Cooperative Regulatory Enforcement and the Politics of Administrative Effectiveness

John T. Scholz

COOPERATIVE REGULATORY ENFORCEMENT AND THE POLITICS OF ADMINISTRATIVE EFFECTIVENESS

JOHN T. SCHOLZ
State University of New York
Stony Brook

*E*ven *when political interests control bureaucratic outputs, the control of policy outcomes is complicated by trade-offs between controllable versus effective implementation strategies. I use a nested game framework to explain why a cooperative strategy can increase enforcement effectiveness in the narrow administrative game and why principal–agent control problems and collective action problems associated with the strategy lead policy beneficiaries to oppose the effective strategy in the broader political games. Analyses of state-level Occupational Safety and Health Administration enforcement provide evidence that cooperation does enhance the impact of enforcement in reducing workplace injury rates but that policy beneficiaries oppose and sabotage cooperation. The interactions between administrative effectiveness and interest group politics in this and other implementation situations require that both be analyzed simultaneously, and the nested game framework can provide a systematic approach to such analyses.*

W hy are government bureaucracies ineffective in achieving policy goals? The field of public administration has traditionally answered this question in terms of technical and management problems that decrease the likelihood of achieving a given policy goal. In the last two decades, political science has emphasized the role of interests in causing administrative ineffectiveness. Administrative choices are portrayed as the continuation of legislative politics by other means, with opposition groups sabotaging effective administration at every turn (Mazmanian and Sabatier 1983; Moe 1989; Seidman 1980) and bureaucrats seeking their own interests at the cost of policy goals (Bardach 1977; Downs 1967; Miller and Moe 1983). Furthermore, a number of empirical studies have documented the responsiveness of regulatory enforcement to the demands of interest groups (Gormley 1983; Marlow 1981; Marvel 1982; Moe 1985; Scholz and Wei 1986; Williams and Matheny 1984) and

their elected representatives (e.g. Moe 1982; Scholz 1989; Wood 1988; Weingast and Moran 1983). These arguments reflect the simple calculus of interests predicting that policy opponents will oppose effective administration of policies that hurt their interests while policy supporters will favor effectiveness.

I will focus on the apparently perverse situation in which *policy supporters oppose effective administration.* I argue that potentially effective administrative strategies frequently impose problems of control that make effective strategies less attractive to policy supporters than safer, more controllable strategies. I first introduce the nested game perspective to illustrate why effective administrative strategies offering higher payoffs to beneficiaries in the narrow administrative game may impose unacceptable risks in broader political games. I then discuss the regulatory enforcement dilemma in which cooperative tit-for-tat strategies lead to higher payoffs for regulatory beneficia-

ries than baseline deterrence strategies. The game framework is presented informally in this article to clarify the analysis. A formal treatment can be found elsewhere (Scholz 1984a).

But cooperative strategies require greater administrative discretion, which reduces the ability of beneficiaries to ensure that the enforcement agency will perform adequately. Two political games illustrate the effectiveness–control trade-offs facing supporters. The first game utilizes a principal–agent framework (Mitnick 1980; Moe 1984) to analyze the choice of appropriate levels of discretion. The second analyzes the free-rider problem arising when beneficiaries directly participate in the enforcement process. Both games specify conditions under which policy beneficiaries will oppose cooperative strategies.

I then test the relevance of the analysis for Occupational Safety and Health Administration (OSHA) enforcement. Empirical tests confirm the greater effectiveness of cooperative strategies as well as the perverse negative impact of policy beneficiaries on effectiveness. I conclude that studies of political controls over bureaucracy need to move beyond the current focus on bureaucratic outputs, because it ignores the question of how effectively these outputs are translated into outcomes desired by interest groups. This requires political analyses to confront the classical public administration problems of effectiveness. The nested game approach provides an appropriate extension to the simple calculus of interest capable of explaining the seemingly perverse actions by policy beneficiaries.

Perverse Interests and Nested Games

Why would policy supporters not favor the most effective means of administrating their policies? Bendor and Moe (1985) may have been the first to point out the asymmetric control problem that causes policy *beneficiaries* to contribute more than adversaries to policy inefficiencies. Bureaucratic slack was the prime form of inefficiency in their simulation model. Adversaries were, of course, more willing to cut the agency's budget to control slack than were beneficiaries, since beneficiaries would also lose benefits if the budget were cut.

Moe (1989) elaborated on the regulatory control problems that led advocates of regulatory policies to favor ineffective administrative structures. In the U.S. context, groups anticipate that their current ascendancy in the legislative process is only temporary and that their opponents will soon get their turn in power. Thus, instead of selecting an administrative structure that would most effectively deliver the desired service, policy advocates prefer structures that lock in benefits even after the opposition has taken control of the administration. What appears to be a perverse choice of structure from a narrow public administration perspective becomes more sensible when viewed from the broader perspective of the political control game.

I shall argue that the *nested games* perspective provides a useful framework for systematizing the study of interests and effectiveness, and particularly for clarifying the trade-offs between control and effectiveness. Moe (1984) suggested that the hierarchy of controls from interest groups through elected representatives to bureaucratic leaders and their subordinates could be represented as a hierarchy of principal-agent games. Tsebelis (1990) introduced the concept of nested games to explain how choices in international affairs judged to be perverse in a narrow context appear to be more rational when viewed from a broader perspective. The specification of the narrow game context failed to account for strategic choices and outcomes important in other games affecting choices in the narrow game.

