also over time. For example, regulators and other organizations may consider voluntary activities more legitimate once they have diffused among a larger set of firms.

The institutional literature provides a complementary approach to collective action theory. It contributes to understanding how the social context shapes organizations' behavior and the dynamics of collective relationships. Institutional studies have found that firms might engage in symbolic management as a means to respond to social pressure and to improve their legitimacy (e.g., Edelman, 1992; Meyer and Rowan, 1977; Westphal and Zajac, 1998, 2001). As Oliver (1991: 155) notes, 'from an institutional perspective. . .the appearance rather than the fact of conformity is often presumed to be sufficient for the attainment of legitimacy.' The institutional literature explains that the use of symbolic management increases with the strength of institutional pressures. Institutionalists have argued that early adopters and late adopters of management practices and technologies face different pressures from their institutional environment and therefore may implement the same practice for different reasons (Tolbert and Zucker, 1983; Westphal, Gulati, and Shortell, 1997). Using the case of the diffusion of civil service reform, Tolbert and Zucker (1983) demonstrate that first movers are mainly interested in the technical efficiency of a practice while followers are more subject to institutional pressure. They argue that first movers adopt management practices because 'of real needs,' while followers, in contrast, do not implement a practice because of its merits but because other organizations do. Westphal *et al.* (1997) also show that early adopters of total quality management practices in hospitals seek efficiency gains while later adopters aim at increasing their legitimacy. Since institutionalists contend that decoupling is more likely when institutional forces are present and when a practice is adopted for legitimation reasons (Meyer and Rowan, 1977), it follows that late joiners may be more prone to symbolic cooperation (Westphal and Zajac, 1994; Zajac and Westphal, 1995). In the case of the adoption of the international total quality management standard ISO 9000, it was found (Naveh, Marcus, and Moon, 2004) that first movers outperformed second movers because ISO 9000 conformed to the first movers' need for performance enhancement, while the second movers adopted ISO 9000 because of external pressure. From the evidence of our own study, we would clarify that early adopters are also motivated by social pressures because measures that improve performance and that are covered by a publicly promoted voluntary agreement could be adopted without participation in the agreement.

This paper combines corporate political strategy theory with institutional theory to test an empirical model of collective corporate political activity where private incentives are institutionally shaped.

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We argue that private incentives vary with the timing of joining collective corporate political activity and that symbolic cooperation is more likely with late joiners than with early joiners.

CORPORATE POLITICAL ACTIVITY THROUGH ENVIRONMENTAL VOLUNTARY AGREEMENTS

Environmental VAs are 'collaborative arrangements between firms and regulators in which firms voluntarily commit to actions that improve the natural environment' (Delmas and Terlaak, 2001: 44). VAs vary in objectives and design and, as a result, offer different kinds of strategic opportunities for participating firms to influence political outcomes (Lyon and Maxwell, 2004). VAs can be designed to preempt regulation as a response to a regulatory threat, to provide flexibility in the implementation of existing regulation, and/or to influence the form of future regulation (Delmas and Marcus, 2004; Delmas and Terlaak, 2001; Maxwell and Decker, 1998; Segerson and Miceli, 1998). The Climate Challenge program, created by the electric utility industry to preempt legislation relating to climate change, was a form of VA also known as a 'negotiated agreement,' one typically negotiated by an industry trade association (Delmas and Terlaak, 2002; Maxwell, Lyon, and Hackett, 2000), and was therefore a type of collective corporate political strategy. Another prominent example of a negotiated agreement, one outside the United States, is the German Declaration on Global Warming Prevention. In 1995, the major industry associations in Germany agreed to reduce CO_2 emissions, based on 1990 levels, by 20 percent by the year 2005. In return, the German government signaled that it would refrain from implementing an energy tax (BDI, 1996). Negotiated agreements have been adopted widely in Europe and Japan but to a lesser extent in the United States, where they represent an institutional change away from traditional command-and-control regulation, which has dominated U.S. environmental policy (Lyon and Maxwell, 2004; Delmas and Terlaak, 2002).[1]

VAs represent proactive political strategies that are undertaken to shape and control the way that norms and public policies are defined (Oliver and Holzinger, 2008). They differ from other political strategies identified in the literature, such as information-based strategies, financial-incentives strategies, and constituency-building strategies (Hillman and Hitt, 1999). For example, although VAs might include an exchange of information between firms and regulators, this is not their main objective. VAs represent a quid pro quo where firms commit to provide a public good voluntarily in return for a potential private benefit. VAs also differ from self-regulation strategies in that the latter represent collective political strategies undertaken without government involvement (Bonardi and Keim, 2005; Delmas and Terlaak, 2001; King and Lenox, 2000). There are two different forms of cooperation at work concerning the formation and structure of VAs; the first of these forms occur among firms within the industry that jointly decide to reduce their environmental impact voluntarily. This type of cooperation is usually orchestrated by the trade association. The second form of cooperation occurs between firms and government where they agree on a mutually acceptable arrangement.

While all types of participation through a VA might have symbolic value, we argue that there are three main types of cooperation related to participation and VAs. First, firms participate and cooperate by improving their environmental performance. In undertaking actions to improve their environmental performance, these participating firms must accomplish organizational or technological changes that could lead to such improvement. Thus, for these firms, participation in a VA is coupled with practical changes at the operational level. We refer to this type of participation as substantive cooperation. Second, firms can refuse to participate in the collective activity and free ride on the behavior of other members of the industry who participate fully in the VA. Although the literature has focused mostly on these two options, we argue that there is a third: participation in a VA without substantive implementation of the VA's requirements. Firms might in this way enter into the agreement but not actually improve their environmental performance. In this sense, participation in VAs may be *only* symbolic as firms decouple their practical actions from formal organizational structures in which they participate (Meyer and

[1] For a literature review on voluntary agreements in Europe and in the United States, see Delmas and Terlaak, 2002. See also Delmas and Marcus, 2004, for a comparison of the characteristics of voluntary agreements to those of command-and-control regulation.

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Rowan, 1977). Consequently, we refer to participation in a VA without performance improvement as symbolic cooperation.

THE CLIMATE CHALLENGE PROGRAM

The Climate Challenge program was a VA between the U.S. DOE and electric utility industry representatives to reduce, avoid, or sequester greenhouse gas emissions through voluntary commitment.[2] The program was initiated just after President Clinton's 1993 launch of the Climate Change Action Plan in which he announced the nation's commitment to reducing U.S. emissions of greenhouse gases to their 1990 levels by the year 2000. At the time, the Clinton administration was investigating the possibility of implementing a 'tradable credit' system in which firms that exceeded the limits, or 'caps,' on emissions could buy emissions credits from entities that were able to stay below their designated limits. As they were among the leading generators of greenhouse gases in the United States, electric utilities were particularly worried about the possibility of new regulations being implemented.[3] The Climate Challenge program was clearly an attempt by the industry to promote voluntary approaches and negate the need for future greenhouse gas regulations. The Edison Electric Institute, the trade association for U.S. shareholder-owned electric companies, was instrumental in the creation of the program, aiming to demonstrate that emissions reductions could be achieved voluntarily rather than through mandated regulation. Tom Kuhn, president of the Edison Electric Institute, made this clear in a statement to the press one year after the start of the program:

> 'Our industry has demonstrated that a vigorous, voluntary approach toward curbing greenhouse gas emissions is the way to go. We will continue to put these programs in place while opposing government and international mandates that would cost the U.S. economy thousands of jobs. Utilities have met the challenge and are continuing their leadership role in working with the Government to find creative and effective ways to improve the environment.'[4]

The U.S. DOE also explicitly stated on the Climate Challenge Web site that 'an effective voluntary effort may negate the need for legislation or regulation' and that 'emission reductions could possibly be used for 'credit' against future mandatory requirements.'[5] It was clear, then, that the primary goal of utilities that participated in the establishment of the program was to legitimize voluntary practices in order to avoid regulation.

The Climate Challenge program consisted of a general Memorandum of Understanding signed by the national electric trade organizations and the DOE on Earth Day 1994, and individual agreements signed by the utilities between 1995 and 1999. In these agreements, each participating firm committed to (a) reduce, avoid, or sequester greenhouse gas emissions; (b) annually report its activities and achievement; and (c) confer periodically with the DOE over evaluations of its progress and discussions of the adjustment. Each participating firm had to establish the level and detail of its commitment to be reached by the year 2000. These commitments included improving generation efficiency, switching fuels to lessen the use of carbon fuels such as natural gas, and increasing generation using noncarbon sources such as renewable energy and nuclear power. By 2000, at the end of the program, 124 participation agreements had been signed. The signatories represented approximately 60 percent of the 1990 U.S. electric utility generation and utility carbon emissions (DOE, 1996).

