Regulation & Governance

Regulation & Governance (2012) doi:10.1111/j.1748-5991.2012.01140.x

Incentivizing self-regulation: Federal vs. state-level voluntary programs in US climate change policies

Lily Hsueh and Aseem Prakash
University of Washington, Seattle, WA, USA

Abstract

How does program sponsorship influence the design of voluntary programs? Why and how do voluntary programs on climate change sponsored by the state and federal governments in the United States vary in their institutional design? Scholars emphasize the signaling role of voluntary programs to outside stakeholders, and the excludable benefits that induce firms to take on non-trivial costs of joining voluntary programs. Scholars have noted several types of benefits, particularly reputational benefits programs provide, but have not systematically studied why different programs emphasize different types of benefits. We suggest that excludable benefits are likely to take different forms depending on the institutional context in which program sponsors function. We hypothesize that federal programs are likely to emphasize less tangible reputational benefits while state programs are likely to emphasize more tangible benefits, such as access to technical knowledge and capital. Statistical analyses show the odds of a voluntary program emphasizing tangible benefits increases by several folds when the program is sponsored by the state as opposed to federal government.

Keywords: environmental policy, state and federal government policy, voluntary programs.

1. Introduction

Public law, often termed as command and control, is the key pillar of environmental governance across the world (Revesz 2001; Stavins 2004; Borck & Coglianese 2009). In recent years, new instruments have emerged to supplement the extant regulatory mode. These include information-based regulations (Toxics Release Inventory), collaborative partnerships (watershed partnerships), and market-based approaches (cap and trade mechanisms).[1] Importantly, Coglianese (2008) notes a "managerial turn" in environmental policy because regulators recognize that firms play a key role in solving environmental problems and firms' internal management needs to be shaped with this objective in mind (Geiser 2001; Coglianese & Nash 2006). One such managerial approach is voluntary programs which impose obligations on participants that are beyond the legal requirements (or where the law is silent) to induce them to contribute to the production of environmental public goods.[2] Because such efforts are expensive, in return for their efforts, participants receive excludable benefits, both tangible and non-tangible (Prakash

Correspondence: Lily Hsueh, Evans School of Public Policy, University of Washington, Box 353055, Seattle, WA 98195-3055, USA. Email: lhsueh@u.washington.edu

Accepted for publication 13 March 2012.

& Potoski 2006). Excludable benefits are membership benefits, which actors sponsoring the voluntary programs dispense in order to recruit participants. These benefits are "excludable" to the extent that only participants have access to them; this thwarts free-riding by nonparticipants.

Voluntary programs have proliferated across issue areas (Coglianese & Nash 2001; Vogel 2005; Hsueh & Prakash 2012) and across the globe (Fiorino 1999; Morgenstern & Pizer 2007; Prakash & Potoski 2012). For example, voluntary programs for increasing energy efficiency and curbing toxic chemical use have been established in the US, Canada, France, Germany, Japan, and the United Kingdom, among other industrialized countries (Dietz & Stern 2002; Price 2005; Morgenstern & Pizer 2007; Arimura *et al*. 2008; Hsueh 2012). Importantly, these programs are sponsored by supra-national structures such as the European Commission, national and state governments, nongovernmental organizations (NGOs), and trade associations. The US Environmental Protection Agency (EPA) has sponsored close to 100 programs while there have been over 300 programs reported by the European Environmental Agency, and 30,000 voluntary programs in Japan (Morgenstern & Pizer 2007).[3]

Scholars have studied how voluntary programs emerge and diffuse, and their efficacy. There is less work on how the characteristics of the sponsoring actors and their institutional environment influence program design, specifically the forms in which programs supply program benefits to their participants. Indeed, much of the literature treats program design as exogenous. Because program sponsors have different attributes and function in different institutional environments, we expect voluntary programs to vary in their design, which has important consequences for public policy.

To test the link between sponsorship and design, we examine voluntary programs in the context of climate change mitigation, sponsored by US regulators who are otherwise charged with enforcing command and control regulation. To control for the national context, we focus on the United States. The US federal system offers an interesting context to unpack the category of "regulators" into federal and state regulators. This allows us to understand their varying strengths and constraints regarding program sponsorship. We believe the insights developed in this paper regarding the link between sponsorship and design should inform the discussions on voluntary programs in other "federal" systems including the European Union, its member countries, and their regions.[4]

Voluntary program literature focuses on two design dimensions – stringency of obligations and tools for monitoring and enforcement – which signal the extent to which the program will encourage environmental stewardship (King & Lenox 2000; Potoski & Prakash 2009), and allow outside stakeholders to assess program quality. Scholars have explored the drivers of program benefits because participation levels in voluntary programs are influenced by perceived program benefits in relation to program costs. However, scholars have not systematically discussed the link between program design and the types of benefits the program offers. This paper moves the discussion on program benefits in a new direction. Instead of focusing on *levels* of excludable benefits programs offer to their participating members, we examine how programs might systematically offer different *types* of excludable benefits. In particular, we study how characteristics of the sponsoring actors and the institutional environment in which they function influence program design and therefore the specific forms in which their programs supply excludable benefits.[5] This is because program sponsors have different motives, competencies, and face different types of institutional pressures which influence the design of the

program they have established.[6] Thus, instead of taking program design as exogenous, we endogenize it with particular attention to the characteristics of the program sponsor.

Holding the issue area and the national context in which the programs function constant (climate change in the US context), we examine the influence of sponsorship on program design. Typically scholars examine how programs sponsored by NGOs might differ from those sponsored by trade associations (Sasser *et al.* 2006), or how programs sponsored by regulators might differ from those sponsored by some other actors (Darnall *et al.* 2010). We unpack "regulators" as a category of program sponsors and focus on varying institutional contexts in which state and federal regulators in the United States function. We speculate that ways in which excludable benefits are provisioned in voluntary programs sponsored by federal regulators and state regulators will differ because of variations in the institutional contexts in which these regulators function. Our claim is that all else being equal, program design reflects the context in which the program sponsors function. While other factors might also matter, we are interested in the marginal effects of sponsorship on design. The use of statistical techniques allows us to test the hypothesis such that, all else being equal, we expect federal regulators to focus on intangible benefits while state regulators will focus on tangible benefits such as technical knowledge and financial benefit. While beyond the scope of our study, we believe such differences among programs sponsored by regulators functioning at different scales should be observable in other countries, particularly in federalist systems.

While most major environmental regulation in the United States derives from federal statutes, state action on the environment was seldom far behind, sometimes even ahead of federal action. Before the 1970s, which mark the era of extensive federal involvement, some states had made strides in tackling air pollution problems (Revesz 2001). Devolutionary trends, which began in the mid-1970s and hastened after President Reagan's "new federalism" program (Ringquist 1993), created the policy space for states to emerge as policy laboratories (Klyza & Sousa 2008). The role of the states in environment policy is likely to remain critical through the presidency of Barack Obama, particularly in a context of increased fiscal pressures at the federal level and in the absence of national legislation addressing climate change mitigation.[7]

Public policy scholars have tended not to focus on the relationship between federal and state governments' roles in environmental policy. With the exception of the literature on federal preemption of state regulations and a related literature on state authorization, most research either focuses on the state level or the federal level but generally not comparing both. However, the literature on state authorization and primacy offers some guidance on the determinants of "cooperative federalism" or the hybrid of state and federal policy in response to environmental challenges (Kincaid 1990).[8] The literature suggests that there is a division of labor between the state and federal governments in environmental governance. While most major environmental statutes in the US are created at the federal level (e.g. Clean Water Act, Resource Conservation and Recovery Act), states can voluntarily exercise a fair level of control for implementing, monitoring, and enforcing regulation through a formal process whereby the federal government grants the state "authorization" or "primacy."

By contrast, legal scholars of regulatory federalism have long debated the merits of environmental regulation at different scales of governance – the state government versus the federal government. Our paper does not seek to adjudicate these debates.[9] Rather, we draw insights from the state authorization literature on the role of the federal and state

governments in environmental policy, and the environmental law and federalism literature to explain the institutional logic of how voluntary programs are designed at the state and federal levels in the US.[10]

Following Rabe *et al.* (2005), we suggest voluntary programs on climate change mitigation should also be viewed as economic development initiatives. Indeed, our data shows that in about 80 percent of cases, states emphasize economic development as an important objective of their voluntary program. Importantly, along with the development dimension, states' power to permit, inspect, and enforce is likely to be correlated with their ability to offer informational benefits (as opposed to reputational benefits).

Our empirical analysis focuses on federal and state sponsored voluntary programs across a variety of sectors – agriculture, buildings, power generation, transportation, and waste management – which are key emitters of greenhouse gases. We draw on the EPA's database, which provides us with information on 129 voluntary programs;[11] detailed information about individual programs is obtained from their respective websites. We perform a large-N statistical analysis to evaluate the likelihood that a voluntary program offers informational and financial benefits rather than reputational benefits as a function of the program's sponsorship – our key explanatory variable of interest – plus other variables such as media type, state partisanship, participant target size, funding source, and industry characteristics.