The nested game analysis of bureaucratic effectiveness begins with the narrow administrative game that focuses on the classical public administration problem—How can the agency most effectively use its resources to achieve the policy goal? In this game, the government agency attempts to achieve policy goals by inducing the desired behavior for the target population within its jurisdiction through positive incentives (food stamps, medicare payments) or through enforcement (tax collection, regulation). The most effective strategy is the one that produces the highest expected payoff for the agency. Note that the nested game perspective emphasizes the importance of considering strategic interactions between the government agency and target population, particularly when enforcement is a primary concern (Bianco, Ordeshook, and Tsebelis 1990; Scholz 1984a; Tsebelis 1989).

But the administrative game takes place within a political context in which political *principles* attempt to control the actions of the government *agents*. Agencies may pursue suboptimal strategies in the narrow game because of constraints from this broader political game. Many forms of the political games could be analyzed to represent various control problems. I will present the narrower administrative game and two nested political games of particular importance for understanding the role of policy beneficiaries in the ensuing empirical study of OSHA enforcement.

Cooperation, Effectiveness, and the Enforcement Game

As in most policy areas, analyses of regulatory enforcement generally reflect a decision theory framework that does not account for the strategic interaction between the enforcement agency and the entities subject to its authority (Tsebelis

1989). The standard deterrence model assumes that firms will comply with regulations to the extent that the value of expected costs of compliance and punishment for noncompliance exceeds the value of expected benefits of noncompliance. Since higher rates of inspection, citation, and penalties should increase the expected costs of noncompliance, enforcement effectiveness from this perspective should simply reflect the level of enforcement.

Several game-theoretic models of enforcement illustrate that very different predictions result when more complex strategic behavior between regulated firms and enforcement agencies is added to the analysis. (Bianco, Ordeshook, and Tsebelis 1990; Graetz, Reinganum, and Wilde 1986; Greenberg 1984; Reinganum and Wilde 1986; Scholz 1984a; Tsebelis 1989). Of particular relevance for understanding enforcement effectiveness is the model of cooperative regulatory enforcement (Scholz 1984a). This model argues that the basic deterrence equilibrium of the decision theory approach is ineffective because of the inherent inefficiency of the regulations being enforced and the costs of enforcement actions. Both firm and agency can be better off if the agency forgoes legalistic enforcement of regulations that are inappropriate for a particular firm in return for extralegal efforts on the part of that firm to work toward the policy objective—in OSHA's case, to reduce industrial injury and illness rates.

A strategy that could induce cooperation would reduce the basic inefficiencies associated with regulatory standards[1] and therefore be more effective than the basic deterrence strategy that simply enforces by the book (Bardach and Kagan 1982). To understand this cooperative strategy one needs to analyze the enforcement dilemma that I have described in detail elsewhere (Scholz 1984a and 1984b). Only a summary of the model will be presented here.

Figure 1 illustrates the enforcement dilemma in which firms can choose either

Figure 1. Payoffs for the Enforcement Dilemma

		Agency's Choice	
		Flexible Enforcement	Maximal Enforcement
Firm's Choice	Flexible Compliance	3,3 Voluntary Compliance Equilibrium	0,5 Harassment
	Minimal Compliance	5,0 Capture	2,2 Deterrence Equilibrium

Note: The numeric entries represent the utility to firm (listed first) and agency for each set of choices. To emphasize the symmetry of the choice situation, the worst case for the firm is used as the base point (0), so that the firm's utility is positive even though costs, rather than benefits, are associated with each outcome for the firm. Any payoffs consistent with the usual restrictions on prisoner's dilemma payoffs ($t > r > p > s$ and $2r > t + s$ for each player) could be substituted in the example.

minimal compliance or flexible compliance, and the agency can choose either maximal enforcement or flexible enforcement. The utility that firm and agency receive for each possible combination of choices in a given period are presented in the designated cells, with the firm's payoff given first.

In the classical deterrence equilibrium, the firm chooses *minimal compliance,* a level of compliance that minimizes the firm's expected costs of compliance, expected penalties, and legal costs net of any benefits gained by the firm from improved safety. The agency chooses *maximal enforcement* that imposes penalties for all detected violations and requires all violations to be abated regardless of cost or suitability for the firm's particular safety problems.

The voluntary compliance equilibrium is preferred over the deterrence equilibrium by both firm and agency. In this equilibrium, the agency reduces its monitoring and prosecution costs with *flexible enforcement,* overlooking minor technical violations in recognition of the firm's extralegal safety efforts to reduce greater hazards not directly addressed in regulations (Bardach and Kagan 1982; Sigler and Murphy 1988). Firms choose

flexible compliance, a level of compliance that produced greater workplace safety levels than minimal compliance associated with the deterrence equilibrium. Such flexibility would allow a firm to tackle its worst health and safety hazards with the most efficient methods available rather than spending money to comply with safety standards that are less important and inefficient in the firm's particular situation. The voluntary compliance outcome provides both firm and agency with the mutual rewards of flexible compliance combined with flexible enforcement.

While firm and agency both prefer the voluntary compliance outcome to the deterrence outcome, both would be even better off in the short run if they took advantage of the other's flexibility. If the firm chooses minimal compliance with an agency choosing flexible enforcement, the firm may avoid most or all compliance costs and produce little safety improvement desired by the agency. Similarly, if the agency chooses maximal enforcement with a firm choosing flexible compliance, the firm loses more than full compliance costs and the agency gains greater safety than full compliance alone would bring. The first outcome is associated with the social costs of capture by regulated firms,

the second with the social costs of harassment by an overzealous agency. Both outcomes are less efficient, and therefore less socially desirable, than voluntary compliance; yet both present temptation payoffs attractive to either firm or agency.