There were no direct sanctions for firms that did not participate in the program or that participated only symbolically. Even though each participating utility was subject to requirements to provide information about its greenhouse gas emissions, no limits were set on such emissions. Although the DOE reviewed the participants' annual self-reported information during the course of the program, no penalties were imposed on firms that did not meet their commitments. Furthermore, the

[2] The industry representatives were Edison Electric Institute, American Public Power Association, National Rural Electric Cooperative Association, Large Public Power Council, and Tennessee Valley Authority.

[3] About 40.5 percent of the U.S. CO_2 emissions were attributed to the combustion of fossil fuels for the generation of electricity in 1998 (DOE, 1999).

[4] Newswire Association, 1996, 'U.S. electric utility companies are not waiting to reduce greenhouse gas emissions,' *Financial News* 12 April.

[5] See http://www.climatevision.gov/climate_challenge/factsheet.htm last accessed in March 2006.

initial Memorandum of Understanding stated that utilities would be allowed to quit the program whenever they chose 'without penalty and without being subject to remedies at law or equity.'[6]

The Climate Challenge program exhibits features that make it particularly appealing in the study of differences over time in cooperative strategies among participants and between participants and nonparticipants. The program permitted firms to enter the VA at various dates during its operation. Early joiners enrolled in the program during the official ceremony organized in March 1995 by the DOE. These firms participated in the design of the program. Late participants enrolled in the program at a later date, after the official ceremony. This was a high visibility event involving high-level officials such as Al Gore that concluded more than a year of active negotiations between the industry and the DOE concerning the rules of the Climate Challenge program. Utilities that signed the agreement after the official ceremony did not participate in the initial setup and configuration of the program. This allows us to compare the cooperative behavior of early and late joiners. Furthermore, approximately half of the investor-owned electric utilities joined the program. This enables a comparison of cooperative behavior between participants and nonparticipants. Finally, because no clear sanctions were associated with partial or no implementation of the requirements of the program, this particular setting did not encourage tight coupling between firms' participation and the reduction of their emissions. As a result, this program was likely to exhibit symbolic cooperation. Joining without actual implementation could thus be seen as a relatively inexpensive way to acquire legitimacy in the environmental arena.

Welch *et al*. (2000) evaluated the effectiveness of the Climate Challenge program during its early years. According to their results, participating firms did not reduce their emissions significantly more than nonparticipants during the 1995–1997 period. The authors warn that these results have to be viewed with caution because they are based on a study of only the first two years of the program and include only the top 50 utilities east of the Rocky Mountains. In contrast, our study focuses on the entire life of the program, through the year 2000, allowing us not only to assess differences between late and early joiners, but also to consider a longer time period when evaluating the results of firms' CO_2 reduction efforts. In addition, we include a larger and more representative sample of firms (132 utilities), incorporating more variability in firm characteristics. The firms in our sample produced 61 percent of the U.S. electricity generated from 1995 to 2000. Moreover, we reviewed the overall effectiveness of the Climate Challenge program and aimed to understand which firms within the program behaved symbolically, and which ones undertook substantive cooperation.

HYPOTHESES

Building on the literature of institutional theory and of corporate political strategy, we develop hypotheses to explain substantive and symbolic collective corporate political strategy. We argue that first movers and late joiners face different institutional pressures that influence the type of cooperative behavior they will pursue within VAs. We first develop hypotheses on the institutional pressures that drove a firm's decision to participate early, to participate late, or not to participant at all in the Climate Change program. We focus on the two major constituents of the institutional environment of utilities, namely the government and the industry association, and on how the utilities' relationship with these constituents prior to the program can explain collective cooperative behavior. We subsequently develop hypotheses based on firms' visibility, their resources, and their ability to sustain collective action. Finally, we examine the potential for positive findings on our hypotheses to predict when substantive participation and symbolic participation may occur during the life of a VA.

Political pressure

Even though the creation of a VA might help an entire industry avoid possible future regulations, not all firms will experience the same level of threat from such potential regulations and therefore will not experience the same benefits from preempting regulation. The corporate political activity literature shows that firms' incentives to undertake corporate political activity vary according to the national regulatory environment in which they operate (Hillman, 2003; Hillman and Wan, 2005;

[6] See http://www.climatevision.gov/climate_challenge/cc_accordxNSTATESP.htm

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Murtha and Lenway, 1994). Within a single country, states and smaller areas with governmental authority issue different rules and regulations. We argue that differences in subnational politics will affect the likelihood that firms will undertake corporate political activity at the national level. In the U.S. context, environmental legislation at the federal level is usually implemented by states. For example, the Federal Clean Air Act of 1963 is a federal law covering the entire country. However, state and local governments play an important role in the implementation of the law through their own regulations and standards.[7] As a result, firms face a complex set of regulations, which vary state by state. Firms located in states with more stringent regulations will thus be under more pressure to undertake reductions in emissions, and will have more incentive to participate in corporate political strategies. A program that demonstrates the effectiveness of voluntary practices at the national level could also help influence future regulation at the state level.

Furthermore, in a federal context, firms may try to influence state congressional representatives by participating in VAs. These representatives may pay more attention to strategies undertaken by companies in their district. When congressional representatives are more prone to vote positively on more stringent environmental regulation, firms have more incentives to show them that improved environmental performance can be achieved voluntarily.

We argue that firms subjected to greater institutional pressure through political mechanisms were more likely to have participated in the early stages of the Climate Challenge program. Timing is important for firms subjected to a great deal of political pressure. They need to move as early as possible to preempt the evolution of the political issue at stake into a potentially more costly regulation (Baron, 2003; Bonardi and Keim, 2005). This is because it is usually more difficult for firms to advance their agendas once issues have become widely salient (Bonardi and Keim, 2005). In summary, firms subjected to greater levels of political pressure within the state in which they operated were more likely to be early joiners of the Climate Challenge program than were firms that did not face such levels of pressure. It follows that firms operating in states with lower levels of political pressure would not have experienced the same desire to participate in a program at its initiation, and would have been more likely to wait and see what others did. We therefore hypothesize as follows:

> *Hypothesis 1: Political pressure had a significant positive impact on the participation of early joiners in the Climate Challenge program in comparison with nonparticipants and late joiners.*

Links with the industry association

Scholars have shown that the structure of communication networks influences the order in which potential adopters receive information about innovations and therefore the order in which they adopt them (Abrahamson and Rosenkopf, 1997; Westphal *et al*., 1997). For example, Westphal *et al*. (1997) show that in the earlier stages of the diffusion process, communication ties may help match innovations to organizations' unique efficiency needs. Trade associations have been shown to play a central role in facilitating the emergence of corporate political strategies (King and Lenox, 2000), since they constitute industry networks that provide a central forum for communication about political issues at stake (Gupta and Lad, 1983; Rees, 1997). For example, Gupta and Lad showed how trade associations can play a fundamental role in the collection and diffusion of information about the industry and its economic and regulatory environment (Gupta and Lad, 1983). Firms participating in a trade association are, therefore, more informed about the impact of potential regulations on their activities than firms that do not participate in the association. They are also more likely to be informed about the negotiations that lead to the creation of a VA.

Firms participating in a trade association are also more likely to be exposed to normative pressure exerted by their peers as divergence of opinion may be more difficult in a context of continuous relations. Trade associations employ a variety of informal mechanisms to encourage compliance with their own program requirements (Lenox and Nash, 2003). Lenox and Nash describe how a number of trade associations convene meetings to share implementation experiences among members and

[7] States must develop implementation plans to enforce the Clean Air Act. A state implementation plan is a collection of the regulations used by a state in cleaning up polluted areas.

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how such meetings impose pressure on managers of firms that are falling behind (Lenox and Nash, 2003).

Furthermore, because firms pay significant fees to join a trade association, firms that choose to join may do so because they agree with the policy of the association. Thus, firms that are part of a trade association are more likely to be the first participants in an action initiated by the association. We therefore propose the following:

Hypothesis 2: Early participants in the Climate Challenge program were more likely to be members of the industry trade association than were late joiners and nonparticipants.

