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When Governments Regulate Governments

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Abstract: *This article advances a political theory of regulation that accounts for the choices of regulators and regulated entities when both are governments. Leading theories of regulation assume that governments regulate profit-maximizing firms: Governments set rules, to which firms respond rationally in ways that constrain their behavior. But often the entities that governments regulate are other governments. We argue that government agencies and private firms often face different compliance costs, and that agencies have greater incentives than firms to appeal regulations through political channels. Simultaneously, the typical enforcement instruments that regulators use to influence firm behavior may be less effective against governments. Our empirical subjects are public and private entities' compliance with the U.S. Clean Air Act and Safe Drinking Water Act. We find that, compared with private firms, governments violate these laws significantly more frequently and are less likely to be penalized for violations.*

Replication Materials: The data, code, and any additional materials required to replicate all analyses in this article are available on the *American Journal of Political Science* Dataverse within the Harvard Dataverse Network, at: https://se.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/INXGMT.

Vast research literatures on regulatory policy seek to explain government regulation of privately owned, profit-maximizing firms. In classic models of regulation, governments set regulations pursuant to policy objectives, to which firms respond rationally by modifying their behavior. However, many regulatory policies—especially health, safety, and environmental regulations—apply to government agencies as well as private firms. In the United States, tens of thousands of government agencies at local, state, and federal levels provide a dizzying array of functions that are subject to regulation just like their private-sector counterparts. Regulated government is ubiquitous, and yet existing research offers little theoretical leverage and even less empirical evidence on what happens when governments regulate governments.

This article advances a theory of regulation that accounts for the choices of regulator and regulated when both are governments. Government agencies and private firms confront different incentives and constraints in the regulatory arena. Unlike profit-maximizing firms, government agencies face contested, ambiguous missions and are politically constrained from raising revenue to meet regulatory requirements. At the same time, agencies do not face direct competition from other firms, rarely face elimination, and may have sympathetic political allies. Consequently, the regulator's usual array of enforcement instruments (e.g., fines, fees, and licensure) may be potent enough to alter behavior when the target is a private firm, but less effective when the regulated entity is a government agency.

We argue that government agencies have greater incentives than profit-maximizing firms to shirk regulation and/or seek regulatory relief through political channels. The result is a *political* theory of regulation, in which the ultimate effect of regulatory policy turns not on the regulator's carrots and sticks, but rather on the regulated agency's political costs of compliance with or appeal against the regulator, and the regulator's political costs of penalizing another government. One implication of this theory is that public agencies are less likely than similarly situated private firms to comply with regulations. Another implication is that regulators are likely to enforce regulations less vigorously against public agencies than against private firms because such enforcement is both less effective and more costly to the regulator.

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The empirical subjects of this study are public agency and private firm compliance with, and government enforcement of, the Clean Air Act (CAA) and the Safe Drinking Water Act (SDWA). These laws provide excellent empirical traction because many public agencies and private firms provide substantively similar services (e.g., drinking water, energy, and health care) under these laws and therefore are directly comparable. To summarize our main results, we find that public agencies are more likely than private firms to violate the regulatory requirements of the CAA and SDWA. Moreover, we find that regulators are less likely to impose severe punishment for noncompliance on public agencies than on private firms.

We begin with a very broad overview of classic theories of regulation, highlighting the ways in which they fit awkwardly with government agencies as regulated entities. We review the modest research literature on government regulation of other governments and then develop our theory of regulation, culminating in a pair of hypotheses. The second half of the article evaluates these hypotheses with analyses of CAA and SDWA compliance and enforcement. We present findings, discuss their significance, and conclude with a revision to some conventional wisdom on regulatory policy and politics.

Theories of Regulation and Their Applicability to Government

Regulation is an "attempt by the government to control the behavior of citizens, corporations, or *subgovernments*" (Meier 1985, 1; italics added). The conventional rationale for regulation is to correct for market failures that occur due to natural monopolies (e.g., utility service), information asymmetries between producers and consumers (e.g., drug safety), or negative externalities (e.g., pollution).[1] Generally speaking, the success of a regulatory policy depends on the regulator's ability to impose costs on regulated entities (Viscusi, Vernon, and Harrington 2000). In egregious cases, the regulator can use criminal sanction or threaten to eliminate a violator from the market by stripping a firm of its license to operate.

Implicit, and occasionally explicit, in classic theories of regulation is the assumption that regulated entities are individuals or business corporations. The very depiction of these policy needs as "market failures" presumes that producers are profit-maximizing firms whose monopoly positions, information advantages, or abilities to externalize costs result in net social losses (Breyer 1982). Regulatory theory seeks to explain how firms respond to regulation by weighing the cost of compliance against the risk of sanction for violation (Viscusi, Vernon, and Harrington 2000). Firms comply with regulations when the risk of penalties outweighs the cost of compliance. A large social science literature analyzes many aspects of regulation with an aim toward understanding how regulators influence behavior and how the regulated respond (see Baldwin, Cave, and Lodge [2012] for a recent review).

Governments Regulating Governments

Conventional theories of regulation fit awkwardly when government agencies are the regulated entities. There are three broad reasons for this mismatch. The first is that the profit-maximizing assumption, which allows elegant and verisimilar theorizing about private firms, rarely applies to government agencies. Public agencies often face conflicting priorities and pursue ambiguous goals (Chubb and Moe 1988; Wilson 1989).[2] Government managers are responsible to elected officials, voters, and professional peers, rather than shareholders. Without the clear standard of profitability to guide them, public managers must balance regulatory mandates against competing priorities like equity, affordability, representativeness, and political responsiveness.

The second related reason for the mismatch is that private firms and public agencies face different costs of compliance. A modest literature in economics considers the effects of ownership on regulatory compliance, finding that private firms and government agencies respond differently to regulation due in part to differences in compliance costs (Berg 2013; Berg, Lin, and Tsaplin 2005). Private firms may pass the costs of regulatory compliance through to consumers relatively easily and without serious threat to competitiveness, so long as other firms must also comply with the regulation. By contrast, Lindsay (1976) observes that public agency managers must secure political support for the revenue increases, capital investments, and increased operating expenditures that regulatory compliance requires. Political constraints similarly limit government agencies' abilities to maintain financial reserves and organizational slack that might help address regulatory challenges (Hendrick 2006; Tyer 1993). The effective cost of compliance is therefore greater for a public agency than for a private firm because the public agency manager bears these political costs

[1] Stigler (1971) famously advanced another rationale for regulation: to preserve market share for dominant firms.