If the agency knew the firm's choice prior to committing itself, it could simply respond with flexible enforcement when the firm chose flexible compliance. However, flexible enforcement saves monitoring costs by reducing the frequency and intrusiveness of inspections. Effectively, this means that the agency's commitment to flexible enforcement can only be based on past rather than current behavior, since firms choosing minimal compliance will be able to slip through the looser monitoring associated with flexible enforcement. Similarly, the firm must decide its level of compliance prior to knowing what the next inspector from the agency will do. The difficulty in maintaining voluntary compliance is therefore similar to the problem of maintaining the cooperative solution in the prisoner's dilemma, where choices are made simultaneously. Fortunately, the enforcement dilemma is comparable to a repeated prisoner's dilemma, for which cooperative outcomes are achievable.

Extending Axelrod's analysis (1984) of cooperation under repeated play of the prisoner's dilemma, I demonstrated that the socially desirable voluntary compliance equilibrium can be maintained if (1) the agency pursues a cooperative strategy with the vengeful and forgiving characteristic of Axelrod's tit-for-tat strategy, (2) firms are sufficiently concerned with future encounters with the agency to resist the short-term temptation to avoid all compliance costs, and (3) enforcement and compliance technologies in the regulatory environment produce a prisoner's dilemma payoff matrix. Whenever these three conditions hold, formal analysis demonstrates that firms will obtain the highest payoff possible by always choosing flexible compliance (Scholz 1984a).

Several analysts have observed cooperative-type enforcement strategies in regulatory settings and argued that they are more effective than strategies that proceed by the book (Bardach and Kagan 1982; Kagan 1978; Kagan and Scholz 1984; Kelman 1982; Muir 1977; Nonet and Selznick 1978; Shover, Clelland, and Lynxwiler 1983). On the other hand, some critics argue that such strategies undermine the moral force of law by officially tolerating violations and therefore weaken enforcement (Silbey 1984). Others have argued that tit-for-tat strategies are less robust in the presence of information uncertainty (Bendor 1987), implying that cooperative strategies may be less effective if the agency is uncertain about the compliance status of the firm. The claim of effectiveness needs to be tested empirically, which requires that the cooperative strategy must be differentiated from the baseline strategy I will refer to as the deterrence strategy.

The baseline deterrence strategy always chooses maximal enforcement, which means that all firms face the same probability of being caught and punished in each round. The firm's best response is therefore minimal compliance. The cooperative strategy, on the other hand, treats firms differently based on their past behavior. As with tit-for-tat, maximal enforcement is used against firms that have established a record of minimal compliance in the past, and flexible enforcement is used against firms with an established record of flexible compliance. By being vengeful, this strategy discourages minimal compliance. By being forgiving, it encourages firms to move from minimal to flexible compliance.[2] As a result, society gains the advantages associated with the voluntary cooperative equilibrium; firm and agency avoid costly legalistic battles; and enforcement is focused on the real problems in each firm rather than technical violations of possibly inefficient standards.

But how can the cooperative strategy

be recognized empirically? Educational and cooperative gestures by the agency do not ensure the combination of vengefulness and forgivingness of a tit-for-tat strategy (Braithwaite 1985; Graboski and Braithwaite 1986). As previously noted, the cooperative strategy concentrates more enforcement activities on the small set of firms with a record of minimal compliance and on more serious, rather than technical, violations. The greater the concentration of enforcement, the stronger the cooperative component in an agency's enforcement strategy. The empirical study creates a cooperation index by summing two measures of concentration that could be obtained from OSHA: the percentage of all citations that included serious violations, and the percentage of all penalties imposed for serious violations.[3] The Occupational Safety and Health Administration classifies a violation as serious if the violation substantially increases the possibility that an injury will occur.

The hypothesis to be tested is that for a given level of enforcement, OSHA jurisdictions with a higher index of cooperation will be more effective in reducing injury rates. In other words, the same basic enforcement actions of inspections, citations, and penalties will have a greater effect on injury rates when deployed with the cooperative strategy than with the baseline enforcement strategy. To control for the level of enforcement, the empirical study uses as a stringency index the sum of three highly correlated and annual measures of enforcement: inspections, serious citations, and penalties per worker in manufacturing. Since there is no clear theoretical guide about the relative weight each enforcement measure should contribute to the stringency index, the standardized form of each measure is used to produce equal contributions to the variance of the stringency measure.

If cooperative enforcement is such an effective strategy for the enforcement

dilemma, why isn't it universally employed? To answer this question, we need to move from the narrow enforcement game to the political games that restrict the agency's choice of effective strategies.

Political Interests and Cooperative Enforcement

Normally, interest group theory would predict that representatives of groups enjoying the benefits of regulation would be expected to press for higher levels of enforcement outputs *and* the most effective use of these outputs. Conversely, representatives of groups subject to enforcement actions would presumably seek less enforcement and less effectiveness. Empirical research has generally confirmed the expected responsiveness of enforcement outputs to the partisanship of presidents, congressional committees, congressional delegations, and to interest group strength. The empirical study will also test for these hypothesized effects on enforcement outputs.