Firm's visibility

Visibility affects the level of social pressure to which a firm is subjected (Pfeffer and Salancik, 1978). Constituents of an institutional environment are more likely to take interest in an organization of which they are aware. For example, a dominant firm with a large market share will most likely be under the spotlight of environmental activists and the community where it operates concerning its environmental efforts. Such exposure to a higher level of scrutiny from external constituents of firms' institutional environment explains why visibility has been shown to be an antecedent of organizational behavior (Fiss and Zajac, 2006; Oliver, 1991). Research has noted also that more visible firms are more likely to be the target of activism (Meznar and Nigh, 1995) and to participate in collective action (King and Lenox, 2000). These firms, therefore, have more to gain from participating in a VA than less visible firms, and it is likely that they participate in the creation of the VA to increase their legitimacy with constituents of the institutional environment.

Hypothesis 3: The greater the firm's visibility, the more likely was the firm to join the Climate Challenge program early.

Firms' resources—previous environmental investment

Firms' resources and the ability of a firm to sustain the cost of collective action have been shown to be important explanatory factors in firms' involvement in such action (Lenway and Rehbein, 1991; Meznar and Nigh, 1995; Schuler and Rehbein, 1997). There are two competing arguments about the relationship between resources and firms' involvement in collective corporate political actions such as VAs: first, that firms with a high level of resources or slack resources will be able to afford political action; second, that firms with fewer resources will seek a political solution to their limited resources.

In the case of the Climate Challenge program, the levels of investment in environmental performance improvements prior to the initiation of the VA may have affected the potential benefits of participating in a voluntary program. 'Greener' firms, ones that have already invested in reducing their environmental impact before the initiation of a related VA, could be more likely to join one provided that it gave credit for their earlier efforts. On the other hand, 'browner' firms, those that have not invested in reducing their environmental impact prior to a VA, may use the agreement to improve their reputation as they need such improvement more than the others. Because there are rationales for both greener and browner firms to join a VA, the empirical evidence is mixed. One set of empirical studies shows that firms with larger percentages of emission reductions prior to making their participation decisions were more likely to participate in voluntary activities, mainly to publicize their efforts (Arora and Cason, 1996; Bansal and Hunter, 2003; Khanna and Damon, 1999). In contrast, other studies show that firms with lower environmental performance are more likely to undertake voluntary activities, largely because they are under more pressure to do so (Konar and Cohen, 1997; Videras and Alberini, 2000). We argue below that both greener and browner firms had incentives to participate in the Climate Change program, affected by circumstances that varied over time.

Companies that have taken early steps on voluntary reductions of their emissions may find it advantageous to compel other, less committed competitors to follow suit (Hoffman, 2005). Scholars have suggested that chemical companies that had undertaken investments in safety and environmental improvements were behind the origin of the industry program Responsible Care, and that these companies, among other things, hoped to impose a cost on their competitors (King and Lenox, 2000; Reinhardt, 2000). In addition, in the case of the Climate Challenge program, the DOE suggested that participating firms could potentially

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receive future 'credits' for their emission reductions in the event that a tradable permit system were put into place. This provided an incentive for greener firms to participate, and to put their efforts on the record as soon as possible. Assuming that a future regulatory target would require a firm to reduce its emissions by a percentage from some base year, firms that acted early to reduce CO_2 yet failed to register those reductions early under a voluntary scheme were in danger of being penalized.[8] In summary, firms that have already started efforts to reduce their emissions are more likely to benefit from a program that gives them credit for their past experience, regardless of what other firms contribute.

In such a context, it seems logical that firms that have not yet undertaken efforts to reduce their emissions would resist the costs associated with initiating such a program. However, such firms could still benefit from participating in a program if it allowed them to be associated with greener firms. Researchers have highlighted how the nature of early adopters of a technology or a management practice can impact future adoption (DiMaggio and Powell, 1983; Rosenkopf and Abrahamson, 1999). In particular, Rosenkopf and Abrahamson show that initial adopters with good reputations can pressure other organizations to adopt a practice (Rosenkopf and Abrahamson, 1999). Pressure may not be needed, however, because followers might want to be associated with 'high-quality' first adopters to increase their external legitimacy. While late joiners may not have been subjected to the same political pressure to participate in a VA as early joiners were, as time passes nonparticipants could become singled out as the black sheep of the industry, especially if their environmental performance is poorer. This situation arose with the Climate Challenge program when nonparticipant firms were identified by some nongovernmental organizations (NGOs) as bad performers. For example, nine months after the creation of the program and the main meeting where the majority of participants had agreed to take part, a report by the nonprofit organization Council on Economic Priorities put the utility Virginia Power on a list of the nation's worst polluters for 'failing to participate in the U.S. Dept. of Energy's Climate Challenge program for reducing greenhouse gases, and for Virginia Power's lack of a formal environmental policy.'[9]

We hypothesize, therefore, that the level of environmental effort undertaken by a firm prior to the start of the Climate Challenge program influenced not only the firm's participation decision, but also the timing of its participation. While firms that undertook environmental efforts prior to the creation of the program had incentives to participate early to influence competition, the incentives for firms that had not yet undertaken such efforts became stronger for late joiners after a 'critical mass' of participants had joined. This leads us to propose:

> *Hypothesis 4: Early joiners of the Climate Challenge program were more likely than late joiners and nonparticipants to have undertaken efforts to reduce their emissions prior to the start of the program.*

Substantive versus symbolic cooperation

Because early and late joiners' incentives are shaped by different institutional pressures, we argue that early joiners are more likely to undertake substantive actions to reduce their environmental impact and late joiners are more likely to only symbolically participate in a program.

First, greater political pressure, strong trade association connections, and higher visibility put early joiners under more scrutiny than late joiners. As research shows, firms with different levels of visibility are likely to frame strategic change differently and to adopt different levels of implementation of management practices (Fiss and Zajac, 2006). Such scrutiny increases the likelihood that performance might be checked by regulators or environmental NGOs. Additionally, if early joiners wish to bring others into their collective action, they need to provide evidence to their competitors that they are undertaking substantive action in order for their claim of reducing their emissions to be credible.

Second, late joiners, because they don not feel as much pressure as early joiners, may just continue their course without making much change to their practices. Because they have not yet begun

[8] 'Baseline protection' is the term of used by firms and regulators to describe this phenomenon.

[9] Southeast Power Report (1995): 'Southern Company, Dominion Resources Dismiss 'Worst Polluter' Allegations' Dec. McGraw-Hill, Inc., 13.

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the process of emission reductions, late joiners have to undertake more drastic transformations since initial steps typically require the most investment, changes in procedures, and so on. (Darnall and Edwards, 2006). This can lead to path dependency in a continuation of established practices that avoid the costs and changes that would arise with full commitment to the collective strategy. Similar behavior was observed in other VAs where firms that joined late did not follow up with actions related to the agreement (Delmas and Keller, 2005).

Of course, this is possible in a context that facilitates decoupling where late joiners perceive that the risks associated with symbolic participation are small. Joining after the announced success of a program, a firm may not fear damaging the reputation of the program or being singled out. In the case of the Climate Challenge program, for example, the DOE announced in October 1996 that the electric utilities participating in the program had committed to reduce, avoid, or sequester more than 44 million metric tons of carbon equivalent by the year 2000. This represented almost half (45%) of the total cuts that the United States pledged at the world environmental summit in 1992 (DOE, 1996). It is therefore possible that companies joining a program after such a point might have believed the program was already successful and that their lack of contribution would not endanger the program's perceived effectiveness. In addition, media attention to a VA may decline over time to focus on other issues (Hoffman, 1999). Late joiners may therefore be under less scrutiny than early joiners.

In summary, because early and late joiners faced different incentives and pressures, and because the Climate Challenge program did not encourage tight coupling, it could be expected that they would adopt different cooperative behaviors within the VA. Specifically in relation to the Climate Change program, we hypothesize as follows:

> *Hypothesis 5: Late joiners were more likely to only symbolically cooperate while early joiners were more likely to substantively cooperate within the Climate Change program.*

EMPIRICAL ANALYSIS

To test our hypotheses, we collected data from a number of sources. From the DOE, we used the Climate Challenge 'participation accords' and 'letters of commitment' to identify participating firms.[10] We also used data on utilities' characteristics and environmental performance from the U.S. Federal Energy Regulatory Commission (FERC) Form Number 1,[11] from the U.S. Energy Information Administration (Forms EIA-860, EIA-861, and EIA-906), and from the U.S. Environmental Protection Agency Clean Air Market Program's Web site.[12] After merging the related databases, we retained 132 major investor-owned electric utilities representing 61 percent of the total U.S. electricity production by utilities from 1995–2000 and 75 percent of the CO_2 emitted by the electricity sector during that period. We focus on large investor-owned firms because these companies represent the majority of industry electricity and pollution generation. These are the biggest and more visible electric utilities. The results of our analysis should be extrapolated to smaller firms with a degree of caution.