Our paper is structured in the following way. In section two, we examine the relationship between program design and program sponsorship. We identify conditions under which programs can be expected to emphasize tangible informational and financial benefits, as opposed to the less tangible reputational benefits. We theorize about the systematic difference in the logic that underpins federal and state programs in the US climate change policy. In section three, we test our argument with a statistical analysis in which we establish a (correlational) relationship between excludable benefits and program sponsorship. Finally, we conclude by identifying lessons for climate change policy and the literature on voluntary programs.

2. Program design and program sponsorship

Voluntary environmental programs impose "beyond compliance" obligations on participating members, which are expected to lead to the provision of environmental public goods. Because such provision is expensive and not required by the law, these programs compensate their participants by providing some type of benefit. To check "free-riding" by non-members who want to bask in the warm glow of membership in environmental stewardship programs without paying the costs, these benefits need to be "excludable" (Potoski & Prakash 2009) in the sense that they can be appropriated by program participants only. In emphasizing the excludable nature of benefits to curb free riding, scholars focus predominantly on *intangible* benefits such as goodwill, reputation, or more broadly, compliance with the social license to operate (Gunningham *et al.* 2003). Program members enjoy such benefits by associating with the program "brand," often by displaying the program logo on their products or in corporate communication.[12]

In addition to intangible benefits, firms might be motivated to participate in voluntary programs to appropriate benefits that are more *tangible* in nature (Coglianese & Nash 2006). Two types of tangible benefits are relevant here and we term them as "first-order" and "second-order" benefits. The former pertains to access to technical

knowledge, assistance, and financial capital. Like brand reputation, technical knowledge is non-rival but excludable. By joining a program, members can have access to technical information about new technologies or processes and assistance that non-members do not possess. Moreover, a member's use of the new knowledge and assistance does not diminish it for the consumption of others (up to a certain point due to congestion or boundary condition).

In addition to technical knowledge and assistance, some government sponsored voluntary programs offer financial capital to program participants. Access to financial capital shares a similar logic as technical knowledge and assistance – up to a point. Depending on the levels of the budgetary support a sponsoring regulator has at his disposal, access to financial assistance may become rivalrous at some stage. The key point is that access to such funds is contingent on program membership. In acquiring information and capital, program members are incentivized (and voluntarily obligated) to reduce pollution, such as the emissions of greenhouse gases, and therefore supply positive social externalities. Because the main objective of voluntary programs that emphasize technical assistance and scarce capital is to induce members to "open the door" to new technologies and establish best practices, such programs will tend to be more inclusive in relation to programs that offer positive brand reputation.

There is a second-order benefit from joining voluntary programs: the ability to corner the "first mover advantage," which allows program members to shape future technological and regulatory trajectories. For example, the acquisition of new technologies might enable firms to enter a new market (e.g. renewable energy technologies) and help standardize technologies in which they have prior competencies (Nehrt 1998). Similarly, given that much of the regulation emphasizes the use of best available technologies, acquisition of untried technologies might enable program members to acquire competencies in a technology, which has the potential to become the baseline technology for future regulation (e.g. state or federal greenhouse gas emission limits). Thus, the "first mover advantage" benefits include the ability to help set the technological and regulatory baselines and to register patents and trademarks that will safeguard them in the future. Early profits can be re-invested in improving the resource base. Programs that provide "first mover advantage" as a type of tangible, non-rival, and excludable benefit mitigate the costs and risks that firms must overcome to gain control of resources that non-participants may not be able to appropriate.

This raises an obvious question: why won't *all* firms join such programs? While profit-seeking firms can be expected to desire the "first mover advantage," not all firms have the administrative or technical capacity necessary to fulfill program obligations. Simply put, systematically absorbing technologies is expensive. Firms vary in their abilities and volition to experiment with relatively untried technologies. In joining a program, participants incur risks, which vary depending on the type and stringency of obligations imposed by the program on its members. We speculate that the risk of moving away from the status quo becomes a de facto barrier to program membership.

Our key hypothesis is that, all else being equal, the form in which a voluntary program offers excludable benefits depends on the institutional context in which the program sponsors function. In the context of the United States, we posit that there is an implicit specialization between programs sponsored by state and federal regulators. Consequently, federal and state programs are likely to favor different types of excludable benefits. This is not to say that states are always in the forefront in environmental

protection; indeed in several instances federal regulators have taken the lead. Our claim pertains only to variations in program design. In this regard, we draw insights from the state authorization literature on the role of the federal and state governments in environmental policy, and the environmental law and federalism literature to explain the institutional logic of how voluntary programs are designed at the state and federal levels.

While scholars of regulatory federalism do not specifically identify voluntary programs as potential state level policy initiatives for competition with other states, we suggest that voluntary programs directed at climate change mitigation could very well be a part of the mix of policy initiatives that states include in their "competitive strategy portfolios" (Rabe *et al.* 2005, p. 3). In fact, interviews with several directors of climate change voluntary programs in various states confirm that economic development has been an important concern or objective in the creation of their programs.[13] This bears out empirically: at least 80 percent of the state programs in the EPA database, from which we obtain data on voluntary programs, have economic development and/or related considerations as their program objective(s).

Consider the case of Texas which has tended to accentuate the non-climate benefits in implementing "renewable portfolio standard (RPS),"[14] including opportunities to secure a more diverse and reliable electricity supply, to create entrepreneurial opportunities for renewable energy developers, and to reduce conventional air contaminants. Over half of the fifty US states have also emphasized economic development gains when adopting similar RPS standards. Many states have enacted RPS legislation in part in reaction to concerns about rising global energy prices under the assumption that local renewable sources would protect them from future energy price fluctuations (Rabe *et al.* 2005). States have positioned themselves strategically with respect to climate change mitigation for the purpose of ensuring economic development.

First of all, when states pursue economic development there are likely to be different goals and constraints facing the state regulatory agency than the federal government. Unlike their federal counterparts, state environmental agencies are more likely to face a wider range of stakeholders and micro level pressures in their pursuit of economic development. Likewise, states must consider their respective economic advantage. Wiener and Koontz (2009) find that for renewable energies, the concern over the stability of the price of electricity, the potential job creation associated with renewable energy technologies, and the desire to be perceived as an environmental policy leader by environmentally conscious contingencies, are the key factors driving certain states to adopt policies in support of small wind energy.

We offer two examples: the New Jersey Clean Energy Program and Wisconsin's Focus on Energy program. In 1999, the New Jersey State Legislature passed the Electric Discount and Energy Competition Act to "lower the current high cost, and improve the quality and choices of service, for all of this State's residential, business and institutional consumers, and thereby improve the quality of life and place this State in an improved competitive position in regional, national and international markets."[15] The new law authorized the New Jersey Board of Public Utilities to "approve alternative forms of regulation in order to address changes in technology and the structure of the electric power and gas industries; to modify the regulation of competitive services; and to promote economic development."[16] Under this charge, the New Jersey Board of Public Utilities created the New Jersey Clean Energy Program to "promote increased energy efficiency and the use of

clean, renewable sources of energy including solar, wind, geothermal, and sustainable biomass" (2008 Annual Report, p. 5).[17]

The New Jersey Clean Energy Program provides education, information, and financial incentives to the State's residents, business owners, and local governments to encourage them to adopt renewable energy systems and energy efficiency measures. An area of emphasis for the New Jersey voluntary program has been in green job training. The program offers special courses as well as funding non-profit centers, such as The Hispanic Family Center of Southern New Jersey and the Lincoln Park Coast Cultural District, to train interested individuals to work in companies that produce or market renewable energy technologies. According to the New Jersey Clean Energy Program's 2008 annual report: "The result for New Jersey is a stronger economy, less pollution, lower costs, and reduced demand for electricity (2008 Annual Report, p. 5)."

Likewise, Wisconsin's Focus on Energy was established to help "Wisconsin residents and businesses manage rising energy costs, promote in-state economic development, protect our environment and control the state's growing demand for electricity and natural gas."

Wisconsin's Focus on Energy achieves these objectives by working with Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects. The program dispenses information, resources, and financial incentives "to implement projects that otherwise would not get completed, or to complete projects sooner than scheduled."[18] One unique feature of the Wisconsin's Focus on Energy is its investment in "Environmental and Economic Research and Development." The program supports research projects that address "the interconnections among energy use, environmental quality and economic stability," which have been determined by the Wisconsin State Legislature to be a policy priority.

In pursuing a multiplicity of goals, states are likely to sponsor programs that offer informational and financial benefits to promote new markets, create jobs, and stabilize prices, and to signal environmental leadership. When these goals are met there is an increased likelihood for a state to attract more businesses and jobs to the state, and thus fuel economic growth in the state. A positive outcome leads to a self-reinforcing cycle (Rabe *et al*. 2005).

Moreover, to achieve economic development goals, states may wish to target specific sectors or segments of a given sector, or specific populations. A state's local knowledge about whom and which sector or subsector to target could reap substantial gains in economic growth and social welfare enhancements for the state. Adler (2005; 2012) contends, "differences in geography, climate, and local demographics can influence – if not determine – what sorts of policies best fit a given part of the country . . . [States are free to account for regional variation . . . and overcome the knowledge problem (Adler 2012, p. 92, p. 137)."