Although interest group theory is based on the desired outcomes a group receives rather than the government outputs they control, little theoretical or empirical work has attempted to connect the control of outputs with the effectiveness of these outputs in achieving a group's desired outcomes. In fact, the particular nature of cooperative enforcement alters the simple interest equation in several ways that appear perverse from the straightforward interpretation of interest group theory.

The most obvious change arises because both policy beneficiaries and opponents can gain from cooperative enforcement strategies. Consequently, regulated firms should favor cooperative enforcement even while seeking the lowest possible level of enforcement activity. The occupational safety and health policy

arena possesses several traits that Quirk (1989) argues should promote such cooperation—mutual gains from cooperation for the two primary well-organized factions: business and labor.

On the other hand, regulatory beneficiaries and their representatives may *not* favor cooperative enforcement despite its effectiveness. As noted, the problem for beneficiaries arises over their ability to control the bureaucracy. The two key features of the cooperative strategy—flexible enforcement and the differential treatment of firms—both require more administrative discretion than the baseline deterrence strategy. Discretion in turn creates a different set of political dilemmas for beneficiaries.

Regulatory Beneficiaries and the Principal–Agent Game

For regulatory beneficiaries and their representatives in the policy arena, the problem of controlling agency enforcement action can be represented by the principal–agent model (Mitnick 1980; Moe 1984). The political principal desires the bureaucratic agent to perform certain tasks, and must devise some incentive scheme to get the self-interested agent to perform as desired. The problem for the principal stems from asymmetric information, represented in different games as lack of knowledge about the agent's preferences and abilities, difficulties in monitoring the agent's behavior, and uncertainty about the impact of the agent on the task (Rasmusen 1989).

Such uncertainties are commonplace for political principals, but they are exacerbated by the discretionary requirements of the cooperative strategy. Inspectors must have the discretion to overlook minor violations and treat some firms less stringently than others. If inspectors are positively oriented toward policy goals and have the ability to make the trade-offs appropriate for flexible compliance

and to recognize flexible compliance in firms, beneficiaries could obtain the benefits of cooperation by providing the required level of discretion. On the other hand, if the agents are negatively oriented or incapable, discretion is likely to increase the likelihood that enforcement will be captured by business interests. Once discretion is provided, the policy decision locus is shifted more fully from the legislative to the administrative arena in which business is likely to have greater influence. Discretion increases business incentives to influence the "street-level" inspectors at the same time it decreases the ability of the national office and oversight agencies to monitor and control the behavior of inspectors (Scholz 1984b).

Figure 2 illustrates the ordering of payoffs to regulatory beneficiaries in the resultant principal–agent game. If beneficiaries provide the necessary discretion to pursue the cooperative strategy, they will receive either the highest or lowest payoff possible (three or zero, respectively). If they minimize discretion to the lesser requirements of the deterrence equilibrium, they will receive at best the more modest payoff of the deterrence equilibrium (two). But they will also avoid the worst case if the bureaucracy is incapable or unsupportive, since the greater capacity to control and monitor the deterrence strategy would help minimize the problem of lax enforcement. The agency payoffs are not given in Figure 2 because beneficiaries must choose without knowing for certain what the agency's payoffs may be. Furthermore, the choice facing beneficiaries is a one-shot, rather than a repeated, game because cooperative enforcement requires a long-term commitment in order to develop the benefits of cooperation (Scholz 1984a).

Given the uncertainty about how supportive the enforcement agency will be of policy goals, beneficiaries may feel the broader discretion required for cooperative enforcement is too risky. For exam-

Figure 2. Payoffs for the Principal–Agent Game

		Agent's Choice (Bureaucracy)	
		Favor Policy Goal	Disfavor Policy Goal
Principal's Choice (Beneficiaries)	Necessary Discretion	3,? Voluntary Compliance Equilibrium	0,? Capture
	Minimal Discretion	2,? Deterrence Equilibrium	1,? Lax Enforcement

Note: The numeric entries represent the utility payoff to beneficiaries, taken from Figure 1 for all but the outcome labeled *lax enforcement.* The agency payoffs are not given in Figure 2 because beneficiaries must choose without knowing for certain what the bureaucrat's payoffs may be.

ple, if beneficiaries have to make a single choice and if they feel that the bureaucracy is more likely to be negatively than positively oriented toward their interests, their best strategy in Figure 2 would be to opt for minimal discretion. Since cooperative enforcement most likely requires several years to develop into an efficient strategy (Scholz 1984b), beneficiaries in a given enforcement arena must be willing to make a long-term commitment to providing sufficient discretion in order to gain the benefits of cooperation.

The risks associated with cooperative enforcement were particularly salient in the polarized political environments of the 1970s that created OSHA and other regulatory agencies (McCaffrey 1982; Mendeloff 1979; Noble 1986). The provisions for automatic penalties, limited prosecutorial discretion, and citizen initiatives of enforcement written into the enforcement sections of regulatory statutes signaled a fear of agency capture and an attempt to ensure a stringent, noncooperative style of enforcement (Bardach and Kagan 1982). Reflecting this environment, OSHA in particular earned a reputation in the early years as an unbending, legalistic enforcer of the law, the very antithesis of a cooperative enforcement agency. Differing priorities intro-

duced under the Carter and Reagan administrations, on the other hand, have increased OSHA's interest in and ability to pursue more cooperative strategies (thereby providing the variance in programs at the state level essential for this study).