Estimated model and dependent variables

Our goal was to understand the factors that explain utilities' participation in the program and to assess their performance outcomes. The decision to participate in the Climate Challenge program and the performance results were likely to be influenced by the same factors (Anton, Deltas, and Khanna, 2004; Khanna and Damon, 1999). To compare emissions outcomes between participants and nonparticipants of the program, and thus to isolate the effect of participation in a VA on environmental performance, we needed to correct for a potential endogeneity problem (Hartman, 1988; Heckman, 1978, 1979; Maddala, 1983). We therefore

[10] Utilities with more than 50,000 customers developed individual participation accords while those with fewer than 50,000 customers submitted letters of commitment. See http://www.climatevision.gov/climate_challenge/cc_accords.htm

[11] 'The Form No. 1 is a comprehensive financial and operating report submitted for Electric Rate regulation and financial audits [of major electric utilities]. Major is defined as having (1) one million megawatt hours or more; (2) 100 megawatt hours of annual sales for resale; (3) 500 megawatt hours of annual power exchange delivered; or (4) 500 megawatt hours of annual wheeling for others (deliveries plus losses)' (http://www.ferc.gov/docs-filing/forms.asp#1 accessed 18 October 2009).

[12] Utilities that report to the Clean Air Market are those that have power generating units with nameplate capacity 25 megawatt or more and those with new units that began commercial operation on or after 15 November, 1990.

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used a two-stage estimation model that simultaneously identifies the outcome of program participation (here, CO_2 emission per unit of electricity produced) and the determinants of a firm's participation decision to address this issue (Khanna and Damon, 1999; King and Lenox, 2000; Rivera, 2002; Welch *et al*., 2000).

Our other empirical challenge that differed from previous studies concerned our desire to not only explain, using the first-stage equation, the probability of participation in the VA, but also to differentiate between early and late joiners. Because we wanted to understand differences among various types of participants, we modified the traditional first-stage equation to predict the likelihood that a firm would be a nonparticipant, a late joiner, or an early joiner. In the second stage, we used the predicted values of these various types of participants to test how voluntary cooperative strategies contributed to pollution reduction.

In the *first-stage regression*, we predict participation in the VA using two models. First, a binary logit model predicts participation in the Climate Challenge program; second, a multinomial logit model predicts the three types of participants: (1) nonparticipant, (2) late joiner, and (3) early joiner. Both models are estimated by maximum likelihood (Greene, 2008).

Participation. This binary variable represents the decision of a firm to participate in the Climate Challenge program. It takes a value equal to one for the year of enrollment and the following years and zero otherwise. The Climate Challenge participation agreements were used to identify participants and the year of their enrollment in the program, and nonparticipants. These were accessed through the DOE's Web site. We use this measure as a dependent variable in the binary logit model for the first-stage regression (Model 1a). The binary logit model provides an estimation of the likelihood that a given electric utility would participate in the program. This model allows us to analyze the aggregate effectiveness of the program in the second-stage regression.

The participation model in the binary logit model is specified as follows (first stage):

$$\text{Prob (Participation}_{i,t} = 1) = F(Z'_{i,t-1}\beta) \quad \text{(Model 1a)}$$

Where *participation* is the binary dependent variable of this first stage, $Z_{i,t-1}$ is the set of exogenous independent variables, and F is the cumulative logistic distribution $F(x) = e^x/(1 + e^x) = 1/(1 + e^{-x})$.

Type of participant. This categorical variable represents the type of participant within the Climate Challenge program. Early participants were those that enrolled during the official ceremony organized in March 1995 by the DOE, and late participants were those that enrolled at a later date (end of 1995 to end of 1998). The official ceremony of March 1995 was a high-visibility event involving high-level officials, such as Vice President Al Gore. It marked the conclusion of more than a year of active negotiations between the industry and the DOE concerning the general 'rules' of the Climate Challenge Memorandum of Understanding, as well as the specific items included in each signed agreement. The utilities that we designate early adopters were active agents in these negotiations. After the Memorandum was agreed to, the DOE and each participant began work on the corresponding individual agreements. The DOE and the utilities that we identify as early adopters signed the agreements in the March 1995 official ceremony. Utilities that signed the agreement after the official ceremony, when the program was established and publicized outside of the industry, did not participate in the initial setup and configuration of the program. We created a categorical variable and coded nonparticipants as one, late joiners as two, and early joiners as three.[13] This measure is used as a dependent variable in the multinomial logit model for the first-stage regression (Model 2a). The multinomial logit model provides an estimation of the likelihood that a given electric utility would join the program late or early. This model allows us to compare the effectiveness of different types of participants. Multinomial logit handles nonindependence of these groups by estimating the models for all outcomes simultaneously, using one group as a baseline.

[13] Of the 124 agreements signed with the DOE, seven agreements were signed at the end of 1995, one agreement in 1996, eight in 1997, and two in 1998. One agreement can represent several firms because they can be signed at the holding company level.

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The participation model in the multinomial logit model is specified as follows (first stage):

$$\text{Prob (Type of Participant}_{i,t} = j) = \frac{e^{Z_{i,-1}'\beta^{(j)}}}{\sum_{j=1}^{J} e^{Z_{i,t-1}'\beta^{(j)}}} \quad \text{(Model 2a)}$$

where *type of participant* is the categorical dependent variable of this first stage and takes a value of one to three (i.e., $j = 1, \ldots, 3$), depending on the firm's group, and $Z_{i,t-1}$ is the set of exogenous independent variables.

In the *second-stage regression*, we use the predicted values of participation and the type of participant to test whether they explained reductions in emissions.

CO_2 emission per unit of electricity produced. We assess the outcome of the Climate Challenge program in terms of utilities' emissions from 1996 through 2000. The U.S. Environmental Protection Agency reports the amount of CO_2 emissions for each utility under the Clean Air Market Program. We divide this by the amount of net generation in megawatt hours (MWh) reported on Form EIA-906.

$$\text{CO2 rate}_{i,\ t} = \left(\frac{\text{CO2 emissions}_{i,\ t}}{\text{Generation}_{i,\ t}}\right)$$

This variable is normally distributed; we therefore use pooled regression (Model 1b and Model 2b) and random-effect general least squares (GLS) panel regression (Model 1c and Model 2c).

The formulations using this variable are the following (second stage):

$$\text{CO2 rate}_i = \delta\ \text{Participation}_i + X_i'\gamma + \varepsilon_i \quad \text{(Model 1b and Model 1c)}$$

$$\text{CO2 rate}_i = \alpha\ \text{Late joiners} + \eta\ \text{Early joiners} + X_i'\gamma + \varepsilon_i \quad \text{(Model 2b and Model 2c)}$$

where the variable CO_2 rate is the dependent variable that we use to measure the outcome of the Climate Challenge program. $Participation_i$ is the predicted probability of participation in the program obtained in the first stage using binary logit, and X_i is a set of control variables that could also explain reduction in CO_2 emission. The predicted probabilities for each group defined in the type of participant from the multinomial logit are *late joiners* and *early joiners.* The category of *nonparticipant* is the baseline.

Independent and control variables in the first stage

The Climate Challenge program started in 1995 and ended in 2000, but firms could only enroll until 1999. In the first stage, we examine the factors that explain the utilities' participation in the program using the independent variables with one year lagged to avoid reverse causality. Therefore, the independent variables used in the first stage are data from 1994 through 1998. We use several measures as proxy for political pressure. The first is a measure stemming from political/legislative actors in the form of the voting record of the congressional delegation (members of the U.S. Senate and U.S. House of Representatives) of the state in which each firm operates. The second measure represents a proxy of the state resources allocated to the environment as measured by the environmental agency employment relative to the total number of the state's employees. The third represents the regulatory expenses of the utility.