Adler (2012) goes on to argue that well-intentioned policies devised by experts in a federal regulatory agency might not translate well to a given local context, often because of the failure to account for local knowledge. Those same experts also might be unaware of what problems are, or should be, of greatest concern. Those closest to a given environmental concern or economic need in a specific industry or to a specific constituency are more likely to recognize and understand it. Accordingly, to compete with other states for new opportunities for economic growth, a state is likely to educate, demonstrate, and disseminate best practices and dispense funds to encourage members to "open the door"

to new ideas and technologies in a populace, sector, or subsector. If these new ideas and technologies are viable they could potentially spawn new sectors that could bring more jobs and wealth to the state.

To illustrate, there are a handful of programs across states that focus on the education and demonstration of renewable energy technologies and the promotion of energy efficiency in K-12 schools. For example, *Missouri Schools Going Solar*, *New Hampshire Solar on Schools Program*, Oregon and Washington's *Solar 4R School*, and Rhode Island's *Solar on Schools* are four voluntary programs that share similar logic in their program design. For these programs, renewable energy education to primary and secondary school children is their main objective. States target the public school system in a way that the federal government, by virtue of being further away, would not have the ability to – states use their first-hand knowledge of their respective public education system and respective renewable energy industries to construct and tailor programs and attract participating schools. These state programs work with contractors to install solar panels at participating schools and provide them with renewable energy curriculum and a web-based data system to monitor system performance. Financial assistance is offered to participating schools as part of the program to offset costs involved in these efforts. Also, most programs require member schools to site solar technologies in a location of high visibility to the wider community as a public education initiative about renewable energy more generally.

These programs and others (e.g. New York State's Environmental Product Development Program and the Minnesota Renewable Hydrogen program, among others) underscore the salience of states' targeting of specific sectors and populations as an important consideration and rationale for the type of excludable benefits that states are inclined to offer relative to the federal government. New ideas and technologies often require sector specific expertise, geographically specific knowledge of terrain and foliage, and experimentation and learning for best results; the former of which state programs possess when it is a sector the state has comparative advantage vis-à-vis other states and the federal government, and the latter of which state programs have an advantage over federal programs in facilitating because of their physical proximity.

Furthermore, states may offer technical assistance and/or financial capital as excludable benefits in the voluntary programs they create because they would like to experiment with new approaches that could potentially be considered a policy model for other states or for the nation as a whole. There are a handful of state-level voluntary programs in the EPA database that cohere to this institutional logic.[19] For example, the abovementioned New Jersey Energy Program is one such program that possesses the ambition to be an environmental policy leader among states. The State boasts: "New Jersey is one of the fastest growing markets for solar photovoltaic in the United States and is second only to California in terms of installations and installed capacity."[20] The State credits much of its leadership to the Clean Energy Program's financing opportunities for program participants, including a market-based system for Solar Renewable Energy Certificates (SRECs), in which solar energy suppliers can generate enough revenue for the first fifteen years of solar installation projects by selling their certificates.

Another leading voluntary program is the California Climate Action Registry, which is now part of the Climate Registry, a non-profit GHG emissions registry that provides the tools and resources for businesses and governments to calculate, verify, report, and

manage GHG emissions in a publicly transparent way. Other state sponsored voluntary programs that have also sought to create a policy model for managing and/or reducing GHG emissions are Oregon's Greenhouse Gas Offset Partnership Program (now the Climate Trust), the New Hampshire Green House Gas Registry (now part of the Regional Greenhouse Gas Initiative, which goes beyond documentation to the trade of GHG emissions), and New Jersey's Greenhouse Gas Reduction Covenant Initiative.[21] While none of these state sponsored voluntary programs exists in their original form today, their current respective reincarnations reflect their original goal (with the exception of now on a regional rather than state level), of being the first or among the first to take action against GHG emissions while the federal government had stalled to take action.

Take for example the California Climate Action Registry. California Climate Action Registry's archived website declares: "Members of the California Registry served as true leaders in environmental responsibility. They were among the first in the world to measure their emissions according to comprehensive and rigorous standards and make their emissions publicly accessible online." Moreover, not only was the California Climate Action Registry a leader, "the California Registry and its members influenced California climate change policy, such as Assembly Bill 32 (AB 32) and worked to ensure proper recognition from the state for early actions to reduce emissions."[22]

Along with these above-mentioned rationales, states' power to permit, inspect, and enforce is also likely to be correlated with their ability to offer tangible benefits (as opposed to reputational benefits). While firms might be willing to demonstrate environmental stewardship by participating in voluntary programs, it may not be to their advantage economically to invest in pollution abatement. Indeed Koehler (2007) suggests that firms might choose to participate in voluntary programs only to fail on performance because they don't have the economic incentives or resources to actually follow-through. Since US facilities tend to face significant marginal abatement costs (McClelland & Horowitz 1999; Rezek & Campbell 2007), unless compelled to do so through more tangible forms of excludable benefits, most facilities would not invest sufficiently in pollution abatement technology. Given the states' power as well as physical proximity to regulated entities with respect to permitting, inspection, and enforcement, states are able to "open the door" to new technologies for pollution prevention as well as pollution abatement by dispensing financial capital and technical assistance to targeted sectors, firms, and populations in the context of voluntary programs.

By contrast, the federal government has a comparative advantage to the states in offering intangible, reputational benefits to induce participation in voluntary programs. In addition to the clout the EPA brand carries both domestically and abroad, the federal government is in a better position than the states to offer reputational benefits (as opposed to more tangible informational and financial benefits) to program members for two reasons. First, the relatively greater coercive power concentrated at the federal level encourages firms to seek the "favored company" status by joining federal programs (Coglianese & Nash 2006). Second, federal programs allow firms to signal their endorsement for federal support and also give firms opportunities to network with federal officials.

In this context, consider the *Climate Leaders* program. In the absence of federal regulation to limit the emissions of GHGs, the EPA initiated *Climate Leaders* in 2002 as an industry-government partnership to encourage firms across multiple sectors (e.g. semiconductors, chemical manufacturing, automobile, real estate, etc.) to develop long-term comprehensive climate change strategies. Members are required to set

corporate-wide GHG reduction goals and inventory their GHG emissions to measure progress toward their established goals and disclose such information.[23]

In return for meeting program obligations, *Climate Leaders* recognizes members' "climate leadership" by periodically publishing in *Newsweek, Fortune* magazine, and other business media, an advertisement with a list of all participating firms to congratulate "these Climate Leaders for taking action to reduce their greenhouse gas emissions and carbon footprint."[24] Moreover, *Climate Leaders*' website publishes case studies of how corporate-wide climate change policies have transformed business operations.[25] These seemingly intangible benefits elevate members' reputation among consumers and other stakeholders as well as produce goodwill between them and the federal regulators. Program members tap economies of scale by joining federal programs: the reputational gains can be realized across the country, and arguably, across the world. Thus, the potential reputational gains are likely to be sizeable simply because members can advertise their program membership to a larger audience of external stakeholders. Consequently, federal programs have a comparative advantage in emphasizing reputational benefits as an inducement for program membership.

What we have laid out is a deductive argument for the tendency toward the two equilibria because of differences at the two levels of governance in the desired targeting of policy, differences in regulatory goals and constraints, and the states' desire to preempt or influence national policy. Federal programs are better equipped to supply intangible reputational benefits than state programs because of their relatively greater coercive power and access to a larger audience of external stakeholders to whom firms can advertise their program membership. The states have an informational advantage over the federal government as well over other states in understanding the specific needs of the sectors in their respective economies as well as the geographic specific knowledge that is required for efficient implementation of voluntary programs. Finally, while there are federal programs that offer technical knowledge, assistance, and/or scarce capital, state programs that offer reputational benefits, and state as well as federal programs that offer both types of excludable benefits, we posit that deviations from the two equilibria are outliers rather than the norm.

3. Empirical analyses and findings

In the following section, we present a simple econometric model that serves as a diagnostic for the argument outlined in the previous section. We utilize data from the EPA on state and federal voluntary programs on climate change mitigation for our analysis. The 129 programs in our analysis range across diverse sectors that are key emitters of greenhouse gases: agriculture, buildings, power generation, transportation, and waste management. Sponsorship comes from the 50 states, and federal sponsors include the EPA, the Department of Energy (DOE), the Department of Agriculture (USDA), and the Department of Transportation (DOT). Eighty-nine of the voluntary programs are sponsored by state governments, while 40 of the voluntary programs are sponsored by the federal government. The EPA and the DOE sponsor the most number of federal programs in the database; each agency sponsors, respectively, about 65 percent to 25 percent of the federal programs in the database. In addition to recruiting members predominantly from the commercial sector, some programs recruit members from non-profits and government entities, including tribal governments as well as the citizenry. Our unit of analysis is the program.

While we include both active and inactive programs in our main analysis, it is noteworthy that 15 to 20 of the EPA listed programs are no longer functional programs; many of these programs were pilot programs that had an expiration date, while one or two of the programs have been terminated because their funding has not been reauthorized by state governments.[26] We include both active and inactive programs in our analysis because we believe excluding inactive programs could potentially bias our results. If, for example, voluntary programs are "interim" policy programs that enable participants to corner the "first-mover advantage" before a technology standard becomes law, excluding these programs would miss a core aspect of program design. On the other hand, if inactive programs predominately adhere to a different logic than what we hypothesize, excluding them would increase the probability of committing a Type I error (i.e. rejecting the null hypothesis that there is no implicit specialization between states and the federal government when in fact the null hypothesis is true). In one of our alternative specifications, Model 2, we exclude inactive programs from our analysis. The Appendix details our elimination rule and lists the 129 programs that make up our main model.