The enforcement hypothesis suggested by this analysis reverses the initial interest group assumption. Policy beneficiaries in contentious political environments will oppose the more effective cooperative enforcement, while regulated interests will support it. In the empirical study I expect to find that labor involvement will have a strong positive relationship with enforcement stringency, but a negative relationship with cooperative enforcement. Business strength, on the other hand, will have a negative relationship with enforcement stringency, but a positive relationship with cooperation.

The variable measuring labor involvement in a given enforcement arena calculates the complaints per worker filed with OSHA (Scholz and Wei 1986), since this measures the direct activity of labor relative to OSHA enforcement. The proxy measure for business strength in the reported results is the value added in the state's manufacturing sector, since this represents the resources available to business for influencing OSHA enforcement.

In addition, the number of workers, the number of firms, and the value added per firm in manufacturing were also included in analyses and will be discussed when their inclusion changes the analytic results.

I also test the corollary that Democrats will be less associated with cooperative enforcement than Republicans, assuming that Democrats are most likely to represent labor interests and Republicans to represent business interests. On the state level, the variable representing governor's party equals one for Democratic governors and zero for Republicans. The variable for state legislature measures the percentage of Democrats elected to the combined state legislature. On the federal level where ideological scores are available, the variable representing the state's congressional contingent measures the mean difference between trade union (Committee on Political Education) and business (National Association of Manufacturers) ratings for the state's representatives, with higher scores indicating greater support for labor.

A plausible alternative hypothesis is that the electoral system induces representatives to be more favorably oriented to effective enforcement than are the interest groups they represent. First, cooperative enforcement may provide an electoral advantage to the extent that it reduces hostility from regulated firms (Shover, Clelland, and Lynxwiler 1983) without reducing the level of enforcement desired by labor. Second, legislators in contentious political arenas may prefer to delegate more discretion to the enforcement agency, but simultaneously increase their overseeing of agency activities (McCubbins 1985). Legislators may thereby direct business hostility toward the enforcement agency and appease labor by exposing misuse of delegated authority if things go wrong. Finally, elected officials (at least at the party leadership level) might be more concerned with the efficient use of government resources, at least to the extent that budgetary resources saved through cooperative enforcement could be used elsewhere to gain the support of other groups.

In short, Democrats have electoral reasons to support cooperative enforcement that do not apply to labor interests. In Figure 2, for example, if the above advantages added one unit to the payoffs Democrats received for supporting discretion, the resultant payoffs (four and one) would be equal to, or greater than, the payoffs for not supporting discretion (two and one) regardless of the agency's choice. The discretion alternative would weakly dominate. Empirically, this hypothesis would be supported by a finding that labor is negatively related to the level of cooperative enforcement while Democrats who represent them are less negatively related.

Presidential policies during the period of study provide an example of electoral incentives. Despite the difference in parties, both the Carter and Reagan administrations attempted to reduce the number of nonserious citations and small penalties imposed under OSHA, which essentially allowed inspectors to focus more on serious violations most likely to cause injuries. Under Carter, OSHA explicitly concentrated on the serious safety problems in a manner consistent with cooperative enforcement. Under Reagan, the emphasis was more on a reduction in penalties, particularly during the early period of the administration (Scholz and Wei 1986; Sigler and Murphy 1988).

The influence of presidential policies can be analyzed indirectly by comparing enforcement by state and federal agencies, since presidential influence is more direct on the federal agency than on the state agencies that enforce federal OSHA standards in states with approved programs. Consequently, a variable equal to one for states with federal OSHA enforcement and zero for states with state agency en-

forcement represents this combination of federal and presidential influence in the empirical study. Obviously, this measure reflects other factors that differ between state and federal enforcement (Scholz and Wei 1986). It also cannot distinguish between the Carter and Reagan administrations because of the cross-sectional research design. If federal enforcement is found to be significantly more cooperative despite these sources of noise, the active policy under Carter and Reagan of encouraging cooperation would appear to be the most likely explanation for the difference.

Regulatory Beneficiaries and the Third-Party Participation Game

A second nested game that reverses predictions from the simple interest group calculus occurs when interest groups participate directly in the enforcement process, rather than indirectly through the principal–agent control game. Direct participation may transform the basic payoffs of the enforcement agency in the narrow enforcement game. In the case of OSHA, I argue that existing provisions for direct labor participation in OSHA's enforcement process limit the agency's ability to pursue the cooperative strategy.

As a consequence, some characteristics of the free-rider problem limit enforcement effectiveness. Labor as a whole would benefit from the added effectiveness of cooperative enforcement. But laborers in a given plant face a short-run temptation to insist on maximal enforcement to reduce as many safety risks as possible while the inspector is in the plant. Unlike the agency, laborers have little control over when the inspector will return, particularly since labor complaints no longer require OSHA to initiate a full inspection. As in the principal–agent game, control problems lead to uncertainty over long-term benefits of the cooperative strategy.

Even if the plant opted for flexible compliance in the previous period, workers could insist on maximal enforcement when the inspector arrived. If the agency is always forced to use maximal enforcement for firms with active worker participation, these firms are best off choosing minimal compliance. Consequently, the more that workers at individual plants insist on maximal enforcement, the lower the overall benefits to labor that could be gained from cooperative enforcement.

Both the principal–agent and participation games predict that labor participation will decrease the extent of cooperative enforcement. A distinguishing test applicable only for the labor participation game hypothesis is provided by the prediction that labor participation will directly reduce the effectiveness of enforcement by minimizing benefits from any given level of cooperative enforcement.