[2] Goal ambiguity in public management is a topic of perennial interest and occasional conflict among scholars; see Pandey and Rainey (2006) for a useful review.

alongside the direct costs of compliance. Consequently, public agencies tend to underprice their services and produce inferior quality relative to private firms (Lindsay 1976; Oates and Strassman 1978). Finally, where regulations apply to essential service producers (e.g., energy, water, and health care), government agencies may be "providers of last resort" and so may face more challenging operational circumstances than their private counterparts (Kapur and Weisbrod 2000; Rosenau 1999). In this sense, differences in "capacity" between private firms and public agencies are not intrinsic, but rather reflect managers' relative difficulty of securing resources in their respective sectors.

A third difficulty in applying traditional theories of regulation to government agencies lies in the relative potency of the regulator's enforcement levers when the regulated entity is another government. Regulators may be legally limited in the penalties that they can impose on public agencies (Berg 2013; Davies and Probst 2001), and there is evidence that courts impose lower civil penalties on violators when they are government-owned entities (Ringquist and Emmert 1999). A regulator may levy heavy fines and even threaten the viability of a private firm that persistently violates a regulation. Under conventional theories of regulation, a firm that is eliminated from the market due to regulatory violations will be replaced by a new entrant that is willing or able to comply with regulations. But imposing a fine on a public agency penalizes the same public that the regulator is supposed to serve; threatening the very existence of a public agency is not a realistic alternative for a regulator in most instances, particularly if the regulated agency is a monopoly provider of some essential service. The U.S. Environmental Protection Agency (EPA) could hardly threaten to put the U.S. Navy out of business for violation of environmental regulations, for example.

Regulatory Politics in the Public Sector

The ambiguity of agency goals and the difficulty of punishing noncompliance render the regulation of public agencies inexorably political. Despite the ubiquity and significance of regulatory policies that affect governments, political scientists have given the topic scant attention in the almost four decades since Wilson and Rachal (1977, 3) asked, "Can the government regulate itself?"[3]

Wilson and Rachal's (1977) essay ventured a pessimistic answer to its own question. As well as the goal ambiguity and enforcement challenges noted above, they observed that government agencies enjoy a degree of autonomy that flows in part from their legislative, judicial, and interest group allies. Faced with a regulatory challenge, an agency or its surrogates may seek exemptions through lawsuits or legislation at relatively low cost and with a high probability of success (Davies and Probst 2001; Wilson and Rachal 1977). "It may become necessary for those who wish to broaden the scope of public intervention and regulation to favor leaving the day-to-day management of affairs in private hands," Wilson and Rachal concluded. "*Large-scale public enterprise and widespread public regulation may be incompatible*" (1977, 14; italics in original).

A handful of subsequent studies broadly affirm the premises that led Wilson and Rachal (1977) to that conclusion, with the Tennessee Valley Authority (TVA) as the most frequent subject of inquiry. The TVA famously resisted the implementation of the National Environmental Policy Act and the Endangered Species Act pursuant to construction of the Tellico Dam. After losing in a series of administrative showdowns and court decisions, the TVA eventually won an exemption for the Tellico Dam through legislative action (Rechichar and Fitzgerald 1984; Reisner 1986). Durant's (1985) case study shows that the TVA also resisted implementing the CAA and the Clean Water Act.[4] Although Durant is ultimately optimistic about government regulating itself, his study affirms Wilson and Rachal's (1977) prediction that agencies would resist compliance and seek judicial and legislative relief from regulation far more readily than private firms.

Significant empirical evaluation has not followed these studies, and research on governments regulating governments remains almost entirely limited to case studies. The few theoretical treatments of government regulating government have focused entirely on cases of one federal agency regulating another (Durant et al. 1986). Left aside are the thousands of state and local agencies that are subject to regulation. Also neglected is the question of whether private firms comply with regulations more readily than do public agencies. In short, government regulating government is substantively important, poorly understood, and little studied. Twenty years ago, Durant (1985) identified a research agenda on the topic this way:

> Certainly extreme caution is warranted before generalizing from the findings of one comparative case study to the universe of regulatory

[3] Although Meier's (1985) definition of *regulation* explicitly includes "subgovernments" as targets of regulatory control, it gives virtually no attention to the politics of government regulating government.

[4] Paehlke's (1991) comparative study of environmental regulation in the United States and Canada largely affirms Durant's (1985) findings.

> policy implementation experiences. It is hoped, therefore, that the validity of the noncompliance delay effect ... will be tested in different implementation contexts and with a variety of research designs emphasizing the perspective of regulatory targets. Given the intragovernmental focus of this study, *research designs investigating regulatory policy enforcement in the intergovernmental and private sector arenas seem appropriate.* (130, italics added)

Davies and Probst (2001) echoed Durant's call 16 years later, but it remains unanswered: We are aware of no theoretically motivated, systematic analysis of regulatory compliance and enforcement that compares large numbers of private firms and government agencies.[5]

A Political Theory of Government Regulating Government

Here, we offer a generalizable theory that explains the decisions of regulators and regulated entities when the latter include both private firms ("firms") and government agencies ("agencies") at any level of government. Our theory builds on and is consistent with existing research on the subject, but it seeks to clarify the mechanisms at work.

We depict regulation as a process that occurs in relationships between a regulator and a firm or an agency, each of which behaves strategically with respect to the other (Braithwaite and Makkai 1991; Scholz 1991; Winter and May 2001). The regulator's goal is to cause regulated entities to behave in ways that are consistent with policy goals at the lowest cost to the regulator. Firms and agencies seek to minimize their costs while continuing production. The regulator sets standards; firms and agencies may either comply with or violate them. When a violation occurs, the regulator may either tolerate or penalize it. We assume command-and-control regulation (as opposed to market-style regulation), that the regulated entities produce identical goods or services, and that the regulator has complete information about the regulated entities' compliance.