For each of the programs in our analysis, we have collected and self-coded information on each program's offer of excludable benefits, launch date, media of focus (air, water, land, or multi-media), and industry sector, among other variables. For at least half of the programs in our analysis, we have contacted individual program managers for such information; for the other half of the programs, we have obtained the information from their respective program websites.

3.1. Model specification

The econometrics model evaluates the probability that a voluntary program offers informational benefits rather than reputational benefits as a function of the program's sponsorship, plus controls for media type, federal political administration (during the year in which the program was created), state partisanship (the extent to which the three branches of state government are controlled by Republicans or Democrats), and sectoral characteristics. Given the binary nature of our dependent variable, we estimate a binomial logit model of the following form:[27]

$$Informationalbenefit_i = \beta_0 + \beta_1 \mathrm{Pr}ogramsponsor_i + \beta_2 X_i + \varepsilon_i$$

where i indicates voluntary program. The dependent variable, program benefit, takes on one of two values. We let

$$Informationalbenefit = \begin{cases} 0 = reputational\_and\_\mathrm{int}angible & w/\,probablility(p) \\ 1 = \mathrm{inf}ormational\_and\_\mathrm{tan}gible & w/\,probability(1-p) \end{cases}$$

The variable *informationalbenefit* takes on the value 0 if a program offers reputational and intangible benefits and the value 1 if a program offers informational and tangible benefits; definitions of the two types of benefits are described in the previous section. We classify a program as offering reputational and intangible benefits if the program offers public recognition opportunities in the form of media recognition, multi-category or multi-tiered awards, or special ratings to the participating firm or organization as the *primary* benefit for joining the program. Conversely, a program is designated as offering informational and tangible benefits if the program offers technical assistance, an education

and technology demonstration, and/or financial assistance as the primary inducement for member participation.

In these coding rules, what we mean by the "primary" benefit is that we code a program based on the program's chief function – we ask, does the program specialize in publicly recognizing members for meeting program obligations or does the program devote the majority of its resources to providing technical assistance (including demonstrations) and/or financial capital? We glean such information from a program's website by assessing how a program advertises member benefits.

Our coding schema does not preclude programs from offering both tangible and intangible benefits. This means a program that relies primarily on publicly awarding its members for participation could very well also dispense minimal technical assistance (such as informational factsheets with energy saving suggestions) through its website. The converse could also be true for a program that primarily focuses on technical assistance. Furthermore, participating firms can claim reputational benefits even if a program does not offer a specific medallion for participation. This can happen, for example, when a participating firm or organization announces to the public its participation in the state or federal government sponsored voluntary program. Our coding schema does not preclude such actions by program participants. The key point though, is that we are concerned with (and thus code accordingly) the basic approach regarding the provision of excludable benefits to participants.

Many examples can be drawn from the federal and state programs in our sample to illustrate our coding schema. We provide two examples that are typical of federal and state programs, respectively. For the first example, we have classified Best Workplaces for Commuters Program, a federal program that was created in 2000 to encourage the creation of commuter benefits by employers, as offering "reputational benefits." The Best Workplaces for Commuters Program recognizes qualified employers with an "elite designation for offering outstanding commuter benefits."[28] Employers that meet the National Standard of Excellence in commuter benefits (e.g. free or low cost bus passes, carpooling matching, and vanpool subsidies) – a standard created by the Center for Urban Transportation Research and the US Environmental Protection Agency – are placed on a list of Best Workplaces for Commuters. Other public recognition opportunities provided by the program include "high level recognition at a Live National Awards Ceremony."

It is worth pointing out that while the Best Workplaces for Commuters Program is best known for and focuses on assigning "elite designation" to qualified employers, the program also provides some minimal technical assistance in the form of a help-desk. The help-desk assists participating employers in implementing commuter benefits and accessing information about emerging trends and opportunities in commuter benefits. With that said, the Best Workplaces for Commuters Program is first and foremost a public recognition program. The program's website makes this very clear in its first sentence describing the program's purpose: "Best Workplaces for Commuters (BWC) is an innovative membership program that provides qualified employers with national recognition and an elite designation for offering outstanding commuter benefits, such as free or low cost bus passes and vanpool fares and strong telework programs."[28]

Another example is the Iowa's Building Energy Management Program, which has been active since 1986. We have coded the Iowa voluntary program as offering "informational benefits" in the form of technical and financial assistance. Iowa's Building Energy

Management Program promotes energy efficiency in Iowa's public and non-profit facilities. When a public or non-profit entity (such as an Iowa schools and hospitals) participates in the Building Energy Management Program, the program provides consultation, energy audit and technical analysis, finance package creation, and project implementation support. The program does not have a public recognition component.

Statesponsor is our key explanatory variable of interest. It indicates whether a voluntary program is sponsored by the state or federal government. The *statesponsor* variable takes on the value of 1 if a program is sponsored by the state government and 0 otherwise.[29]

X_i is a vector of control variables that includes media type, federal political administration, state partisanship, participant target size, funding source, and industry sector characteristics. Unobserved and invariant factors that are common within sectors are accounted for by industry fixed effects. These industry dummies safeguard the model from potentially omitted factors common within sectors that are correlated both with *informationalbenefit*, the outcome variable of interest, and the explanatory variables.

Both media type and federal political administration, respectively, are indicator variables that 1) designate which type or types of media that the voluntary program encompasses (land, water, or multi-media), and 2) under which presidential administration (Ford, Carter, Regan, Bush Sr., Clinton, or Bush Jr.) that the said voluntary program was created. The rationale for controlling for media type is that it is plausible that sponsorship is correlated with the type of media the voluntary program addresses. Also, the EPA's emphasis could vary, depending on leadership in the White House. For example, it is plausible that a more interventionist administration would support the sponsoring of voluntary programs by federal agencies that dispense technical advice and/or capital funds in addition to or rather than public recognition benefits.[30] If so, by excluding the political administration variable we would overstate the probability that the federal government offers reputational benefits over informational benefits.

Our model also includes a variable that indicates the extent of partisanship in the state government during the year in which the program was created. There is some work which suggests that partisanship needs to be addressed on a 3 point scale reflecting the control of the state legislature and the gubernatorial office (Carsey & Harden 2010). Thus, for our state partisanship variable a score of 3 indicates that the State House, State Senate and State Governorship are controlled by Democrats, and zero would implicitly specify that all are controlled by Republicans.[31] We have coded federal sponsored programs to be either 0 or 3 depending on whether a Republican or Democrat president was in the Executive Office at the program launch date.[32]

Moreover, we include "target size" of participants – private enterprises and public organizations – as another control variable in our model. The regulatory compliance literature suggests that large firms with national brands tend to be much more motivated by reputational concerns, and they tend to possess more technical expertise, and more capacity to innovate and finance voluntary efforts than their smaller counterparts, many of which operate at a local versus national scale. Thus, a conceivable alternative explanation for why federal voluntary programs emphasize reputational benefits is because federal programs more often target large national firms and organization. By contrast, state programs recruit small and medium sized enterprises and local government bodies by a virtue of establishing their value-added vis-à-vis federal programs.

In our coding schema, when a program targets enterprises or organizations with less than 500 employees and/or a scale of operation confined to a local region we code the

program's target size as "small". A program is designated as having a "large" target size if it recruits enterprises or organizations above 500 employees and/or possesses a national or international scale of operation. Programs that do not specify a target size or scale is coded as programs that target "all" sizes.[33]

Finally, our model includes a variable that indicates where voluntary programs obtain their sources of funding. An explanation that could potentially distract from the framework we have presented in the previous section is the possibility that funds dispensed by state regulators come in large or substantial part from the federal government, which could suggest that state regulators offer technical and financial assistance to participants not because they wish to utilize voluntary programs to pursue economic development but because they are a conduit for federal level policymaking and politicking.[34]

The variable "funding source" has 4 categories: state funds; federal funds; mix of state and federal funds; and mix of government and private funds.[35] Private funds include industry and nonprofit foundation monies. When a program obtains funding strictly from the state government it is coded as "state." When a program obtains funding from both state and federal sources it is coded as "state + federal", and so on.