League of Conservation Voters. Several researchers have used the scores of the League of Conservation Voters as a measure of the elected representatives' preferences of a state (Delmas, Russo, and Montes-Sancho, 2007; Hamilton, 1997; Kassinis and Vafeas, 2002, 2006; Lubell *et al.*, 2002; Viscusi and Hamilton, 1999). Each year, the League of Conservative Voters selects environmental issues to constitute an 'environmental agenda' with a panel comprising the main U.S. environmental groups. The organization then creates an index by counting the number of times each representative or senator in Congress votes favorably on the environmental agenda (e.g., on the global warning gag rule, tropical forest conservation, or global climate change). The index ranges from zero to 100, with 100 representing a record of voting for the environmental agenda in all cases. The variable is the average of the environmental scores of the U.S. representatives and U.S. senators of the states where each utility operated (Kahn, 2002), weighted by the percentage of generation of each firm in each state for multistate utilities.

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State environmental employees. Following Kassinis and Vafeas (2006), we measure a state's long-term commitment to the environment through its investment in people as a ratio of the state's environmental agency employment to the total number of the state's employees. This method approximates the state's commitment to environmental protection and its institutional capacity to support its commitment. We collected the data on states' environmental agency employees from the Environmental Council of the States, a national, nonprofit, nonpartisan association of states and territorial environmental commissioners, and obtained the total number of state employees from the U.S. Census Bureau.

Regulatory expenses. Firm-specific characteristics might tend to make a firm subject to greater levels of political pressure (Bansal, 2005). For example, some firms may be temporarily or permanently more dependent than others on governments to obtain licenses to operate. In the electric utility sector, this may happen when firms undergo rate changes or when they want to bring new plants online (Bonardi, Holburn, and Vanden Bergh, 2006). Following Welch *et al*. (2000), we include the annual amount of regulatory expenses paid by the firm as a proxy of regulatory agency pressure. The data came from the FERC Form Number 1, and report particulars of regulatory commission expenses incurred relating to prepared cases that were submitted to a regulatory body, or cases to which such a body was party. It includes, for example, fees paid to the FERC or the costs of dockets.

Trade association membership. We measure the links between utilities and their trade association using membership of the Edison Electric Institute. Created in 1933, the Edison Electric Institute is the association of U.S. shareholder-owned electric companies. Its members serve 71 percent of end-use customers in the United States, and generate almost 60 percent of the electricity produced by U.S. electric generators. The Edison Electric Institute works closely with all its members, representing their interests and advocating equitable policies in legislative and regulatory arenas. We created an indicator in which a utility that is a member of the trade association takes the value one and zero otherwise.

Big player. To provide a proxy for visibility, we follow Delmas and Tokat (2005) and note whether a firm was among the top four sellers in a state in any of the residential, commercial, or industrial markets. For each year and state, we identify which firms were among the four big players in their states using the retail sales reported on Form EIA-861, assigning the value one when the firm was a big player and zero otherwise.

Air pollution controls. We include a measure of a firm's environmental efforts related to air pollution. The variable air pollution controls reflects the investments undertaken for the reduction, prevention, or abatement of any adverse impact of an activity on the environment reported under the category of 'air pollution control facility.' Data were obtained from the FERC Form Number 1 and include the following categories: '(1) scrubbers, precipitators, tall smokestacks, etc.; (2) changes necessary to accommodate use of environmentally clean fuels such as low ash or low sulfur fuels, including storage and handling equipment; (3) monitoring equipment; and (4) other.'

In the first stage, we also control for variables that may affect the probability of a firm being an early or late joiner. These include the level of pollution in the state, a proxy for the environmental preference in the state, the percentage of generation from fossil fuel, the productive efficiency of the firm, the size of the firm as measured by its number of subsidiaries, and year effects.

State pollution. Firms located in states with higher levels of pollution might be subjected to greater scrutiny by and pressure from environmental NGOs to undertake some action to reduce CO_2 emissions and to participate in the Climate Challenge program. We base the measure of pollution on a state's toxic emissions (the total amount of on- and off-site toxic release) for all sectors (Delmas *et al*., 2007; Kassinis and Vafeas, 2002; King and Lenox, 2000). We collected this information from the EPA's Toxics Release Inventory database. The figure for total emissions is divided by the state's land area. We construct a firm-level measure weighting this ratio by the percent of electricity generated by the utility in each state and year.

Sierra Club. In line with previous studies (e.g., Helland, 1998; Kassinis and Vafeas, 2002; Maxwell *et al*., 2000; Riddel, 2003), we measure

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the environmental preferences of the population of the state in which a firm operates based on membership figures for one of the major environmental NGOs, the Sierra Club. The measure itself is the number of dues-paying Sierra Club members per 1,000 state residents.

Productive efficiency. The ability to efficiently produce electricity has an important impact on a utility's profitability and environmental performance (Delmas and Tokat, 2005; Delmas *et al*., 2007). We estimate productive efficiency using Data Envelopment Analysis (Banker, Charnes, and Cooper, 1984; Charnes, Cooper, and Rhodes, 1978). The Data Envelopment Analysis technique uses linear programming to convert multiple input and output measures into a single measure of relative efficiency for each observation. Our construction of the measure of productive efficiency is derived from the work of Delmas and Tokat (2005). Data came from the FERC Form Number 1 (U.S. DOE, FERC Form 1, 1994–1998). The productive efficiency of a firm in a specific year is computed by comparing it with all other firms in the same year, using a program written by Coelli (1996). We use the following items as *inputs*: labor cost; plant value; production expenses; transmission expenses; distribution expenses; sales, administrative, and general expenses; and electricity purchased from other sources in MWh (Majumdar and Marcus, 2001). We consider the following *outputs*: quantities of low-voltage sales (residential and commercial); high-voltage sales (industrial, interchanges out, and wheeling delivered); and electricity for resale to other utilities in MWh (Roberts, 1986; Thompson, 1997).

Percentage of generation from fossil fuel. The type of technology a firm uses for generating electricity might explain its environmental strategies and emission levels (Delmas *et al*., 2007). Firms that generate electricity from fossil fuels, especially coal, are exposed to a higher level of pressure and scrutiny due to their emissions than those that use renewable resources. To account for these differences, and following Welch *et al*. (2000), we utilize the percentage of generation from fossil fuel using data from Form EIA-906.

Number of subsidiaries. The size of a company has been used as one of the main predictors of participation in political activity (Hillman *et al*., 2004). Size is often a proxy not only of the availability of resources within a firm, but also of the ability of a firm to affect the results of collective action. As a proxy for the size of a utility, we include the number of subsidiaries that belong to a firm as taken from the FERC Form Number 1.

Year effects. We include dummy variables for the years 1996 to 1999 in the first-stage model. We omitted the 1995 dummy to avoid overdetermination.

Independent and control variables in the second stage

In the second stage, in addition to the predicted probability of participation in the Climate Challenge program, we include variables that could also explain changes in CO_2 emissions during the 1996–2000 time frame. This includes the variables *air pollution controls* and *percentage of generation from fossil fuel* from the first stage.

Year of installation of the generating units. The age of generating units could have an impact on CO_2 emissions because it is associated with technology and the capacity to be clean. We compute the average of the years of the installation of all the generating units that belong to a utility. Form EIA-860 reports the year of installation at the facility level. We aggregate this information at the firm level based on the percentage of ownership reported in the same database.

Number of plants. The amount of a firm's emissions might be related to the number of plants under its operation. We compute the number of plants under the ownership of a firm using data from Form EIA 906.

Merger process with gas or electric utilities. We also control for the effects of merger activity that occurred during the course of the Climate Challenge program. From 1995 to 2000, 36 mergers or acquisitions were completed between investor-owned electric utilities or between investor-owned electric utilities and independent power producers (DOE, 2000). We take into account whether an electric utility was merging with one or more other electric power producers or gas producers (Delmas and Tokat, 2005; Delmas *et al*., 2007). During the

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merger process, there can be changes in the structure of a firm. For example, firms could decide to downsize the labor force, adopt similar technologies in the merged facilities, or retire some facilities. During this adjustment period, it is possible a firm will pay less attention to environmental performance and pollute more. If the utility or its holding company went through a merger process, then the indicator is one for the year before and continuing until the year after the merger is completed.

Information disclosure. The level of environmental information that firms are required to disclose in each state might affect their corresponding emissions (Delmas, Montes-Sancho, and Shimshack, 2009). Some states require electricity suppliers to provide information regarding fuel sources and emissions associated with electricity generation. In our study, if the firm generated in a state that required a full or partial environmental disclosure, the information disclosure variable takes the value one, and zero otherwise. We use information from the Database of States Incentives for Renewable Energy.[14] For multistate utilities, this variable is weighted based on the percentage of production within each state by the utility. Information disclosure was not required in the period prior to the creation of the Climate Challenge program.