[5]A thorough review of the literature identified just one empirical study that compares public and private regulatory compliance: Wallsten and Kosec's (2008) analysis of SDWA violations. Although Wallsten and Kosec conclude that there is "little *ceteris paribus* difference between private and public water systems in regulatory compliance" (203), their analysis actually finds several such differences. After accounting for methodological differences, Wallsten and Kosec's results are broadly consistent with ours.

The Logic of Compliance

We follow the logic of what Winter and May (2001) call "calculated motivation" for compliance: We argue that regulated firms and agencies will comply with regulations if the net cost of compliance is less than the expected net cost of violation.

Costs of Complying. The cost of compliance is a function of the direct capital and operating costs of the mandated technologies or processes and any indirect costs associated with securing the resources necessary for compliance. Based on existing research, we posit that firms and agencies face different compliance costs. We expect that firms and agencies have identical technological/process costs, but that agency managers face higher indirect costs of compliance because they must secure resources through political processes, whereas firm managers may more easily pass these costs on to consumers (if they operate in a competitive market) or secure them through a legalistic process (if they operate under monopoly pricing regulation, as most private utilities do; Lindsay 1976; Oates and Strassman 1978). On average, then, the net cost of compliance is lower for firms than for agencies.

Costs of Violating. For a regulated firm or agency, the cost of violation is a function of the risk of being penalized, the direct costs of a penalty (e.g., fines or procedural costs) imposed by the regulator, and any indirect costs that follow from violations. A penalized firm or agency may attempt to escape the penalty by appealing it through political or judicial channels (Heyes 2000). We assume that the direct costs of penalties are equal for firms and agencies, but that firms face a higher probability of being penalized than do agencies (Berg 2013; Davies and Probst 2001). We discuss the reasons for this difference in the next section. Private firms also participate in competitive markets, and so firms can incur indirect costs from violations in the form of reduced future market share and shareholder value—losses that are sometimes greater than the direct penalty (Badrinath and Bolster 1996; Caplan 2003; Karpoff, Lott, and Wehrly 2005). Although agencies also may incur indirect reputational costs from violations, we argue that, on average, the immediate indirect costs will be greater for firms because they face more immediate competition for capital and market share than do public agencies. Based on past research (Davies and Probst 2001; Durant 1985; Durant, Fitzgerald, and Thomas 1983; Paehlke 1991; Wilson and Rachal 1977), we expect that agencies are more likely than firms to prevail in their judicial and legislative appeals against

regulators. The result is that, on average, the net cost of violation is higher for firms than for agencies.

To summarize, existing research indicates that, compared with government agencies, private firms' costs of regulatory compliance are expected to be lower and their costs of violation are expected to be higher, ceteris paribus. Our first hypothesis follows:

H1 Compliance: Public agencies commit more regulatory violations than private firms commit.

Notably, the difference in compliance occurs not due to differences in the severity of penalties, but rather for strategic and political reasons.

The Logic of Enforcement

Although conventional models of regulation often include the cost of monitoring and inspection, they rarely depict enforcement as costly to the regulator. We follow Konisky and Reenock (2013) in depicting the regulator's enforcement decision as costly and subject to strategic political considerations. We argue that the regulator will penalize violations when the cost of tolerating the violation is greater than the cost of penalizing the violator.

Cost of Tolerating. The cost of tolerance is simply the regulator's loss of utility from a violation; in a sense, the cost of tolerating a violation is the social cost of regulatory policy failure. We assume that this cost is identical for any violation of a given type or severity, whether it is committed by a firm or an agency.

Cost of Penalizing. For the regulator, the cost of penalizing a violation is a function of the cost of imposing the penalty and the risk that the penalty will be overturned if and when the violator appeals the penalty through legislative or judicial channels. A successful appeal following a penalty imposes an additional cost equivalent to the cost of tolerating the penalty.

Again, past research offers reasons to expect that regulators will respond differently to violations depending on whether the violator is a firm or an agency. Regulators may rely upon the regulated agencies for critical services (Wilson and Rachal 1977) or identify with the managers of regulated agencies as fellow public servants (Davies and Probst 2001; Paehlke 1991; Scheberle 2004) in ways that make it costlier for a regulator to penalize an agency than a firm. Agencies also are more likely than firms to prevail in their legislative and judicial appeals (Durant 1985; Wilson and Rachal 1977), and so the regulator's cost of penalizing firms is lower than the cost of penalizing agencies.

With the regulator's cost of tolerance equal but the cost of penalizing violations greater for government agencies than for private firms, our second hypothesis is as follows:

H2 Enforcement: Regulators are less likely to impose severe penalties on public agencies than on private firms.

Critically, the logic of the regulator turns on strategic political considerations, rather than simply a concern for policy implementation.

Empirical Setting and Research Design

Evaluating these hypotheses requires an empirical context in which public agencies and private firms provide similar services, confront similar regulatory obligations, and are sufficiently numerous to provide statistical traction. American environmental policy provides an ideal context. Although environmental laws are typically considered mechanisms to force private firms to internalize the social costs of their activities, these laws cover many public agencies too.

Specifically, we study two prominent U.S. environmental programs: the Clean Air Act (CAA) and the Safe Drinking Water Act (SDWA). These programs are the primary federal statutes that govern air quality and drinking water quality, respectively, and for several reasons they are particularly useful for our purposes. First, both programs are administered by a single federal regulatory agency, the EPA.[6] Second, the EPA regulates a large number of public agencies and private firms under each program. In the case of the CAA, a diverse set of private and public entities emits pollutants that are subject to regulations. As we discuss below, we analyze electric power plants and hospitals. Similarly, the SDWA applies the same standards to private, investor-owned and government-owned drinking water utilities, all of which provide similar basic products and services. Third, each of these laws is meant to correct a different type of market failure, which lends greater generalizability to our analysis. The CAA addresses negative externalities caused by air pollution, whereas the SDWA is essentially

[6]These laws are implemented jointly by the EPA and state agencies: The EPA sets standards, and states are responsible for much of the day-to-day implementation and enforcement. The EPA also carries out enforcement activities to supplement the efforts of state governments. The present analysis does not distinguish between federal and state regulatory actions.

a consumer safety regulation that attends to information asymmetries between producers and consumers.