Table 1 provides variable descriptions and summary statistics for the base model analysis. Table 2 tabulates the number of voluntary programs that offer reputational and

Table 1 Descriptive statistics

Variable name	Mean	Std. Dev.	Min	Max
Informational benefit	0.667	0.473	0	1
State sponsor	0.689	0.465	0	1
State partisanship	1.623	1.192	0	3
Target size	0.348	0.540	0	2
Program funding	2.364	1.317	0	4
Administration dummy: Nixon	0.186	0.390	0	1
Administration dummy: Ford	0.039	0.194	0	1
Administration dummy: Carter	0.031	0.174	0	1
Administration dummy: Regan	0.062	0.242	0	1
Administration dummy: Bush Sr.	0.116	0.321	0	1
Administration dummy: Clinton	0.388	0.490	0	1
Administration dummy: Bush Jr.	0.178	0.384	0	1
Media dummy: Air	0.280	0.450	0	1
Media dummy: Water	0.016	0.124	0	1
Media dummy: Land	0.070	0.256	0	1
Media dummy: Multi-Media	0.636	0.483	0	1
Sector dummy: Agriculture	0.062	0.242	0	1
Sector dummy: Buildings	0.202	0.403	0	1
Sector dummy: Community Development and Smart Growth	0.038	0.194	0	1
Sector dummy: Industrial	0.085	0.280	0	1
Sector dummy: Power Generation/Energy	0.124	0.330	0	1
Sector dummy: Transportation	0.101	0.302	0	1
Sector dummy: Waste Management	0.062	0.242	0	1
Sector dummy: Multi-Sector	0.318	0.470	0	1
Sector dummy: Other (Forest Management, etc.)	0.008	0.088	0	1

Table 2 Excludable Benefits and Sponsorship

Sponsorship	Excludable Benefits		Total
	Reputational	Informational	
Fed	24	16	40
State	19	70	89
Total	43	86	129

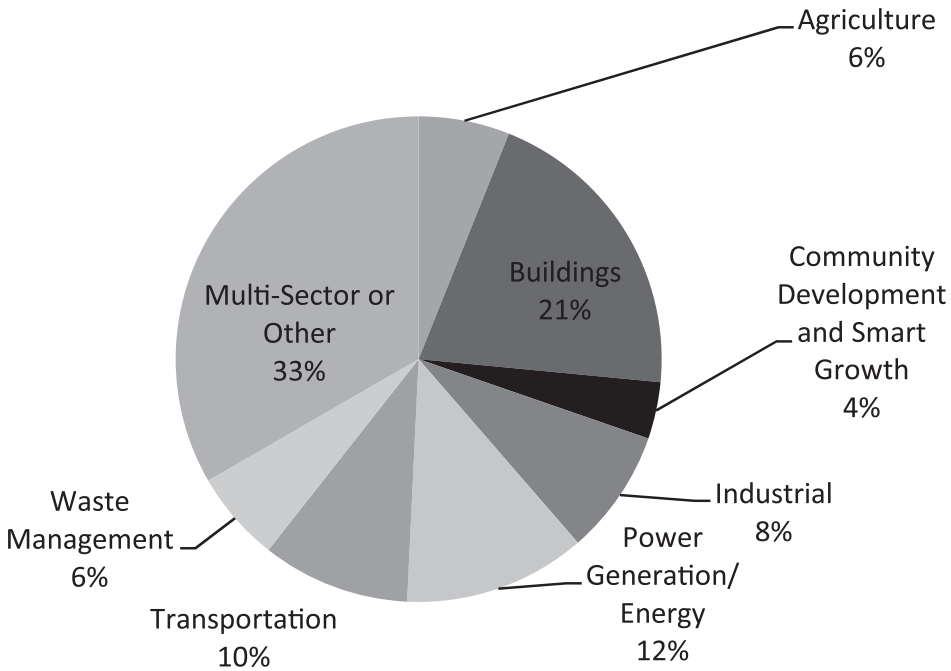

Figure 1 Voluntary clubs by sector.

informational benefits in terms of sponsorship. Moreover, Figure 1 shows a percentage breakdown of voluntary programs by industry sectors in our voluntary program dataset.

The first column of Table 3 presents the main or base model ("Model 1"), which estimates the probability that a voluntary program offers more tangible informational benefits rather than less tangible reputational benefits as a function of the program's sponsorship plus controls for media type, federal political administration, state partisanship, and fixed industry sector effects. In response to the issue of heteroskedasticity, we use the standard Huber-White correction (Wooldridge 2002). All estimation is performed in Stata using the *logit* command.[36]

The second and third columns of Table 3 summarize alternative model specifications. Model 2 replicates the main model but excludes inactive programs. Model 3 replicates the main model but retains programs that specialize in weatherizing low income populations.

4. Results

Across all model specifications, we find that the likelihood that a voluntary program offers informational over reputational benefits is *higher* when it is sponsored by the state

Table 3 Estimation results

Independent Variables	Model 1†		Model 2‡		Model 3§	
	Coeff.	*P*-value	Coeff.	*P*-value	Coeff.	*P*-value
State sponsor	5.390**	0.01	6.993**	0.00	5.210**	0.01
Administration dummy: Ford	0.112	0.20	0.127	0.27	0.625	0.69
Administration dummy: Bush Sr.	0.688	0.66	0.625	0.64	0.801	0.79
Administration dummy: Clinton	0.795	0.75	0.934	0.94	0.890	0.86
Administration dummy: Bush Jr.	0.775	0.75	0.539	0.55	0.806	0.77
State partisanship	0.924	0.73	0.951	0.84	0.854	0.47
Target size	1.012	0.98	0.999	0.99	1.051	0.92
Program funding	1.219	0.30	1.039	0.86	1.262	0.21
Media dummy: Water	0.415	0.44	0.325	0.37	0.510	0.55
Media dummy: Land	0.464	0.48	0.206	0.15	0.363	0.36
Media dummy: Multi-Media	1.811	0.34	1.052	0.94	1.733	0.36
Sector dummy: Buildings	0.108	0.09	0.153	0.17	0.184	0.17
Sector dummy: Industrial	0.127	0.09	0.079**	0.05	0.187	0.15
Sector dummy: Power Generation/Energy	0.419	0.44	0.387	0.43	0.505	0.56
Sector dummy: Transportation	0.106	0.07	0.084	0.06	0.152	0.11
Sector dummy: Waste Management	0.131	0.14	0.246	0.30	0.210	0.27
Sector dummy: Multi-Sector	0.066**	0.01	0.069**	0.02	0.092**	0.02
N(overall)	104		88		110	
Log Likelihood	−55.37		−45.30		−62.03	
F-statistic (Wald)	33.47		31.42		31.99	
Prob > chi2(15)	0.01		0.02		0.02	
Psuedo R^2	0.211		0.234		0.196	

**$P \leq 0.05$.

†Model 1 is our main model: it includes both active and inactive programs but exclude weatherizing low income households.

‡Model 2 excludes inactive programs.

§Model 3 replicates Model 1 with the addition of programs that specialize in weatherizing low income households.

government as opposed to the federal government. Regression coefficients are presented in terms of odds ratio. In the main model, *statesponsor* is significantly related to the probability of a program offering informational benefits (Table 3, Column 1). Its coefficient suggests that a state government sponsor is 5.4 times more likely than a federal program sponsor to offer informational benefits as opposed to reputational benefits. The results also show that a voluntary program that target multiple sectors are more likely (albeit only marginally – the odds ratios are quite small) to dispense financial assistance and/or technical assistance as program recruitment benefits. None of the other control variables yield statistically significant results. The bottom-line is that Model 1 results provide support for our hypothesis that sponsorship matters, and that state and federal governments specialize in different types of excludable benefits.

Model 2 and 3 in Table 3 present the alternative specifications. In both of the alternative specifications program sponsorship is a statistically significant predictor of the

Table 4 Analysis-of-variance (ANOVA)

		State sponsor	F-statistics	*P*-value
Informational benefit	M	3.97	21.33	0.00
	SD	(0.19)		

type of excludable benefit a voluntary program dispenses. Model 2 excludes the non-operational programs. We find that in the case of active programs, state sponsors are about 7 times more likely than federal sponsors to offer informational benefits as opposed to reputational benefits. Excluding inactive programs does not alter the direction of our results and only minimally increases the odds (by about 1.5 decimal points) that a voluntary program sponsored by the state government would dispense informational benefits, relative to Model 1 results. Among the active programs, voluntary programs that target the industrial sector or multiple sectors have a statistically significant higher chance (again, minimally) of dispensing informational benefits.

Model 3 replicates Model 1 with the addition of programs that specialize in weatherizing low income households. We had excluded programs that specialize in weatherizing low income households from the baseline model (Model 1) because while these activities have climate change implications, these programs are by and large programs with the specific aim of poverty reduction not climate change mitigation. Regardless, the results essentially do not change when we include these programs in our analysis. A series of *F*-test indicates that the program sponsorship coefficients have significantly higher values than the coefficients on the other variables in all three models.

Overall, the results across all models suggest that the nature of excludable benefits (specifically, tangible versus non-tangible) is likely to be function of program sponsorship. These results are consistent with the theoretical argument that sponsorship matters for program design and that a pattern of implicit specialization appears to exist between federal and state programs.

Finally, an ANOVA analysis further corroborates our findings. Table 4 reports the results from one-way ANOVA analysis. In line with our regression results, the proportions of voluntary programs offering informational versus reputational benefits differ by sponsor. The *F*-test confirms the statistical significance of *statesponsor* in explaining *informationalbenefit* with respect to the comparison of variance estimates. Finally, we reject the null hypothesis that there is no difference in the population means of the different levels of *stateponsor* (state vs. fed).