The Enforcement Environment

Public administration studies of effectiveness would generally focus on the nature of an agency's tasks and the task environment rather than political factors. The task environment is likely to influence the level of cooperation (Scholz 1984a) and enforcement (Scholz and Wei 1986). Consequently, four task variables have been included in the study to control for possible spurious relationships as well as to estimate the relative importance of task and political factors in influencing enforcement levels, styles, and effectiveness.

The task variables will only be discussed briefly, since they are not of primary interest. The first variable—resources for safety—measures the value added per employee in the manufacturing sector. Firms that generate more value per worker are more likely to have the resources to respond to OSHA enforcement; therefore, states with resource-rich

firms are likely to exhibit more effective enforcement. Worker injury rates measure the seriousness of the problem facing OSHA in the state. High rates should presumably increase concern with effectiveness and lead to higher levels of enforcement and cooperation.

High unemployment, on the other hand, emphasizes economic rather than safety concerns and tends to reduce levels of enforcement and concern with effectiveness. High per capita income in the state indicates greater wealth, which could increase resources available to the state for enforcement. High income may also increase the relative importance of safety compared to more basic economic concerns with employment and therefore increase both cooperation and the level of enforcement.

Data and Method of Analysis

The Occupational Safety and Health Administration provides one of the better opportunities to analyze the relationship between political interests and enforcement effectiveness, since measures of political interests, enforcement actions, and the desired outcomes (worker injury rates) are available. Considerable evidence indicates that political influences cause significant variation in OSHA enforcement activities at the state and local level (Marlow 1981; Marvel 1982; Scholz, Twombly, and Headrick 1988; Scholz and Wei 1986; Thompson and Scicchitano 1985). Other evidence indicates that OSHA enforcement has small but significant impacts on injury rates: a 10% increase in enforcement is estimated to reduce injury rates between 2% (Viscusi 1986) and 1.5% (Scholz and Gray 1990), depending on assumptions about impacts on safety. While most studies have found significant impacts (Cook and Gautschi 1981; Smith 1979; Viscusi 1979), some have found none (Bartel and Thomas

1985; McCaffrey 1983). (See Scholz and Gray 1990 for a review.) Studies of enforcement effectiveness have not, however, looked at differences in effectiveness across jurisdictions that may occur because of different political environments.

The following analysis combines these two research traditions to illustrate the impact of states' political environments on the effectiveness of OSHA enforcement. The state provides an appropriate unit of analysis for the "ecology" of cooperative enforcement (Scholz 1984a) for two reasons. First, the benefits of encouraging the evolution of cooperation accrue throughout the cooperative agency's jurisdiction and are not as readily detected by using individual firms as a unit of analysis. Benefits also accrue over a relatively long period of time, requiring an appropriately long period of observation for each state. Second, the political and enforcement jurisdictions correspond most closely at the state level. Of equal importance, states provide a convenient unit of analysis because data are available for 34 states—complete injury rate data are not available for the remaining 16 states because of sampling limitations in the Bureau of Labor Statistics annual survey. Data limitations unfortunately limit the conclusiveness of the analysis but provide the best available preliminary test of the hypothesized relationships between interests and enforcement effectiveness.

In the first stage of this analysis, I estimated the effectiveness of enforcement actions in reducing industrial injury rates for each of the 34 states. Independent estimates for the effectiveness of inspections, citations, and penalties in each state were combined to form an effectiveness score for the state. The mean of all political and task variables for the same period were calculated for each state and combined in a second data set with the effectiveness scores. The primary analysis then used

this cross-sectional data set with 34 state observations to analyze the direct and indirect impacts of political and task variables on effectiveness.

Stage 1: Effectiveness Estimates

Effectiveness scores were calculated from a data set of annual observations from 1976 to 1985 for the 34 states in the study. Enforcement measures included the annual number of inspections, serious citations, and penalties per worker in manufacturing, which were provided by OSHA. The measure of workplace injuries—lost workday injury and illness incidence per worker—was gathered from the Bureau of Labor Statistics' annual survey, the source of data for most OSHA evaluation studies.

I first used the following equation to estimate enforcement effectiveness:

$$\text{injury}_{ti} = \beta_1 \text{unemployment}_{ti}$$
$$+ \beta_{2i} \text{enforcement}_{t-1,i} + e_{ti},$$

where t represents the year and i the state of the observation. Thus, a negative coefficient β_{2i} indicates effective enforcement in state i, since higher levels of enforcement are associated with lower injury rates.

This equation reflects the assumption about lagged effects found in other estimations of OSHA enforcement effectiveness (Bartel and Thomas 1985; Scholz and Gray 1990; Viscusi 1986),[4] but differs in three ways: (1) the state, rather than industry, provides the unit for aggregation; (2) enforcement coefficients are estimated independently for each state unit; and (3) only unemployment, the most robustly significant variable from other studies, is included as a control for spurious relationships. The first two differences reflect the focus on state enforcement arenas, and the third reflects the small number of data points (10 per state) available for analysis. Since injury data for individual

firms or even for industries within each state are not available, more powerful analytic approaches and more extensive sets of control variables could not be employed.

Two data transformations were used to correct for diagnosed regression problems. First, the data was centered (mean of each variable set to zero in each state) to remove state differences in mean levels of injury rates and in reporting standards used in the Bureau of Labor Statistics survey. No intercept term was included in the equation because the data was centered. Second, the data was adjusted to correct for first-order autocorrelation that was diagnosed by a Durbin–Watson test. Estimation was done independently for inspections, citations, and penalties to minimize problems of collinearity among the enforcement variables.