Data and Measures

Most of the data we rely on in this study come from the EPA. Due to differences between the CAA and the SDWA, we discuss each separately. Descriptive statistics for all variables are included in Table A1 of the supporting information.

Clean Air Act. The EPA regulates diverse sources of air pollution under the CAA. To help isolate the effect of public ownership, we focus our main analysis on two types of regulated facilities: power plants and hospitals. These industrial categories include the most publicly owned facilities among large air pollution sources. Restricting our analysis to power plants and hospitals allows us to make an "apples-to-apples" comparison, since we can reasonably assume that there is relatively little different about the actual operations of public versus private facilities, particularly as they relate to meeting pollution control obligations. That is, a public hospital and a private hospital are probably more validly comparable than, say, a municipal incinerator and a corporate aluminum smelter. Table 1 shows the public-private breakdown of these facilities; approximately 11% of power plants and 18% of hospitals are government-owned.[7] As we discuss later, in supplementary analysis we also examine a larger set of facilities as a check on the generalizabilty of our findings to a broader, more diverse set of industrial categories.

The EPA's Integrated Data for Enforcement Analysis (IDEA) system archives historical information on firm compliance and government enforcement actions.[8] Specifically, IDEA maintains records of facility CAA compliance with two status determinations: general noncompliance and high-priority violator (HPV) status. With general noncompliance, the EPA or a state agency has determined that a facility is not meeting procedural or substantive regulations. HPV status reflects a determination that a facility is failing (often persistently) to meet core CAA obligations, usually pollution standards, and can trigger significant punitive sanctions. We code compliance status with two dichotomous variables: a value of 1 indicates that a facility was in general noncompliance or HPV status at some point during the year, and 0 reflects that a facility was not. During the period of our analysis—2000 to 2011—just over 11% of the power plants and hospitals in the sample were in general noncompliance with the CAA, whereas just over 5% were HPV status.

The IDEA system also includes data on regulatory actions to enforce the CAA, including monitoring inspections and punitive measures. Punitive measures range from *informal* actions such as notices of violations and other warnings to *formal* actions such as administrative orders, consent decrees, and financial penalties.[9] Our analysis of compliance uses measures of inspections and sanctions that were directed at a facility in a given year as control variables since regulatory actions are strongly correlated with compliance determinations. Our analysis of regulatory behavior uses these data to construct two dependent variables. The first is an indicator coded 1 if a regulator administered a punitive measure in response to noncompliance (0 otherwise), and the second is coded 1 if the regulator imposed a financial penalty (0 otherwise).[10]

The CAA models also include a set of facility-level control variables. First, to capture the size of a facility, we include a dummy variable for major air sources (1 if a major source, 0 otherwise). A major air source is defined under the CAA as a stationary source that emits regulated pollutants above specific thresholds,[11] and we expect major air sources to be more frequently in noncompliance given the scale of their operations and the more complicated nature of their regulatory obligations. We also control for potential differences between power plants and hospitals (1 and 0, respectively) to account for any systematic differences between power plants and hospitals that might be missed by pooling the data.

Last, we include a set of contextual variables that measure demographic and economic circumstances in the area around each facility.[12] These variables include

[7]Facilities that the EPA characterizes as "federally reportable" are included in Table 1 and in the analysis.

[8]The data are available at http://echo.epa.gov/data_downloads.

[9]These data do not include civil and criminal referrals to the Department of Justice or to a similar state agency.

[10]This analysis is conducted at the action level since a facility may have received more than one enforcement action (with or without an associated financial penalty) in a given year.

[11]Generally, the thresholds are stationary sources that emit at least 100 tons/year of criteria air pollutants (or less when a source is located in an poor air quality area), or at least 10 tons/year of an individual hazardous air pollutant, or at least 25 tons/year of a combination of hazardous air pollutants.

[12]The demographic and economic variables are measured at the county level (annually from 2000 to 2010; we use 2010 for all later years) rather than the facility level. The resulting unit mismatch between facilities and counties introduces some error into our models, causing less efficient estimation and inflated standard errors for our parameter estimates. To the extent that this is an issue, it would make finding a statistically significant relationship between public ownership and regulatory outcomes more (not less) difficult.

Table 1 Public Agencies and Private Firms Regulated under the CAA and SDWA

	CAA				SDWA	
	Power Plants		Hospitals		Water Utilities*	
	#	%	#	%	#	%
Total	**3,102**		**1,009**		**4,277**	
Private firms	**2,756**	**88.8**	**823**	**81.6**	**480**	**11.2**
All public agencies	**346**	**11.2**	**186**	**18.4**	**3,797**	**88.8**
Federal	15	4.34	49	26.3	73	1.7
State	23	6.65	84	45.2	41	1.0
Local	302	87.3	53	28.5	3,605	84.3
Tribal	6	1.73	0	0.00	17	0.4
Public-private partnerships					61	1.4

Note: Data are from the U.S. Environmental Protection Agency. Clean Air Act data are as of August 2012, and Safe Drinking Water Act data are as of April 2014. *Includes only utilities serving populations of 10,000 or more.

the percentage of the county population that is African American, Hispanic, or living below the federal poverty line, as well as median household income and the unemployment rate. These control variables serve multiple purposes. First, they account for possible confounding effects; past research has shown that economic and demographic factors are associated with both facility compliance and government enforcement activity (Gray and Shadbegian 2004; Konisky 2009; Konisky and Reenock 2013). Second, these contextual characteristics help address the possibility that there are important factors associated with whether a facility is publicly or privately owned. For example, the facilities may serve different populations (e.g., public hospitals may serve poorer populations), which may in turn be related to both the likelihood that a facility violates its regulatory obligations and is of a particular ownership type. Similarly, demographic economic characteristics could affect the financial capacity of some public agencies to raise funds for capital expenditures, which too could impact their compliance.