5. Conclusion and implications

Because actors establish voluntary programs with specific objectives, program design reflects sponsoring actors' resources and institutional context. It is important to unpack broad categories of sponsoring actors, such as "regulators" because for subcategories such as federal and state regulators, the institutional contexts in which they establish programs differ. Our analysis suggests that all else equal, federal programs are likely to emphasize less tangible reputational benefits recruitment inducements while state programs are likely to emphasize more tangible benefits such as information provision, technical assistance, and financial capital. Federal programs are better equipped to

supply reputational benefits given the EPA's (and the DOE's, DOT's, etc.) well-known brand name, their relatively greater coercive power, and the potential economies of scale in advertising program membership across the US. By contrast, the institutional logic of state programs appears to be based on differences across states in desired targeting and regulatory considerations, and states' desire to preempt or influence national policy, as states compete vis-à-vis other states for economic development. The states have a relative informational advantage over the federal government (and other states) in understanding the specific needs of the sectors in their respective economies. Moreover, states tend to use environmental programs to further other state-specific policy objectives such as economic growth and development, including ensuring energy security, for example. Finally, states may experiment with new approaches via voluntary programs that could be potentially considered a policy model for other states or for the nation as a whole. Future work should seek to unpack other broad categories of program sponsors, namely trade/industry associations and NGOs. Arguably, these categories have subcategories that vary along analytical lines such as institutional context and actor resources.

In one of the most comprehensive cross country study of voluntary program performance, Morgenstern and Pizer (2007) find that by and large voluntary programs have exhibited a wide-ranging degree of effectiveness in improving environmental outcomes in the US, Japan, and Europe. These mixed results are not particular surprising because according to the voluntary program literature, notably Potoski and Prakash (2009), *effective* programs have rule structures that mitigate two central collective action problems: attracting firms and other entities to participate in the program (recruitment challenge) and ensuring that participants adhere to program obligations (shirking challenge). Without rule structures that overcome the recruitment and shirking challenges voluntary programs are not likely to be effective in achieving desirable environmental outcomes.

To overcome the recruitment challenge, voluntary programs must induce firms to take on the non-trivial costs of joining voluntary programs. As we have noted in our paper, scholars suggest that voluntary programs do so by the provision of excludable benefits (Arora & Cason 1999; Potoski & Prakash 2009). Our paper focuses on the recruitment challenge and explicates how the two levels of government in the US federalist system – the federal and state governments – offer different types of excludable benefits because of their different institutional characteristics and regulatory and policy goals to ensure willful participation by firms and other organizations.[37]

In light of this, a question that arises is whether or not the type of excludable benefits the sponsoring actor offers influences program efficacy. From our perspective, there is no inherent institutional rationale for why a particular type of excludable benefits would lead to a more or less effective voluntary program. An important implication of this assertion is that both state and federal government sponsored programs are equally likely to succeed and produce positive externalities (e.g. lower GHG emissions, increased energy efficiency), given the recruitment and shirking challenges mentioned above have been overcome.

Furthermore, the literature suggests that program efficacy can be examined at two levels: at the level of individual participant, and at the level of the program (pollution reduction per participant * number of participants).[38] We do not believe benefit type is likely to influence pollution reduction per participant because this is a function of the

stringency of the monitoring and sanctioning mechanisms provided in the program. With that said, benefit type might affect the number of participants. The role of institutional fit might be relevant here. This is because when the sponsoring actors deviate from their institutional comparative advantage, program attractiveness could be compromised, and this might dampen participation levels. This program attractiveness could be in part work as a "sorting" mechanism by influencing types of firms that these program target and attract. Arguably, this might have a bearing on program efficacy, an area for future research.

The uneven efficacy of voluntary programs might reflect the fact that programs are not designed to fit the "needs" of the firms. Instead, they are conditioned by the needs of the sponsoring actor. This is especially true for programs sponsored by regulators, which are often dealing with a variety of political pressures (Coglianese & Nash 2009). Arguably, Japan and Europe are better placed in relation to the United States because of the less adversarial relations between firms and governments (Kagan 1991; Kollman & Prakash 2001).

The above discussion also suggests that there is no ideal program design or program sponsor: programs need to be evaluated in relation to their fit with their institutional environments. This implicit specialization between state and federal regulators with respect to voluntary programs suggests that efficiencies are achieved when each level of government designs voluntary programs that correspond with their institutional opportunities and constraints. In adhering to and enhancing their respective comparative advantages state and federal regulators are more likely to create portfolio of voluntary programs that together achieve desired environmental outcomes. A case can be made to recognize and live with policy complexity instead of seeking a common institutional blueprint or sponsorship for policy instruments across domains. This coheres well with the argument scholars such as Elinor Ostrom (2010) have made about polycentricity, and the need to think how different public goods might be supplied efficiently at different scales of government. Our paper makes this argument in the context of a single public good, environmental protection, and in the context of a single instrument type, voluntary programs. Nonetheless, our paper has a broad implication, which should be of relevance for the scholars studying other issues in public policy, regulation, and governance.

This also suggests that one needs to tread carefully on the metaphor that "states are policy laboratories." States are certainly excellent terrains for policy experimentation but policy scholars need to be cognizant of the challenges in scaling up the lessons from one level of aggregation to another. The policy challenge that state programs are responding to may get articulated in a different ways when firms and regulators function in a different institutional environment. With this said, in designing voluntary programs policymakers should be cognizant of and actively seek opportunities for program coordination between the two levels of government. We hypothesize that hybrid programs which combine characteristics of both worlds – informational and financial benefits come from the state, while reputational benefits come from the federal government – are likely to achieve relatively greater environmental outcomes because these programs supply a comprehensive set of incentives to participating firms to reduce toxic emissions and/or experiment with green technologies at lower/minimum costs while raising their reputation with consumers in the marketplace.

Notes

1 Of note, these new instruments are authorized by command and control regulations, and should be viewed as working in conjunction with it.

2 Alberini and Segerson (2002, p. 17) note: "[U]nder a voluntary approach, a polluter will not participate unless his payoff (broadly defined) is at least as high as it would be without participation."

3 The scholarship on voluntary governance is now well established across social science disciplines. Scholars have explored voluntary governance in the context of social regulation (Rees 1997), social license to operate (Gunningham *et al.* 2003), reflexive law (Orts 1995), smart regulation (Gunningham *et al.* 1999), non-state market driven systems (Cashore *et al.* 2004), and regulating from the inside (Coglianese & Nash 2001).

4 For example, it would be instructive to study how and why the design of voluntary environmental programs sponsored by the European Commission, such as the EMAS (Eco-Management and Audit Scheme), differ from those sponsored at the national level.

5 We do not explore how the same benefit may be viewed differently by stakeholders depending on the identity of the program sponsor. On this subject, see Carmin *et al.* (2003).

6 We briefly comment on the link between the type of excludable benefits the sponsoring actor offers and program efficacy in the concluding section.

7 Source: http://www.ecos.org/files/3265_file_AnnualReportYearbook.pdf; accessed 25 March 2009. The Environmental Council of the States (ECOS) has played an important role in this regard. The latest ECOS endeavors include technical and administration assistance to states in the development of cap-and-trade programs in their respective regions in the absence of federal action. Moreover, the ECOS has promoted increased engagement with federal agencies. For example, the ECOS Compliance Committee and the EPA have collaborated to develop tools to assess state compliance and enforcement programs and create federal-state forums for sharing information and expertise regarding pollution cleanup.

8 See Kelemen (2004) for an analysis of the patterns of environmental regulation in the European Union and four federal polities – the United States, Germany, Australia, and Canada, through the lens of regulatory federalism.

9 In fact, we believe that a multitude of regulatory structure that tracks the complexity and diversity of environmental problems is likely to work best. At some stages of the environmental regulatory process, economies of scale will be available. In others, diseconomies will predominate. Thus, some regulatory activities will benefit from being centralized, while others will best be undertaken on a more decentralized basis. Economies of scale aside, at times regulatory inaction at one level of government have and will prompt action at another level, as has been the case with climate change policy in the United States. Voluntary programs on climate change mitigation sponsored by the state regulators are part of a larger set of policy initiatives by the state governments in response to federal regulatory inaction (Rabe *et al.* 2005; Engel & Orbach 2008).

10 In addition to our rationalistic explanations for the types of excludable benefits that state programs offer, there might be a political explanation as well. Perhaps state programs are more likely to provide funding/subsidies because state legislatures (in relation to the US Congress) are more vulnerable to Baptist-bootlegger coalitions arguing for subsidies. This political explanation is consistent with our claim that the context in which program sponsors function should influence the design of the voluntary programs they seek to establish. We thank the editor for this point.

11 Source: US EPA; originally accessed 25 October 2009 at: http://yosemite.epa.gov/gw/StatePolicyActions.nsf/webpages/VoluntaryPartnershipPrograms.html.