Renewable portfolio standard. This variable captures the effect of operating in a state with an established renewable portfolio standard (Delmas *et al*., 2007). These standards mandate that utilities generate a specified proportion of their energy from renewable sources. We first create a variable that takes the value one if the state had a renewable portfolio standard in place, and zero if not, using the Database of State Incentives for Renewable Energy. For multistate utilities, this variable is weighted based on the percentage of electricity produced within each state by the utility. Renewable portfolio standards did not exist in the period prior to the creation of the Climate Challenge program.

Year effects. We incorporate dummy variables for the years 1997 to 2000 in the second-stage model.

[14] Interstate Renewable Energy Council, http://www.dsireusa.org/.

RESULTS

Table 1 displays the descriptive statistics for the first- and the second-stage regression.

First stage: participation model

Table 2 presents the results for the participation decision model using the binary logit and multinomial logit specification. As discussed earlier, this methodology allows us to compare the effectiveness of the participation and the different types of participants. The first column (Model 1a) contains the results using the binary logit analysis explaining the probability of participation in the VA. The second column (Model 2a1) shows the results of the multinomial logit explaining the probability of being a late joiner (as compared with being a nonparticipant). The third column (Model 2a2) displays the results of the multinomial logit explaining the probability of being an early joiner as compared with being a nonparticipant. The fourth column (Model 2a3) includes the results of the multinomial logit explaining the probability of being an early joiner as compared with being a late joiner. Models 1 and 2 correctly classify 76.12 percent and 77.95 percent of the observations, respectively.

The multinomial logit model makes the assumption that categories are independent. This is called the independence of irrelevant alternatives assumption. We use a formal Hausman, McFadden, and Small-Hsiao test, which confirmed the independence of our categories (Small and Hsiao, 1985).[15]

In the first model (Model 1a), the variables *League of Conservation Voters* and *regulatory expenses* are positive and significant at the five and 10 percent level, respectively. Firms that had a higher level of pressure from elected legislatures were more likely to enroll in the program. Firms that paid a higher amount of regulatory expenses were also more likely to enroll. Looking at the same variables in the multinomial logit models (Models 2a1, 2a2, and 2a3), we find that early joiners differed from late joiners and nonparticipants. The variables *League of Conservation Voters* and *regulatory expenses* are both significant for early joiners as compared with nonparticipants and late joiners. However, these two variables do not

[15] Results available upon request from the authors.

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Table 1. Descriptive statistics of variables used in first- and second-stage regression[a]

First-Stage Model	Mean	S.d.	1	2	3	4	5	6	7	8	9	10	11
1. Participation [b]	0.60	0.49											
2. League of Conservation Voters	45.98	22.45	0.08*										
3. State's environmental employees	3.86	1.45	0.00	−0.28*									
4. Sierra Club	1.89	3.28	−0.03	0.21*	0.02								
5. State's pollution	0.48	0.37	0.10*	−0.15*	0.21*	−0.16*							
6. Regulatory expenses	2.64	3.09	0.10*	0.03	−0.12*	0.09*	−0.10*						
7. Trade association's membership	0.78	0.42	0.08*	−0.07	−0.06	−0.03	−0.10*	0.12*					
8. Visibility/big player	0.83	0.38	0.08*	−0.07	0.27*	0.09*	0.12*	0.25*	0.20				
9. Air pollution controls	16.63	5.15	0.09*	0.03	0.11*	−0.09*	0.18*	0.03	0.01	0.03			
10. Productive efficiency	0.88	0.15	0.17*	−0.25*	0.12*	−0.12*	0.13*	0.01	0.08*	0.08*	0.02		
11. Number of subsidiaries	1.66	2.37	0.41*	0.13*	0.17*	0.06	0.22*	0.12*	0.10*	0.10*	0.14*	0.13*	
12. % of generation from fossil fuel	77.62	20.30	−0.08*	−0.34*	0.05	−0.22*	0.12*	−0.37*	−0.14*	−0.10*	0.09*	0.19*	0.03

Second-Stage Model	Mean	Sd.	1	2	3	4	5	6	7	8
1. CO_2 emissions per generation	0.93	0.66								
2. % of generation from fossil fuel	77.72	20.18	0.30*							
3. Air pollution controls	16.30	5.67	0.09*	0.08*						
4. Year of installations (average)	1957.74	11.35	−0.01	0.29*	0.05					
5. Number of plants	5.21	3.57	−0.02	−0.04	0.06	0.03				
6. Merger with electric utility	0.23	0.42	0.12*	0.11*	−0.01	0.01	0.11*			
7. Merger with gas utility	0.07	0.26	0.05	−0.06	0.03	−0.11*	0.16*	−0.05		
8. Information disclosure	0.15	0.35	0.08*	−0.09*	−0.11*	−0.15*	0.01	0.09*	0.06	
9. Renewables portfolio standard	0.12	0.32	0.04	−0.04	−0.10*	−0.16*	0.05	0.09*	0.04	0.38*

[a] N=638. Correlations with an absolute value greater than 0.08 are significant at the 5% level.
[b] 83 participating firms are included with 62 early joiners and 21 late joiners. The number of non-participating firms included in the sample is 49.

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Table 2. Logit estimates of participation in Climate Challenge program[a]

Model	Binary logit	Multinomial logit		
Dependent variable	Participants (Model 1a)	Late joiners (Model 2a1)	Early joiners (Model 2a2)	Early joiners (Model 2a3)
Reference group	Non-participants	Non-participants	Non-participants	Late Joiners
League of Conservation Voters	0.011 (0.005)*	−0.004 (0.007)	0.015 (0.006)**	0.019 (0.007)**
State's environmental employees	0.055 (0.080)	0.005 (0.105)	0.007 (0.091)	0.002 (0.110)
Sierra Club	0.013 (0.027)	0.006 (0.032)	0.003 (0.034)	−0.004 (0.038)
State's pollution	0.172 (0.329)	−0.134 (0.453)	0.175 (0.359)	0.309 (0.454)
Regulatory expenses	0.067 (0.037)+	−0.048 (0.053)	0.078 (0.040)+	0.126 (0.052)*
Trade association's membership	0.616 (0.257)*	0.090 (0.327)	0.881 (0.305)**	0.790 (0.364)*
Visibility/big player	0.378 (0.309)	−0.189 (0.390)	1.045 (0.373)**	1.233 (0.430)**
Air pollution controls	0.063 (0.020)**	−0.072 (0.024)**	0.083 (0.027)**	0.155 (0.025)**
Productive efficiency	2.507 (0.728)**	2.007 (0.944)*	3.374 (0.843)**	1.367 (1.038)
Number of subsidiaries	0.706 (0.085)**	0.385 (0.115)**	0.885 (0.102)**	0.500 (0.087)**
Percentage of generation from fossil fuel	−0.005 (0.005)	−0.015 (0.006)*	−0.001 (0.005)	0.014 (0.006)*
Year 1996	0.123 (0.297)	0.030 (0.402)	0.126 (0.337)	0.096 (0.414)
Year 1997	0.493 (0.296)+	0.059 (0.396)	0.022 (0.335)	−0.037 (0.410)
Year 1998	0.408 (0.296)	−0.108 (0.404)	−0.093 (0.333)	0.015 (0.416)
Year 1999	0.353 (0.311)	0.013 (0.416)	−0.241 (0.354)	−0.255 (0.430)
Constant	−5.309 (0.997)**	−0.169 (1.286)	−7.551 (1.217)**	−7.382 (1.425)**
Observations	638	638	638	638
% correctly classified	76.12%	77.95%		
Pseudo r-squared	0.23	0.25		

[a] Number of participating firms: 83 including 62 early joiners and 21 late joiners. Number of nonparticipating firms: 49.
Standard errors are in parentheses. + Significant at 10%; * significant at 5%; ** significant at 1%.

significantly differentiate late joiners from nonparticipants. We therefore find evidence that firms that incurred high regulatory expenses and a greater pressure from elected legislatures were more likely to be early joiners in the program. This confirms Hypothesis 1 concerning the role of political pressure in predicting early participation in the VA. The variable representing the number of state environmental employees divided by the total number of employees did not significantly influence the probability of a utility's participation in the Climate Challenge program. This could be explained by the fact that this variable may not represent the type of regulations or programs that impact an electric

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utility, and may relate more, for example, to the maintenance of parks and connected activities.