Safe Drinking Water Act. Data on SDWA compliance come from the EPA's Safe Drinking Water Information System (SDWIS).[13] The data set contains descriptive information and SDWA violations data for all of the regulated water systems in the United States, covering the period of 2010–13. The present analysis includes all systems that served 10,000 people or more, totaling 4,277 systems in 2013. Together, these systems serve about 250 million people, or about 78.4% of the U.S. population that receives drinking water service. Table 1 reports the numbers of water utilities included in the analysis by public or private ownership; about 89% are government-owned and 11% are investor-owned.

The SDWA establishes limits for contaminants that threaten human health and requires utilities to apply approved treatment technologies. If a utility's drinking water exceeds contaminant limits or fails to employ the required treatment techniques, it commits a *health violation.* The SDWA also establishes water quality testing, reporting, and public communication protocols. Monitoring requirements vary as a function of a utility's size, its source of supply, and other aspects of its system. Utilities must publish annual drinking water Consumer Confidence Reports and announce violations in a timely manner. Failures to comply with these requirements are *monitoring violations.* Both health violations and monitoring violations are measured as the number of violations of each type for a system in a given year. The utilities analyzed here averaged 0.15 health violations and 0.69 monitoring violations annually during the period of analysis.[14]

Health violations represent failures to fulfill the SDWA's core purpose, but they may be less directly related to ownership since they may occur for reasons that are

[13]The data are available at http://water.epa.gov/scitech/datait/databases/drink/sdwisfed/index.cfm.

[14]A 2011 Government Accountability Office (GAO) audit found that states underreport violations to the EPA, but it identified no systematic bias in underreporting (GAO 2011). The present analysis assumes that underreporting is randomly distributed and so does not bias the models employed here. Even if underreporting is nonrandomly distributed, bias with respect to utility ownership is likely to result in underreporting of public agency violations (Scheberle 2004), so any bias is likely to work in favor of the null hypothesis.

effectively beyond the control of utility managers. Water sources vary in initial quality and vulnerability to pollution in ways that can cause health violations and for reasons that have little to do with the utility's ownership (Levin et al. 2002). Monitoring violations typically occur when utility personnel fail to gather water samples with the required frequency, analyze samples adequately, report violations quickly, or communicate water quality information to the public. Because they are strictly procedural, monitoring violations are perhaps better indicators of ownership influence over regulatory compliance since they are largely attributable to management.

We include a few controls in the SDWA models, some of which we expect to affect health violations and monitoring violations differently. We include a control for the utility's main source of water supply, coded 1 for groundwater and 0 for surface water. We expect that groundwater systems will have fewer health violations than those that use surface water, but that this effect will not appear for the monitoring violations (Wallsten and Kosec 2008). Similarly, we expect that systems that purchase water from wholesale suppliers will have fewer violations than those that produce their own supply because the wholesale supplier is responsible for many of the SDWA's requirements. Thus, we include a dummy variable coded 1 for purchased water and 0 for water produced by the utility itself.

We also control for utility size and age. We generally expect larger utilities to commit more violations because their treatment and distribution systems are more extensive and therefore vulnerable to problems, although, as a utility's size increases, it may have more human and financial resources to dedicate to compliance (Hanford and Sokolow 1987). To control for size, we include the logged population served by each utility. With respect to system age, we expect older water systems to experience more violations due to aging infrastructure or obsolete technology. The SDWIS database does not include full data on system age, but as a next-best alternative, we include an indicator variable for "new systems," with systems that were first reported to the SDWIS after 1981 coded 1 and those listed prior to 1981 as 0. Finally, our estimates of SDWA violations include the same county-level demographic and economic variables that we use in our CAA compliance models.

Turning to enforcement, regulatory officials have significant discretion over how to respond to SDWA violations (Scheberle 2004). The regulator's first response to a violation typically is an informal action, such as a warning letter, telephone call, or field visit. Regulators may also impose a formal enforcement action, which might include a civil citation and fine, an administrative order, or a referral to the Justice Department for criminal charges. We measure SDWA enforcement action with a binary indicator coded 1 if a regulator administered a formal enforcement action in response to a violation and 0 if the regulator took only an informal enforcement action or no action at all.[15]

Model Specifications

To test our hypotheses, we estimate a series of statistical models to identify differences in the compliance of public agencies and private firms with the CAA and SDWA, as well as regulators' enforcement responses under both laws. Before describing these models, it is important to note that the IDEA and SDWIS data sets provide saturation samples; that is, they include every reported violation and enforcement action for virtually every regulated facility for the period of analysis.[16] That is, our data consist of essentially the entire population of interest. Although our theory is meant to generalize beyond the CAA and SDWA, in the present analysis the aim of statistical regression is to assess internal validity: Regression helps isolate the effects of facility ownership from the other correlates of violations and enforcement.[17] With a saturation sample, we can be confident that the observed correlations are true for the population; *statistical significance* here refers to the confidence with which we can discern correlations from the stochastic processes that underlie the data.

Compliance. To test our first hypothesis that agencies commit more regulatory violations than firms, we estimate models of the following basic form:

$$V_{it} = \alpha_{it} + \beta_1 G_i + \beta_2 F_i + \beta_3 P_{it-1} + \beta_4 V_{it-1} + \gamma_t + \delta_s + \varepsilon_{it}, \quad (1)$$

[15] We code SDWA and CAA enforcement actions differently because virtually all SDWA violations have a corresponding enforcement action, even if only a letter or phone call.

[16] A very small number (less than 0.5%) of facilities drop out of the analysis due to missing data.