12 Sociological approaches also emphasize the role of intangible benefits and communitarian pressures in encouraging firms to join voluntary programs (Rees 1997). However, such benefits reflect the norm of appropriateness and not the norm of instrumentality.
13 Interviews took place with the directors of the following state programs: California Climate Action Registry (interview date: 19 May 2009); Hawaii Green Business (12 May 2009); New Hampshire Climate Change Registry (6 May 2009); New York Environmental Product Development Program (30 April 2009); and Virginia Environmental Excellence (7 May 2009).
14 A Renewable Portfolio Standard (RPS) is a regulation that requires the increased production of energy from renewable energy sources, such as wind, solar, biomass, and geothermal.
15 Source: Lines 14–18 of the New Jersey Electric Discount and Energy Competition Act. Source: http://www.njleg.state.nj.us/9899/Bills/s0500/7_i1.pdf; accessed 13 February 2012.
16 Source: Lines 37–42 of the New Jersey Electric Discount and Energy Competition Act. Source: http://www.njleg.state.nj.us/9899/Bills/s0500/7_i1.pdf; accessed 13 February 2012.
17 Source: http://www.njcleanenergy.com/files/file/Library/CLEAN%20ENERGY%202008%20Annual%20Report%20final%281%29.pdf; accessed 13 February 2012.
18 Source: http://www.focusonenergy.com/About-Us/; accessed 13 February 2012.
19 All states in our sample that have sought environmental policy leadership appear to be among America's Greenest States according to the Forbes Magazine. Source: http://www.forbes.com/2007/10/16/environment-energy-vermont-biz-beltway-cx_bw_mm_1017greenstates_2.html; accessed 3 February 2012.
20 Source: http://www.njcleanenergy.com/renewable-energy/programs/solar-renewable-energy-certificates srec/new-jersey-solar-renewable-energy; accessed 13 February 2012.
21 New Jersey had originally subordinated its Greenhouse Gas Reduction Covenant Initiative to the Regional Greenhouse Gas Initiative until Governor Chris Christie pulled the state from the regional mandatory cap-and-trade initiative in May 2011.
22 Source: California Climate Action Registry's archived website, http://www.climateregistry.org/; accessed 23 April 2012.
23 The EPA's decision to regulate large emitters of GHGs means that *Climate Leaders* members who are large emitters will be expected to comply with EPA's newly proposed rules. Monica Neukomm, *Climate Leaders*' program manager suggests that large emitters who have been members of *Climate Leaders* are in a better position than non-members to meet the new regulation. A telephone interview with Monica Neukomm took place on 13 May 2009.
24 Source: http://www.epa.gov/climateleaders/documents/partner-recogniton/psa_dec_2007.pdf; accessed 25 October 2009.
25 Source: http://www.epa.gov/climateleaders/casestudies/index.html; accessed 25 October 2009.
26 Source: http://yosemite.epa.gov/gw/StatePolicyActions.nsf/webpages/VoluntaryPartnershipPrograms.html; accessed 25 October 2009. Programs have different life spans but this paper does not examine why the life span varies. Our aim is quite straightforward: contribute to the voluntary program literature by examining how attributes of program sponsors (state and federal governments in our case) influence program design.
27 Our binominal logistical model is the commonly used single-index form with conditional probability given by $p_i \equiv \Pr[y_i = 1|X] = F(X_i'\beta)$, where $F(\cdot)$ is a specified form, which we take to be the cumulative distribution function (cdf) of the logistic distribution. Estimation of the main model as well as estimation by alternative specifications is done by the maximum likelihood estimator (MLE).
28 Source: Best Workplaces for Commuters Program, http://www.bestworkplaces.org/; accessed 23 April 2012.
29 Of note, state sponsored programs which use minimal federal funds are coded as "state" if most operating funds come from the state government and if the programs are operated by the state government.

30 This could in turn vary by sector and media type, although we do not control for this in this diagnostic model.

31 We recoded data on the percentage of Senate, Assembly and Governor Controlled by Democratic Party from Bob Turner at Skidmore University into a scale 0 to 3. A score of 3 indicates that Democrats control the State House, State Senate, and State Governor, and zero means that all are controlled by Republicans. A score of 1 or 2 indicates that 1/3 or 2/3, respectively, of the State Senate, State Assembly, and State Governor, is controlled by the Democrats. Source: http://www.skidmore.edu/~bturner/go222_p2.pdf; accessed 27 September 2011.

32 This coding scheme, by construction results in multicollinearity, which raises the variance of the coefficient estimates but does not bias our results in anyway. The two indicator variables for the presidency of Carter and Reagan, respectively, are dropped by *Stata* from the estimation results to account for the multicollinearity.

33 We have obtained information about each program's target size from each program's public website. More than two-thirds of the programs in our sample, regardless of state or federal sponsor, recruit members of all sizes and/or scales of operation. Only two out of 40 federal programs in our sample restrict the employee size or scale of operation (local vs. national) of participating entities. Moreover, state programs that set specific target size and scale of operation make up less than half of the state programs in our sample. A look at the membership rosters of randomly selected state programs (those who publicize membership rosters) suggests that program membership is quite diverse with respect to employee size and scale of operation. For programs that do not restrict the size of firms and organizations that join, membership range from small family owned businesses based in a specific locale to large publicly traded corporations that operate on a multinational basis.

34 Federal agencies sometime recruit state agencies to dispense federal funds via fed-state partnerships, for a variety of subsidized activities rather than dispense the funds directly through federal agencies.

35 Information about each program's funding sources come from each program's public website. Of the 70 funds-dispensing state programs in our sample only four of these programs are strictly financed by the federal government. Twenty of these programs obtain financing sources from state coffers, while 17 programs dispense to members both federal and state monies. Finally, 21 of funds-dispensing programs obtain funds to give away from multiple sources – government, industry, and (much more rarely) nonprofit foundations.

36 In our preliminary analysis (not shown), we find that the log-likelihood for the logit model is essentially the same as that for the probit model, suggesting there is little difference between the predicted probabilities from the two widely used functional forms (Cameron & Trivedi 2005). Consequently, we have chosen the logit model as our model specification because of the ease of interpreting the estimated coefficients in terms of the odds ratio.

37 The shirking challenge must also be overcome for program efficacy, but is not the focus of our paper. Program design attributes, such as the stringency of program obligations, as well as active monitoring and credible sanctions for noncompliance, help overcome the shirking challenge.

38 Borck and Coglianese (2009) include another dimension: reductions by non-participants whose activities have been influenced by spillovers (isomorphic pressures) from participants.

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Appendix

The EPA database of voluntary programs on climate change contains 182 programs. We have omitted 53 programs to a total 129 for the purpose of our analysis based on the following elimination rule:

Programs with a sole function of financing (~10)
Programs that are focused on weatherizing the poor (~9)
Programs that are a part of larger parent programs (~16)
Programs that are private sector or non-profit sector driven (~3)
Programs that are large umbrella organizational divisions within EPA or DOE (~15)

The following table contains the list of the programs in our analysis:

Program	Origination Date	Status	Sponsor	Benefit type	Benefits
Advanced Technology Vehicle Program	1993	Active	State	Informational	Financial & technical assistance
Agricultural and Forestal District Program	1979	Active	State	Informational	Technical assistance
AgSTAR	1994	Active	Fed	Informational	Technical assistance
Alternative Energy and Energy Efficiency Program	2004	Active	State	Informational	Technical assistance
Alternative Transportation Fuels Curriculum and Teacher Training Program	1985	Active	State	Informational	Technical assistance
Best Workplaces for Commuters Program	2000	Active	Fed	Reputational	Best workplace designation
Building Energy Codes Program	1992	Active	Fed	Informational	Technical assistance
Business and Industry Energy Efficiency Programs	N A[–1]	Active	State	Informational	Technical assistance
California Climate Action Registry	2001	Inactive	State	Informational	Technical assistance
Clean Air Minnesota	2001	Active	State	Reputational	Media recognition
Clean Cities Program	1993	Active	Fed	Reputational	Multi-category awards
Clean Corporate Citizen (C3)	2006	Active	State	Reputational	Multi-tiered awards
Clean Diesel Emerging Technologies Program	2005	Active	Fed	Reputational	Emerging technology designation
Clean School Bus USA	N A[–1]	Active	Fed	Informational	Technical assistance
Climate Leaders	2002	Active	Fed	Reputational	Media recognition
Climate VISION (Voluntary Innovative Sector Initiatives: Opportunities Now)	2003	Active	Fed	Informational	Technical assistance
Coal Combustion Products Program (C2P2)	2001	Active	Fed	Reputational	Multi-category awards
Coalbed Methane Outreach Program (CMOP)	1994	Active	Fed	Informational	Education & technology demonstration
Combined Heat and Power (CHP) Partnership	1998	Active	Fed	Reputational	Multi-category awards
Connecticut Clean Energy Fund	2000	Active	State	Informational	Financial assistance & education
Conservation Security Program (CSP)	2002	Active	State	Informational	Financial & technical assistance
COOLAdvantage Program	2001	Active	State	Informational	Financial & technical assistance
Demand Response Programs/Flex Your Power	2002	Active	State	Reputational	Multi-category awards
Distributed Generation and Combined Heat and Power (DG-CHP) Program	2000	Active	State	Informational	Financial & technical assistance
PFC Reduction/Climate Partnership for the Semiconductor Industry	1999	Active	Fed	Reputational	Multi-category awards
Energy $aving Partner (E$P)	1976	Active	State	Informational	Technical assistance
Energy Efficiency Services and Green Buildings Services	1996	Active	State	Informational	Technical assistance
Energy Efficient Homes Midwest (EEHM)	N A[–1]	Active	State	Reputational	Energy rating of homes