The variable *trade association membership* is a significant predictor of participation at the five percent level. It is important to note that this variable is significant for early joiners as compared with nonparticipants and late joiners. We therefore find evidence that firms that belonged to the trade association were more likely to enroll in the program and to join it early. This confirms Hypothesis 2 concerning participation in the trade association as a predictor of early participation in the VA.

The variable *Big player* shows a positive and significant sign at the one percent level in Models 2a2 and 2a3. Big player firms were more likely to enroll early in the program. This confirms Hypothesis 3 regarding the positive impact of visibility on early participation.

With respect to the effect of existing resources, the variable *air pollution controls* is positive and significant at the one percent level in predicting participation and in differentiating early joiners from both late joiners and nonparticipants. This indicates that the variable *air pollution controls* has a positive and significant effect on the odds of participating in the program and on being an early joiner as compared to a late joiner. However, this variable also differentiates late joiners from nonparticipants with a negative and significant sign at the one percent level. This means that *air pollution controls* has a negative and significant effect on the probability of being a late joiner as compared to a nonparticipant. This confirms Hypothesis 4 on the role of environmental efforts in distinguishing between early and late participants in the program.

Turning to the control variables, we find that size matters in explaining participation and differentiating among early and late joiners. The variable *number of subsidiaries* exhibits a positive and significant sign at the one percent level in all models. The bigger firms, measured using the number of subsidiaries owned by a firm, were more likely to join the program. The variable *productive efficiency* of a firm is also significant and positive. This shows that the more efficient the firm, the more likely it was to join the program. However, we note that early joiners and late joiners did not exhibit significant differences in levels of efficiency. This is consistent with the literature predicting that slack resources are a predictor of collective action (Lenway and Rehbein, 1991). The variable *percentage of generation from fossil fuel* is positive and significant to explain early joiners as compared to late joiners and negative and significant to explain late joiners as compared to nonparticipants. This indicates that early joiners were more heavily relying on fossil fuel than late joiners and therefore probably under more scrutiny and pressure to change their behavior than late joiners. Utilities with a major part of their income from fossil fuel might also have more at stake than more diversified utilities and therefore be more likely to participate in collective action strategies (Ostrom, 1990).

In both analyses, our findings do not support the claim that the environmental preferences of the population measured by the number of Sierra Club memberships per 1,000 residents affected the behavior of utilities in regard to the program. This result differs from previous studies showing the effect of such a variable on environmental voluntary activities (Maxwell *et al*., 2000). This could be explained by the fact that the Climate Challenge program is mostly an effort to preempt regulation and less to appease environmental NGOs, which may in general have looked at this particular environmental practice with suspicion. In addition, the level of pollution generated in the state in which the electric utility produced it did not have a significant effect on the decision to enroll in the program.

Second stage: outcome of Climate Challenge program model

Table 3 presents the regression results for the outcome of the Climate Challenge program with CO_2 emissions per unit as the dependent variable (second stage). Models 1b and 1c display the regression results when the probability of participation from the first stage is introduced into the equation. Model 1b is the pooled regression, while Model 1c presents the random-effects general least squares (GLS) panel model. Models 2b and 2c contain the results for the multinomial probabilities predicting late and early joiners. Model 2b is the pooled regression while Model 2c includes the random-effects GLS regression. The Lagrange multiplier (Breusch and Pagan, 1980) suggested the use of panel rather than pooled estimation. The Hausman test (Hausman, 1978) showed that a random-effects

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Table 3. Regression estimates of changes in Co2 emissions 1996–2000[a]
Dependent variable: Co2 emission per unit (Co2 emissions/generation)

	Pooled (Model 1b)	Random GSL (Model 1c)	Pooled (Model 2b)	Random GSL (Model 2c)
Probability of participation	−0.132	−0.055		
	(0.110)	(0.152)		
Probability of participation (late joiners)			0.056	0.194
			(0.171)	(0.223)
Probability of participation (early joiners)			−0.544	−0.486
			(0.127)**	(0.180)**
Percentage of generation from fossil fuel	0.008	0.005	0.008	0.005
	(0.001)**	(0.003)*	(0.001)**	(0.002)*
Air pollution controls	−0.000	−0.008	−0.006	−0.012
	(0.004)	(0.005)	(0.003)+	(0.005)*
Year of installations (average)	−0.005	−0.002	−0.005	−0.002
	(0.003)*	(0.004)	(0.003)*	(0.004)
Number of plants	−0.005	−0.002	0.002	0.005
	(0.007)	(0.010)	(0.006)	(0.010)
Merger process with electric utility	0.104	0.068	0.104	0.074
	(0.086)	(0.089)	(0.085)	(0.088)
Merger process with gas utility	0.104	0.139	0.107	0.142
	(0.155)	(0.151)	(0.154)	(0.151)
Information disclosure	0.105	0.056	0.046	0.030
	(0.116)	(0.116)	(0.116)	(0.115)
Renewable standard portfolio	−0.016	−0.002	−0.025	−0.011
	(0.121)	(0.136)	(0.124)	(0.138)
Year 1997	0.035	0.016	0.038	0.017
	(0.043)	(0.043)	(0.043)	(0.043)
Year 1998	0.029	0.032	0.025	0.028
	(0.051)	(0.045)	(0.049)	(0.042)
Year 1999	0.081	0.093	0.070	0.083
	(0.082)	(0.075)	(0.085)	(0.077)
Year 2000	0.231	0.244	0.229	0.237
	(0.113)*	(0.103)*	(0.111)*	(0.101)*
Constant	10.711	4.090	10.888	4.141
	(5.157)*	(7.829)	(5.107)*	(7.774)
Observations	638	638	638	638
R-squared$_{(\text{adjusted model b/overall model c})}$	0.15	0.16	0.17	0.20
$\chi_{(Breusch-Pagan)}$		104.27 [0.0000]**		101.65 [0.0000]**
$\chi^2_{(Hausman)}$		13.57 [0.4045]		14.07 [0.4448]

[a] The estimated values are unstandardized coefficients. Standard errors are in parentheses. The corresponding p-values for Breusch and Pagan and Hausman tests are in bracket.
+ Significant at 10%; * significant at 5%; ** significant at 1%.

model is more appropriate than a fixed-effects model.[16]

In the first models (1b and 1c), the probability of participation is not significant. This means that there is no significant difference between participants in the Climate Challenge program and nonparticipants in terms of the reduction of their CO_2 emissions. In the second set of models (2b and 2c), the probability of participation for early joiners is negative and significant at the one percent level. This shows that, among participants, only early entrants reduced their emissions significantly

[16] Results available from the authors upon request.

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more than nonparticipating firms. If a utility with average CO_2 emissions equal to 0.69 tons per MWh in 1996 (the U.S. average of CO_2 emissions in the electric industry in that year) decided to participate early in the Climate Challenge program, it would exhibit CO_2 emissions of 0.204 tons per MWh in 2000 (the other variables being held constant). This means a relative decrease of 14.1 percent for early joiners as compared to a relative reduction of 1.6 percent for all participants (early and late joiners together). This confirms Hypothesis 5, which states that early joiners were more likely to undertake substantive cooperation than late joiners.

Turning to the control variables, the variables *percentage of generation from fossil fuel* and *air pollution controls* are positive and significant at the five percent level in Model 2c and at the one percent level and the 10 percent level respectively in Model 2b. Firms with a higher percentage of their generation from fossil fuel increased their emissions. Firms with higher levels of investments in air pollution controls decreased their emissions. The variable year of installation is negative and significant at the five percent level in Model 2b, indicating that older plants were more likely to increase their emissions over time. The variables representing mergers with electric and gas utilities are not significant. Firms undertaking mergers did not seem to be paying less attention to environmental performance than other firms. Likewise, the variables representing disclosure and renewable portfolio standard policies in the states where a firm operated are not significant. The explanation could be that these policies were implemented toward the end of our study period and more time may be needed to show some effect on performance. The variable associated with the year 2000 is significant, implying an incremental change in CO_2 emissions in the year 2000, compared with the reference year 1996.