The analysis found negative coefficients in 4 states for penalties, in 11 states for inspections, and in all states for serious citations.[5] To create a single scale of effectiveness, each state was assigned a rank of zero if only the coefficient for citations was negative, one if inspections was negative as well, and two if all three were negative. This scale was chosen instead of a composite index based on the coefficient estimates in order to avoid attributing too much significance to the numerical values of the estimates, which were based on only 10 available time periods for each state. The three sets of coefficients were moderately correlated; and the scores were hierarchically consistent in that all 4 states with negative penalty coefficients also had negative coefficients for inspections and all 11 states with negative inspection coefficients also had negative coefficients for citations.

Stage 2: Estimating Impacts on Enforcement Effectiveness and the Levels of Cooperation and Enforcement

The main analysis first examines the impacts of enforcement characteristics,

Table 1. Probit Estimation of Factors Influencing Enforcement Effectiveness

Independent Variable	Standardized Coefficient[a]	Standard Error	t-ratio
Enforcement characteristics			
Cooperation level	1.64*	.55	2.96
Enforcement level	1.66*	.83	1.99
Interest groups			
Labor involvement	-1.25*	.68	-1.84
Elected officials			
Presidential/federal	-.54	.42	-1.29
Party of governor	.78*	.33	2.35
Enforcement environment			
Resources for safety	.54*	.30	1.82
Injury rates	.11	.35	.31
Unemployment	.42	.26	1.57
Threshold	2.11	.64	3.28

Note: The table reports ordered probit coefficients calculated for state effectiveness scores, the three-category dependent variable. The model predicted 74% of the cases correctly, which represents a 9% improvement over a prediction based on the modal category containing 68% of the 34 cases. The insignificant terms not included in the final analysis (business strength, Congress, state legislature, and income) were not significant in any (unreported) alternative models, and their inclusion did not affect the significance of variables reported in this table.

[a]The "standardized" coefficients are ordinary probit coefficients calculated using standardized independent variables.

*$p < .05$, one-tailed test.

political influences, and the task environment on the effectiveness scores calculated from stage 1. Ordered probit results are reported for effectiveness scores in Table 1, since the dependent variable is categorical with a highly skewed distribution. Next, I analyze the indirect effects of political and task variables on effectiveness that operate through their impact on enforcement characteristics. Standard ordinary least squares regression results are reported in Tables 2 and 3, since the levels of cooperation and enforcement are continuous variables. Standardized coefficients are presented for ordinary least squares estimations to facilitate comparisons of the relative impact of independent variables. In the case of the probit analysis, the reported "standardized coefficients" are calculated by standardizing the continuous independent variables prior to estimation.

The combination of small sample size and multicollinearity resulted in significant equations with insignificant coefficients when all relevant independent variables were included in the equations. Limiting the equation to six to eight independent variables at a time eliminated this problem. Consequently, alternative limited models with different combinations of independent variables have been tested systematically, and only variables that were significant in at least some combination were included in the reported estimations. With the few exceptions noted in the following discussion, the level of significance and relative magnitudes of the significant coefficients presented in the tables did not vary across the

Table 2. Ordinary Least Squares Estimation of Factors Influencing Level of Cooperation

Independent Variable	Standardized Coefficient	Standard Error	t-ratio
Interest groups			
Labor involvement	-.13	.18	-.75
Business strength	-.03	.13	-.22
Elected officials			
Congress	-.30*	.13	-2.25
President/federal	.68*	.13	5.45
Enforcement environment			
Injury rates	-.01	.18	-.02
Unemployment	.04	.13	.27

Note: Adjusted r^2 = .53; N = 34. The insignificant terms not included in the final analysis (party of governor, state legislature, income, resources for safety) were not significant in any (unreported) alternative models, and their inclusion did not affect the significance of variables reported in this table.

*$p < .01$.

alternative models limited to eight variables, demonstrating the robustness of reported estimates with respect to different variable specifications of the model.

Results

Cooperative Enforcement Increases Enforcement Effectiveness

The significant, positive coefficient for the level of cooperation reported in Table 1 supports the critical hypothesis that cooperation does increase effectiveness. Despite the potential difficulties that could minimize the effectiveness of collective enforcement, states with more concentrated enforcement associated with the cooperative enforcement strategy are more likely to have higher effectiveness scores when the level of enforcement is controlled. This finding is crucial for the rest of the analysis, since it implies that beneficiaries should support cooperative enforcement according to the simple calculus of interests.

The significant coefficient for the level of enforcement indicates that the overall stringency of an agency's enforcement also influences effectiveness. When the level of enforcement is low, as in "captured" enforcement agencies, the enforcement actions that do take place are apparently less effective in changing business behavior. Since the level of enforcement determines the minimal cooperative level of compliance, there may be a minimal level of stringency below which cooperation would no longer contribute to effectiveness.

The significant influence of both cooperation and enforcement level suggests a major weakness in current evaluations of enforcement effectiveness, which do not account for differences in enforcement strategies. Most studies have considered only the *average* effectiveness across all local enforcement arenas. The evidence in Table 1 suggests that the impact of inspections, citations, and penalties change with the concentration and overall level of activities in the enforcement arena.