[17] There is little reason to believe that regulators underreport enforcement, but the data may not account for all instances of CAA noncompliance. Past work has shown that undetected noncompliance or "compliance bias" may be due to administrative or political factors (Feinstein 1990; Helland 1998; Konisky and Reenock 2013; Scholz and Wang 2006), and it can bias statistical estimates of compliance. Feinstein (1990) developed a method of detection-controlled estimation (DCE) to address this problem. For the CAA models, where compliance bias is most likely present, we estimated some pared-down DCE models (necessary for convergence) with similar results. We report standard logit models to simplify presentation.

where V is a measure of noncompliance status (general noncompliance or HPV status under the CAA; number of violations under the SDWA), α is a constant, i indexes facilities, t indexes years, s indexes states, G is a dummy variable indicating whether a facility is government-owned, F is a vector of facility-level control variables described above, P is a vector of regulatory actions, γ and δ are, respectively, year and state fixed effects, and ε is an error term.[18] The state fixed effects control for time-invariant state-level factors (the SDWA analysis also includes U.S. territories), such as differences in state regulatory administration. The year fixed effects account for year-specific effects, such as changes in federal policy or national economic conditions. We also include a lagged value of V in the models to account for the autoregressive nature of some types of violations.[19]

The variable of most interest is G, which denotes whether the regulated entity is a government agency at any level of government (coded 1) or a private firm (coded 0). Based on Hypothesis 1, we expect that the coefficient on G will be positive ($\beta_1 > 0$) across all models—that is, public agencies will be more likely than private firms to violate regulations.[20]

We use logistic regression to estimate the CAA compliance model, given the dichotomous nature of the dependent variable (i.e., a facility is either in general noncompliance or is an HPV of the CAA in a given year). The dependent variables in the SDWA models are counts of annual health and monitoring violations; consequently, we use negative binomial regression to estimate SDWA compliance.

Enforcement. To evaluate our hypothesis that regulators are less likely to penalize public agencies than they are to penalize private firms, we estimate the following basic model:

$$E_{it} = \alpha_{it} + \beta_1 G_i + \beta_2 F_i + \beta_3 V_{it-1} + \beta_4 I_{it-1} + \gamma_t + \delta_s + \varepsilon_{it}, \quad (2)$$

where Enforcement, E, indicates measures of punitive actions as described previously, V is a binary measure of violations (HPV status for the CAA and at least one violation in the past year for the SDWA), I is an indicator variable denoting whether a facility received an inspection (only in the CAA models because it is not applicable for the SDWA), and the rest of the variables are defined as in Equation (1). Because punishment only occurs if a facility is noncompliant, we restrict our analysis to facilities that were noncompliant in the same year. As in the compliance models, our central interest is the coefficient on G, and the expectation is that $\beta_1 < 0$, indicating that agencies are less likely than firms to be punished by a regulator. We estimate enforcement using logistic regression for both laws.

Results

Our analysis of CAA and SDWA regulations strongly supports our expectations regarding the role of ownership type in regulatory compliance and enforcement. We discuss the results for each in turn.

Compliance

Clean Air Act. Table 2 reports regression results for CAA compliance, first for general noncompliance and second for HPV status.[21] As hypothesized, the coefficients on *Public* are positive, which suggests that publicly owned power plants and hospitals are more likely to be in noncompliance than are their private counterparts. This relationship clearly emerges with each type of noncompliance considered. These coefficients are both statistically significant by conventional standards and substantively meaningful. To illustrate, we report marginal effects of *Public*, setting the year to 2011 (the latest year in the data set) and state to Maryland for the general noncompliance model and Michigan for the HPV model (these states are at the medians for each type of noncompliance), and holding

[18] The estimates we report do not account for possible correlation in the errors across facilities. Models that cluster the standard errors by facility produce similar results.

[19] Lagged dependent variables can introduce bias, but this bias would result in attenuating the effect of government ownership, making it more (not less) difficult to demonstrate a relationship between facility ownership and compliance. As shown in Tables A4 and A5 in the supporting information, our findings hold when excluding lagged terms from the models.

[20] By measuring a public agency with a simple indicator variable, we aggregate public agencies across all levels of government. Analysis reported in the supporting information shows that the relationship between ownership and compliance is consistent across federal, state, local (i.e., county, municipal, and special district), and tribal agencies for the SDWA. For the CAA, the relationship holds for all but state agencies and general noncompliance, and for tribal agencies. The less consistent findings for the CAA across levels of government are likely due to the small number of regulated power plants and hospitals operated by state and tribal agencies. Results for enforcement actions are more mixed for both the CAA and SDWA, again likely due to small sample size across levels of government.

[21] A total of 216 observations are dropped in the models of HPV because the state variable for Idaho perfectly predicted HPV status.

TABLE 2 Determinants of CAA and SDWA Noncompliance

	CAA: Power Plants and Hospitals				SDWA: Water Utilities			
	General Noncompliance		High-Priority Violator		Health Violations		Monitoring Violations	
	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect
Public	0.14*	+0.01	0.25**	+0.01	0.48**	+0.02	0.55**	+0.18
	(0.07)		(0.07)		(0.13)		(0.11)	
Major air source	1.08**	+0.04	1.33**	+0.04				
	(0.06)		(0.08)					
Power plant	–0.24**	–0.01	–0.11	–0.00				
	(0.06)		(0.08)					
Lagged inspections	0.02**	+0.01	0.01**	+0.00				
	(0.00)		(0.00)					
Lagged enforcement actions	0.26**	+0.01	–0.01	–0.00	0.70**	+0.02	0.77**	+0.26
	(0.02)		(0.02)		(0.08)		(0.08)	
Lagged general noncompliance	3.94**	+0.52						
	(0.05)							
Lagged high-priority violator			3.25**	+0.37				
			(0.06)					
Lagged violations					0.68**	+0.03	0.06**	+0.01
					(0.04)		(0.01)	
Groundwater supply					–0.21*	–0.01	0.29**	+0.08
					(0.08)		(0.08)	
Purchased water supply					–0.27**	–0.01	–0.33**	–0.08
					(0.09)		(0.09)	
New system					–0.09	–0.00	–0.19	–0.04
					(0.13)		(0.12)	
Log population served					–0.29**	–0.01	–0.08*	–0.02
					(0.04)		(0.04)	
Percent black	–0.00	–0.00	–0.00	–0.00	0.00	+0.00	0.01**	+0.00
	(0.00)		(0.00)		(0.00)		(0.00)	

(Continued)

TABLE 2 (Continued)