DISCUSSION AND CONCLUSION

We have identified key factors that explain firms' cooperative behavior within VAs. We analyzed three types of cooperative behavior: noncooperation, symbolic cooperation, and substantive cooperation. Noncooperation represents the behavior of firms that did not participate in the VA. Substantive cooperation includes firms that participated in the VA and improved their environmental performance. Symbolic cooperation signifies firms that participated in the VA but did not improve their environmental performance significantly more than nonparticipants. Our results show that early joiners and late joiners of the Climate Challenge program adopted different types of cooperative behavior. Substantive cooperation resulting in reductions in emissions was more likely with early entrants than with nonparticipants. However, we find no significant relationship between late entrant participation in the program and reduction in emissions.

We found that these differences in cooperative behavior are explained by the different institutional pressures experienced by early and late entrants and by their previous levels of investment in environmental improvements. Early entrants were subjected to a higher level of political pressure at the state level, and were more dependent on local and federal regulatory agencies. They were also better connected to the trade association and more visible. When considering investments in environmental improvements, late joiners were also significantly different from early joiners and nonparticipants. In particular, they had undertaken less investment in air pollution controls than early joiners and nonparticipants prior to the creation of the program. Late joiners might have had less at stake than early joiners. Although they may have found some advantage to participation, they did not undertake substantive change to their operations.

We also assessed the overall effectiveness of the program at reducing firms' emissions and found no significant difference between participants overall and nonparticipants in the reduction of their emissions. Even though early entrants reduced their emissions significantly more than nonparticipants, when late joiners are included in the analysis, the program overall does not seem to have been effective at reducing emissions. An important question remains: why would early joiners tolerate symbolic participants? As Lenox (2006) suggests, it is possible that some members are willing to tolerate symbolic behavior rather than quit because their continued participation is necessary to maintain the institution. The participation of all, regardless of their actual level, is better than the participation of fewer firms undertaking substantive action. As we show, early joiners have more at stake than late joiners. They are under more political pressure and are also more visible. Defection by substantive

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contributors to the program would attract attention and even conceivably lead to the collapse of the agreement. Another puzzling factor is the inattention of stakeholders to the actual performance of participants. This phenomenon seems consistent with studies of other voluntary agreements where the appearance of performance rather than actual performance was sufficient to attain legitimacy (King and Lenox, 2000; Rivera and DeLeon, 2004). Research in other sectors, such as corporate governance, has also shown that symbolic action could be positively received by stakeholders (Westphal and Zajac, 1998; Fiss and Zajac, 2006).[17]

Our research advances theory in several ways. We started by pointing out that the corporate political strategy literature was limited in its ability to explain differing collective action behavior because it treated cooperation as static and dichotomous. Helping to respond to the call by several scholars to study the issue of timing in corporate political strategies in more detail (Bonardi, Hillman, and Keim, 2005), our study teases out the institutional pressures that explain different types of cooperation over time. Our findings show that it is very important to analyze various modes of cooperation and to understand their temporal variation. In particular, we highlight some of the dynamics at stake that may encourage symbolic cooperation in a VA and reduce its credibility. We were also able to demonstrate how the social context in which a firm operates affects its level of engagement in collective corporate strategy. Early joiners and late joiners of the Climate Change program operated in very different institutional fields. Early joiners were more connected than late joiners to the industry and more dependent on regulators. The analysis of VAs as a form of corporate political strategy proves to be particularly interesting because these arrangements include cooperation between firms and the government as well as cooperation among firms. We show the importance of analyzing preexisting relationships among these actors to predict the level of cooperation within VAs.

Our study also makes contributions to the institutional theory literature. This literature argues that early joiners are mostly interested in the technical efficiency of a practice, while followers are subjected to more institutional pressures. In this stream of research, early joiners are considered to function outside of their institutional context. As Westphal *et al*. noted, earlier adopters are 'motivated by the opportunity for efficiency gains and free from the 'iron cage' of isomorphic pressures' (Westphal *et al*., 1997: 374). In our study, we challenge these assumptions. We find that early joiners respond to political pressures at the state level, as well as to peer pressure exerted by their trade association. We also find that early joiners were more visible. This is consistent with the findings of Bansal (2005), who identifies the presence of media pressure to be associated with early disclosure of environmental management practices. However, Bansal's study did not relate media pressure to the timing of participation in collective action, nor did it analyze differences in actual environmental performance between firms that did disclose information and those that did not.

In addition, we advance the institutional literature by describing key pressures faced by early joiners, and by linking them to performance. In contrast to the trend in institutional literature to explain convergence toward similar behavior or isomorphism, our study links institutional pressures and incentives to divergence of behavior over time. Furthermore, while previous studies have shown a positive relationship between the number and the quality of initial adopters and subsequent adoptions of technological and administrative innovations, we show that this may not always occur. For example, Rosenkopf and Abrahamson suggest that initial adopters with strong reputations could intensify pressure on other organizations to imitate by adopting the practices of initial joiners (Rosenkopf and Abrahamson, 1999). Our results show that even if firms decided to join the program to be associated with 'high-quality' early joiners—here, firms that have undertaken efforts to reduce their emissions—this does not mean they committed to the same type of actions within the program. We conclude, therefore, that the quality of performance by early adopters does not guarantee the quality of that by later adopters. Other factors need to be examined to reveal and explain the different types of cooperative behavior. We find that institutional pressures and previous investments are the most important predictors of the type of cooperative behavior.

[17] For example, Westphal and Zajac (1998) showed that the stock market reacted favorably to the symbolic adoption of long-term incentive plans even if such plans were not implemented.

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The electric utility sector constituted an opportune field for analysis of the issue of the effectiveness of collective political strategies within the context of the natural environment for several reasons. Because the electric utility sector is highly regulated and also because electric utilities are among the leading polluters in the United States, this is a sector where nonmarket strategies may be more prominent than in other sectors. However, collective political strategies in the context of the environment are coming to the forefront for many other industries facing increasing environmental regulatory oversight. This study can, therefore, help to illuminate collective corporate strategies, such as VAs, that are emerging in other sectors. As the focus of analysis, the Climate Challenge program is representative of most of the VAs currently implemented, the majority without sanctioning mechanisms. Our model identifies conditions that trigger different types of behavior within VAs and points to the limits of VAs lacking sanctions to promote cooperative behavior. Such findings are particularly relevant for policy makers. The U.S. Environmental Protection Agency has typically encouraged a group of very well-known and successful organizations to take the lead in participating in voluntary programs, hoping that these firms would set an example. Our findings suggest that this strategy might not always be effective because followers may only collaborate symbolically and jeopardize the overall effectiveness of the program. We suggest that policy makers who wish to design effective environmental agreements need to adjust the design of VAs for factors that trigger substantive or symbolic cooperation. Our study also suggests that 'one-size-fits-all' VAs might not be the most effective way to entice substantive participation from corporations. As Olson (1965) showed, larger group size tends to discourage individual participation in several ways. In this case, the large group size means that nonparticipation involves little social cost, whereas in a small group, a firm would be risking social censure and possibly retaliation. Policy makers could therefore design VAs with various levels of membership according to their performance level. This type of approach was implemented in the Leadership in Energy and Environmental Design (LEED) certification system (Corbett and Muthulingam, 2007).

Our study has several limitations. First, we studied the factors that could reduce the effectiveness of a VA in terms of its ability to get its members to cooperate substantively. However, we did not assess whether the Climate Challenge program specifically was successful at changing political outcomes. This is beyond our study, and would necessitate identifying whether changes in the political landscape, independent of the Climate Change program, reduced the level of threat that more stringent regulation would be put in place. Second, our study does not take into consideration the other strategic choices that firms could or did pursue outside their participation in the VA. Such choices could include, for example, lobbying (de Figueiredo and Tiller, 2001). Further research is needed to look at the interaction of various strategies and how they influence the likelihood that a firm will undertake substantive or symbolic cooperation within a VA. Third, while we analyzed firms' regulatory expenses, we did not obtain information on utilities' managerial style or organizational structure. For example, further research could survey electric utilities to identify how the size or the organizational influence of electric utilities' legal departments impact cooperative behavior (Edelman, 1992; Delmas and Toffel, 2008). Finally, we focused on cooperative strategies in the United States, showing that variations in political pressure exerted by regulators at the state level are important predictors of such strategies. In other contexts, scholars have shown that national regulatory environments impact corporate political activity (Hillman and Wan, 2005; Murtha and Lenway, 1994). For example, Delmas and Terlaak (2002) have shown that participation in voluntary programs differs across nations. It would be useful to analyze the effect of differing national regulatory settings on the willingness of firms to cooperate within VAs. This is particularly important in the case of climate change being the major transboundary issue of our time where the potential of VAs could be significant—either negatively or positively.

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