Program	Origination Date	Status	Sponsor	Benefit type	Benefits
Energy Efficient Housing Demonstration Program	1997	Active	State	Informational	Education & technology demonstration
Energy IdEA$ (Industrial Energy Advisory Service)	N A[–1]	Inactive	State	Informational	Technical assistance
Energy Performance Contracting Program	1989	Active	State	Informational	Technical assistance
Energy Rated Homes of Mississippi	N A[–1]	Inactive	State	Informational	Technical assistance
ENERGY STAR® Products: Labeling	1992	Active	Fed	Reputational	Energy rating of homes
EnergySmart Schools Program	1998	Active	Fed	Informational	Financial & technical assistance
Environmental Product Development Programs	1982	Active	State	Informational	Technical assistance
Environmental Quality Incentive Program (EQIP)	1996	Active	State	Informational	Financial & technical assistance
E-Star Colorado	1995	Active	State	Reputational	Energy rating of homes
Fertilizer Research and Education Program (FREP)	1990	Active	State	Informational	Education & technology demonstration
Flexible Technical (Flex-Tech) Assistance Program	N A[–1]	Active	State	Informational	Technical assistance
Focus on Energy	2001	Active	State	Informational	Financial & technical assistance
Green Communities Program	1996	Active	Fed	Informational	Education & technical assistance
Green Engineering Program	1998	Active	Fed	Informational	Education
Green Power Partnership	2001	Active	Fed	Reputational	Multi-category awards
Green Star ®	1990	Active	State	Reputational	Multi-category awards
Green Suppliers Network (GSN)	2001	Active	Fed	Reputational	Media recognition
Greenhouse Gas Offset Partnership Program	1997	Active	State	Informational	Technical assistance
Greenhouse Gas Reduction Covenant Initiative	1998	Inactive	State	Reputational	Media recognition
GreenScapes Alliance	2003	Active	Fed	Reputational	Media recognition
Gridless Urban House Project	2001	Active	State	Informational	Technical assistance
Hawaii BuiltGreen	2001	Active	State	Reputational	Green rating of buildings
High Performance Buildings Initiative	2008	Active	Fed	Informational	Technical assistance
Innovative Energy Demonstration Program	1975	Active	State	Informational	Education & technology demonstration
Iowa's Building Energy Management Program	1986	Active	State	Informational	Financial & technical assistance
It All Adds Up to Clean Air	1997	Active	Fed	Informational	Education
Kool Kids	N A[–1]	Inactive	State	Informational	Education & technology demonstration
Landfill Methane Outreach Program (LMOP)	1994	Active	Fed	Informational	Education & technical assistance
LoanSTAR Program	1988	Active	State	Informational	Financial & technical assistance
Louisiana Green Challenge 2000	1996	Inactive	State	Reputational	Media recognition
Low-Income Weatherization Program (LIWAP)	1977	Active	State	Informational	Technical assistance
Michigan Business Pollution Prevention Partnership (MBP3)	1997	Active	State	Reputational	Media recognition
Minimum Impact Development Partnership (MIDP)	1999	Active	State	Informational	Technical assistance
Minnesota ReLeaf Program	1990	Active	State	Informational	Financial & technical assistance
Minnesota Renewable Hydrogen Initiative (MRHI)	2003	Active	State	Informational	Technical assistance
Missouri Schools Going Solar (MSGS)	2005	Active	State	Informational	Education & technology demonstration

Program	Origination Date	Status	Sponsor	Benefit type	Benefits
Mobile Air Conditioning Climate Protection Partnership	1998	Inactive	Fed	Reputational	Multi-category awards
Municipal and Community Environmental Technologies Program	2007	Active	State	Informational	Financial & technical assistance
Natural Gas STAR	1993	Active	Fed	Reputational	Media recognition
New Hampshire Partnership for High Performance Schools	2005	Active	State	Informational	Education & technical assistance
New Hampshire Pollution Prevention Program (NHPPP)	1993	Active	State	Informational	Technical assistance
New Hampshire Solar on Schools Program	1998	Active	State	Informational	Education & technology demonstration
New Jersey Clean Energy Program	2001	Active	State	Informational	Financial & technical assistance
New York Energy $mart Program	1998	Active	State	Informational	Financial & technical assistance
New York State Clean Cities Sharing Network/Alternative Fuel Vehicle Program	1994	Active	State	Informational	Technical assistance
NH Saves	2002	Active	State	Informational	Financial & technical assistance
No Idle Zone – Dare to Care about the Air	2003	Active	State	Informational	Technical assistance
North Carolina Solar Center	1988	Active	State	Informational	Education & technology demonstration
No-Tillage Assistance Program (NTAP)	1987	Active	State	Informational	Technical assistance
Oregon Clean Diesel Initiative	2001	Active	State	Informational	financial & technical assistance
Partnership for Assistance on Agricultural Waste Management Systems, Environmental Assistance Program	N A[–1]	Active	State	Informational	Technical assistance
Performance Track Program	2000	Inactive	Fed	Reputational	Multi-tiered awards
Plug-In To eCycling Program	2003	Active	Fed	Reputational	Media recognition
Pollution Prevention Services	1989	Active	State	Informational	Technical assistance
Pollution Prevention/Energy Efficiency (P2/E2) Program	1995	Active	State	Informational	Technical assistance
Private & Community Forests Program	1993	Active	State	Informational	Financial & technical assistance
Public Building Solar Initiative	2003	Inactive	State	Informational	Financial assistance + education
Recycling Market Development Board	1990	Active	State	Informational	Financial & technical assistance
Renewable and Alternative Energy Sources Programs	N A[–1]	Active	State	Informational	Technical assistance
Renewable Fuels Development Program	N A[–1]	Inactive	State	Informational	Technical assistance
Residential Energy Efficiency Program	N A[–1]	Active	State	Informational	Technical assistance
Schools/Local Government Energy Program	1999	Active	State	Informational	Technical assistance
Sector Strategies Program	2003	Inactive	Fed	Informational	Technical assistance
SF6 Emission Reduction Partnership for Electrical Power Systems	1999	Active	Fed	Reputational	Media recognition
SF6 Emission Reduction Partnership for the Magnesium Industry	1999	Active	Fed	Reputational	Media recognition
Small Business Energy Loan Program	1990	Active	State	Informational	Financial & technical assistance
Small Business Energy Service (SBES)	N A[–1]	Active	State	Informational	Technical assistance
Smart Communities Network	1998	Active	Fed	Informational	Education
Smart Growth Network (SGN)	1996	Active	Fed	Informational	Education & technical assistance
SmartWay Transport	2004	Active	Fed	Reputational	Multi-tier awards
Solar 4R Schools	2002	Active	State	Informational	Education & technology demonstration

Program	Origination Date	Status	Sponsor	Benefit type	Benefits
Solar on Schools	N A^{-1}	Active	State	Informational	Education & technology demonstration
Solar Weatherization Assistance Program (SWAP)	N A^{-1}	Inactive	State	Informational	Technical assistance
Solar-to-Market Initiative	2002	Inactive	State	Informational	financial & technical assistance
South Dakota Weatherization Assistance	1977	Active	State	Informational	Financial & technical assistance
Southwest Connecticut Clean Demand Response Pilot Project	2002	Active	State	Informational	Technical assistance
State Building Energy Management program (SBEM)	2001	Active	State	Informational	Financial & technical assistance
State Home Oil Weatherization (SHOW) Program	N A^{-1}	Active	State	Informational	Financial & technical assistance
State of Wyoming Energy Program	N A^{-1}	Active	State	Informational	Financial & technical assistance
Sustainable Communities	1996	Active	State	Informational	Technical assistance
Technology Export Program	1988	Active	State	Informational	Technical assistance
TREASURE Forest Program	1974	Active	State	Reputational	Awards
Urban Heat Island Reduction Initiative	1997	Active	Fed	Informational	Technical assistance
Vegetation Management Program	1981	Active	State	Informational	Financial & technical assistance
Vermont Business Environmental Partnership	1998	Active	State	Reputational	Awards
Vermont Methane Pilot Project	2000	Inactive	State	Informational	Technical assistance
Virginia Alliance for Solar Electricity (VASE)	N A^{-1}	Inactive	State	Informational	Technical assistance
Virginia Environmental Excellence Program (VEEP)	2000	Active	State	Reputational	Multi-tier awards
Voluntary Aluminum Industry Partnership (VAIP)	1995	Active	Fed	Reputational	Media recognition
Voluntary Diesel Retrofit Program/Diesel Retrofit Technology Verification	2000	Active	Fed	Reputational	EPA stamp of approval
Voluntary Greenhouse Gas Emissions Reduction Registry_NH	1999	Inactive	State	Reputational	Media recognition
Voluntary Greenhouse Gas Emissions Reduction Registry_WI	2000	Inactive	State	Reputational	Media recognition
Voluntary Reporting of Greenhouse Gases Program	1992	Inactive	Fed	Reputational	Media recognition
WARMAdvantage	N A^{-1}	Active	State	Informational	Financial & technical assistance
WasteWise	1994	Active	Fed	Reputational	Multi-category awards
Water-Efficient Products Market Enhancement Program/WaterSense	2004	Active	Fed	Reputational	Label for water efficient products
Weatherization Assistance Program (WAP)	1976	Active	Fed	Informational	Technical assistance
Weatherization Program	1977	Active	State	Informational	Technical assistance
Wind Energy Resource Assessment Program	N A^{-1}	Active	State	Informational	Technical assistance
Wind Powering America Program	1976	Active	Fed	Reputational	Media recognition
Youth Environmental Program	N A^{-1}	Active	State	Reputational	Awards