	CAA: Power Plants and Hospitals				SDWA: Water Utilities			
	General Noncompliance		High-Priority Violator		Health Violations		Monitoring Violations	
	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect
Percent Hispanic	–0.00	–0.00	0.00	+0.00	0.00	+0.00	0.01**	+0.00
	(0.00)		(0.00)		(0.00)		(0.00)	
Percent poverty	–0.00	–0.00	0.02*	+0.00	0.00	+0.00	–0.02	–0.00
	(0.01)		(0.01)		(0.01)		(0.01)	
Median household income	0.00	+0.00	–0.00	–0.00	–0.00	+0.00	0.00	+0.00
	(0.00)		(0.00)		(0.01)		(0.00)	
Percent unemployment	0.04**	+0.00	0.01	+0.00	0.04*	+0.00	0.01	+0.00
	(0.01)		(0.02)		(0.02)		(0.02)	
Constant	–5.65**		–5.99**		–0.77		–3.05**	
	(0.43)		(0.49)		(0.73)		(0.73)	
Observations	49,332		49,166		16,213		16,213	
Wald χ^2 (df)	16272.6 (71)		6442.67 (70)		1168.77 (64)		1814.19 (64)	
Prob > χ2	0.00		0.00		0.00		0.00	

Note: Cells contain coefficients, with standard errors in parentheses. CAA analyses employ logistic regressions; SDWA analyses use negative binomial regressions. Models also include state and year fixed effects not reported. Marginal effects for CAA assume year = 2011 and state = Maryland for general noncompliance and state = Michigan for HPV (median states for noncompliance types). Marginal effects for SDWA assume year = 2013 and state = Colorado (median state for violations). **p < .01, *p < .05.

the rest of the variables in the model at their means.[22] The difference in the predicted probability of a public power plant or hospital being in general noncompliance is .01, which reflects about a 9% increase relative to the mean. Similarly, with respect to HPV status, the predicted probability for public facilities is about .01 higher, which is approximately a 20% increase relative to the mean.

The control variables generally produce expected results. Major air sources are more likely to be noncompliant, as are facilities that were noncompliant in the preceding year and facilities that received previous regulatory attention. Although we did not have a specific prediction regarding noncompliance for power plants versus hospitals, the estimates provide some evidence that power plants were less likely than hospitals to be noncompliant. In general, the contextual variables do not exhibit statistically significant associations with either compliance measure, with the exception of unemployment in the general noncompliance model and percent poverty in the HPV model.

This analysis of power plants and hospitals offers reasonable assurance that observed differences between agencies and firms is not due to making broad comparisons across diverse types of facilities from varying industrial categories. For this reason, these results provide the strongest test of our hypotheses. Restricting the set of facilities, however, raises a question about external validity. As a check on generalizability, we also estimated these compliance models for all federally reportable facilities, the results of which are presented in the supporting information. The coefficients on *Public* are positive when all of these facilities are included in the analysis, but they are not statistically significant by conventional standards, which likely reflects the substantial heterogeneity among public and private facilities.

Safe Drinking Water Act. Table 2 reports the results of negative binomial regression models for SDWA violations.[23] In each model, the effect of *Public* is positive and highly significant, statistically and substantively. As before, to illustrate the variables' substantive effects, we report the marginal effect of public ownership for the year 2013 in the state of Colorado (the median state for SDWA violations during the period of analysis). We find that, with other variables evaluated at their means, the expected count of health violations in a public agency water utility is 0.02 greater than in an otherwise similar private firm—a 14% increase relative to the mean. The effect of public ownership was positive and significant in the model of monitoring violations, as well: Again applying the expected value in Colorado for 2013, a change from private to public raises the estimated monitoring violations count by 0.18 (29% greater relative to the mean).

The results for the utility-level control variables were consistent with some of our expectations and inconsistent with others. New utilities and utilities that purchased their water supplies commit fewer violations, as expected. However, groundwater supply positively predicts both types of violations, with a statistically significant result for monitoring violations. Utility size is negatively correlated with health violations but positively correlated with monitoring violations. The reasons for these differences are unclear and suggest avenues for future investigation. Controls for economic and demographic variables had little effect in these models, except for median household income and percent Hispanic population, which both positively predict monitoring violations.

Enforcement

We next turn to our second hypothesis, which posits that regulators are less likely to impose punishments on public agencies compared to private firms. We test this expectation by estimating Equation (2) for the CAA and SDWA. Since punitive measures can occur only following violations, the number of cases in our enforcement models is much smaller.

Clean Air Act. The first two columns of Table 3 show the results for the CAA analysis. The first set of estimates models whether a noncompliant facility received a sanction; the second set models whether the regulator levied a financial penalty along with the sanction. The coefficient on *Public* is negative in both models, although only statistically significant by conventional standards in the latter. Marginal effects computed for the year 2011 and Louisiana for punitive measures and Wisconsin for financial penalties (the median states for each measure), with other variables at their means, indicate that publicly owned power plants and hospitals violating the CAA are about 1% less likely to receive a punitive sanction as a consequence and about 20% less likely to receive such a financial penalty.

[22] Marginal effects calculated for other states yield similar results.

[23] We fitted several additional models of SDWA violations to help ensure robustness. The modal value of both types of violations is 0, so we fitted logistic models with a binary dependent variable (1 for any violation, 0 for no violations), as well as various zero-inflated negative binomial models. The substantive and statistical significance of public ownership was consistent across all of these specifications. We report negative binomial models without zero inflation here in the interest of parsimony and because there are no compelling reasons to expect the causes of zero counts to differ from the causes of event counts.

Table 3 Determinants of CAA and SDWA Enforcement

	CAA: Power Plants and Hospitals				SDWA: Water Utilities	
	Punitive Measure		Financial Penalty		Formal Enforcement Action	
	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect	Coefficient (Standard Error)	Marginal Effect
Public	–0.01	–0.00	–0.30**	–0.05	–0.25	–0.03
	(0.10)		(0.09)		(0.19)	
Major air source	0.13	+0.03	–0.06	–0.01		
	(0.10)		(0.09)			
Power plant	0.17	+0.04	0.21*	+0.04		
	(0.10)		(0.09)			
Lagged inspections	0.01*	+0.00				
	(0.00)					
Lagged high-priority violator	0.59**	+0.14	0.40**	+0.07		
	(0.07)		(0.06)			
Lagged violations					0.02**	+0.00
					(0.01)	
Groundwater supply					–0.15	–0.02
					(0.14)	
Purchased water supply					–0.12	–0.01
					(0.15)	
New system					–0.25	–0.03
					(0.21)	
Log population served					0.13*	+0.02
					(0.06)	
Percent black	0.01*	+0.00	–0.00	–0.00	–0.01*	–0.00
	(0.00)		(0.00)		(0.01)	
Percent Hispanic	0.02**	+0.00	0.01**	+0.00	0.02**	+0.00
	(0.00)		(0.00)		(0.01)	
Percent poverty	–0.01	–0.00	–0.02	–0.00	0.06*	+0.01
	(0.01)		(0.01)		(0.02)	
Median household income	–0.00	–0.00	–0.00	–0.00	0.03**	+0.00
	(0.00)		(0.00)		(0.01)	
Percent unemployment	–0.01	–0.00	–0.05**	–0.01	0.13**	+0.01
	(0.02)		(0.02)		(0.03)	
Constant	–1.10		–0.67		–7.09**	
	(0.68)		(0.62)		(1.07)	
Observations	5,556		9,445		3,027	
Wald χ^2 (df)	800.07 (69)		981.27 (68)		508.09 (46)	
Prob > $\chi 2$	0.00		0.00		0.00	

Note: Cells contain coefficients from logistic regression analysis, with standard errors in parentheses. Models also include state and year fixed effects not reported. Marginal effects for CAA calculated assuming year = 2011 and state = Louisiana for punitive measure and state = Wisconsin for financial penalty (median states for enforcement actions). Marginal effects for SDWA calculated assuming year = 2013 and state = Illinois (median state for enforcement actions). **p < .01, *p < .05.

Safe Drinking Water Act. The right-hand column of Table 3 reports our model of formal SDWA enforcement action. The *Public* coefficient is large and negative: With marginal effects calculated for 2013 in Illinois (the median state for formal enforcement action), publicly owned utilities that commit violations are 3% less likely to receive a formal enforcement action than similar investor-owned utilities. The *Public* coefficient falls short of statistical significance by conventional standards ($p = .18$). However, since the analysis is based on a saturation sample and, in substantive terms, public ownership more strongly predicts the likelihood of formal enforcement than the utility's source of supply and the age of its infrastructure, these findings indicate that regulators are less likely to take formal enforcement action against public water utilities than private water utilities.

Discussion and Conclusion

We have advanced a political theory of regulation that accounts for differences in the compliance incentives of publicly and privately owned facilities, and for the incentives of regulators to use available enforcement tools against public agencies and private firms. We posit that what matters most when governments regulate governments are not the carrots and sticks available to regulators, but rather the regulated entity's political costs of compliance and political prospects for appeal against the regulator, and the regulator's political costs of penalizing a fellow government agency. Two important implications of this perspective are that government agencies are less likely than similarly situated private firms to comply with regulations, and that regulators are less likely to punish violations when they occur at publicly owned facilities. We tested our theory using two large data sets, demonstrating for the first time in the literature beyond case studies (Durant 1985) that the problem of government regulating government is both real and substantively important.

To summarize, we find consistent evidence that publicly owned facilities are more likely than similar privately owned facilities to violate regulatory requirements under the CAA and SDWA. We also revealed a tendency for enforcement officials to impose less severe punishment on public agencies violating the CAA and SDWA, when compared to similarly noncompliant private firms.

More research on this topic can deepen and enrich scholarship on policy implementation and intergovernmental relations. Additional environmental laws like the U.S. Resource Conservation and Recovery Act (regulating hazardous and solid waste management and disposal) and the Superfund Program (cleaning up abandoned waste sites) provide obvious avenues for further evaluation, but the challenge of government regulating government is not limited to environmental protection. Similar issues emerge in other regulatory policy areas, such as health, labor, occupational safety, privacy, workplace discrimination, and contracting—to say nothing of government regulating government outside the United States. These areas all offer clear opportunities for further theoretical development and empirical investigation.

As expounded here, our theory of government regulating government is a general model and as such invites further refinement. For example, how do the politics of government regulating government play out across levels of government within a federal or decentralized political system? As we have observed, CAA and SDWA regulation across federal, state, local, and tribal agencies is broadly consistent with our theory, but there are notable differences that call for theoretical development.

Based on existing research, we have argued that the political costs of compliance and enforcement are the main drivers of differences between public and private regulated entities. But most past research is based on either broad readings of secondary literature or case studies that are almost entirely focused on federal agencies regulating other federal agencies. Qualitative case studies of regulatory compliance and enforcement would help affirm or point to revisions to our general model, particularly if they are designed to illuminate how regulators assess their roles and constraints when tasked with regulating public and private facilities.

Observing the vast and varied array of government agencies that operate under regulation, Wilson and Rachal (1977) asked: "Can the government regulate itself?" Nearly 40 years on, the theory developed here is a significant step toward answering that question, and our initial analysis of environmental programs offers encouraging support for it. Beyond their theoretical significance, the present results are important for environmental policy. Past work has documented the significant environmental impacts of public agencies (Davies and Probst 2001), and the sheer size of environmental cleanup from historical government activities remains immense (Burger et al. 2004; Durant 2007; Probst and Lowe 2000). If systematic noncompliance by government agencies and the reticence of regulators to punish violations contribute to ongoing regulatory failures, then policy reforms may be necessary to solve the political problems posed by government regulating government. Reforms might range from capacity-building subsidies to more aggressive enforcement mechanisms to privatization of government enterprises.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Table A1. Descriptive Statistics
Table A2. Bivariate Statistics on Compliance and Enforcement
Table A3. Determinants of CAA Noncompliance
Table A4. Determinants of CAA Noncompliance & Enforcement - lag term robustness considerations
Table A5. Determinants of SDWA Violations & Enforcement - lag term robustness considerations
Table A6. Determinants of CAA Noncompliance and Enforcement, by Level of Government
Table A7. Determinants of SDWA Violations and Enforcement, by Level of Government