Third-Party Participation and Enforcement Effectiveness

Table 1 also confirms the negative impact of labor involvement on effective-

Table 3. Ordinary Least Squares Estimation of Factors
Influencing Level of Enforcement

Independent Variable	Standardized Coefficient	Standard Error	t-ratio
Interest groups			
Labor involvement	.75*	.12	6.17
Business strength	-.22*	.09	-2.45
Elected officials			
Congress	.21*	.09	2.28
President/federal	-.20*	.09	-2.38
Enforcement environment			
Injury rates	.05	.12	.39
Unemployment	-.02	.09	-.18

Note: Adjusted r^2 = .78; N = 34. The insignificant terms not included in the final analysis (party of governor, state legislature, income, resources for safety) were not significant in any (unreported) alternative models, and their inclusion did not affect the significance of variables reported in this table.

*$p < .01$.

ness, as predicted in the third-party participation game. Labor involvement is significant, and the magnitude of impact indicated by the "standardized" coefficient is only slightly below the enforcement characteristics in importance. Note that this estimation tests only the direct influence of labor on effectiveness relevant to the third-party hypothesis. Labor does exert a positive influence on effectiveness through its influence on the level of enforcement, as will be discussed later. This indirect effect is eliminated from the estimation in Table 1 by the inclusion of level of enforcement, which also controls for possible spurious effects due to the potential impact of enforcement levels on labor involvement.[6]

The other variables in Table 1 were included primarily as controls but provide further insight into the factors affecting enforcement effectiveness. Among the other political variables, only the party of the governor had significant impact on effectiveness. Democratic governors were associated with higher effectiveness even after controlling for enforcement characteristics that they might influence. This direct effect apparently arises through the governor's influence on the behavior of regulated firms in their electoral districts (Scholz, Twombly, and Headrick 1988). By encouraging firms to either comply or resist agency enforcement actions, by actively working with trade and business organizations to cooperate or confront, and by either ridiculing enforcement actions or endorsing them and condemning noncompliers publicly, elected officials may influence firm responses to the cooperative strategy. To the extent that Democrats have a greater incentive to encourage cooperative responses from firms, their direct participation in enforcement should enhance enforcement effectiveness for a given level of cooperation and stringency. The lack of significance for other elected officials suggests that administrative controls over state agencies provide the governor with greater persuasive powers over state business than is possessed by federal or state legislators. The remaining control variables representing the enforcement environment had less impact on effectiveness. Only resources for safety (value added per worker) was significant, confirming the importance of the resources available to

invest in safety once enforcement makes such investments worthwhile (Scholz and Gray 1990).

Principal–Agent Controls and the Level of Cooperation

The analysis of factors influencing the level of cooperation in Table 2 is consistent with the hypothesis that beneficiaries do not support the most efficient enforcement strategy. Both labor involvement and a liberal congressional constituency are *negatively* related to the level of cooperation, although only the coefficient for Congress is significant.

Business strength was not significantly related to cooperation, even though business benefits from the cost-saving aspects of cooperation and does not face labor's problem of controlling agency behavior. On the other hand, probusiness congressional representatives were associated with higher levels of enforcement. For both business and labor, representatives had more significant influence on the level of cooperation than the groups they represent. Furthermore, that influence was opposite what a simple interest calculus would suggest. Business representatives supported the more efficient enforcement strategy, while labor representatives opposed it.

The significance of Congress and insignificance of interest groups is inconsistent with the alternative hypothesis that elected officials would be more concerned with efficiency and more willing to delegate the required authority to agencies. On the contrary, it appears that liberal congressional representatives were even less inclined to support cooperative enforcement than the labor interests they represent. Democratic representatives consistently reflected the position of leaders such as Gaydos on the Labor Committee and Lantos on Government Operations, who have constantly prodded OSHA to enforce more vigorously, not more flexibly. As Quirk (1989) noted, interest group leaders and representatives find that confrontational rather than cooperative politics have advantages for organizational and coalitional maintenance. The contentious politics of business–labor relations appears to be a zero-sum game in which representatives must choose one side or the other; attempting to appease one side through cooperation reduces the electoral support of the other.

Presidential influence, as represented by the states with federal enforcement, significantly increased the likelihood of cooperation. The emphasis of the Carter and Reagan administrations on the most serious compliance problems was reflected in the significant positive impact of presidential administration on the level of cooperative enforcement (see Table 2). While this explanation of the observed presidential influence is consistent with the clear policy intent of the Carter and Reagan administrations, it should be noted that structural differences between federal and state enforcement provide a competing conjecture consistent with observed results.[7]

Finally, other political variables, as well as the task variables included to control for differences in enforcement environments, had considerably less influence than Congress or the presidential administration. Neither state officials nor task variables were significantly related to the level of cooperation, although the limited power of the research design would caution against concluding that only federal officials influenced the choice of enforcement strategy.

Enforcement Outputs Reflect the Simple Interest Calculus

Finally, Table 3 confirms the conventional wisdom that interest groups and their representatives affect enforcement outputs as expected from a straightforward application of interest group

theory. Labor and their Democratic congressional representatives significantly increase the level of enforcement, while business and their Republican representatives decrease them. The results are reported primarily to confirm that the design of this study generally replicates prior studies when used for the more common analysis relating interests to policy outputs (as opposed to effectiveness).

The presidential–federal administration decreased the level of enforcement in states with federal enforcement. This reflected two emphases in presidential policies that have been confirmed elsewhere. First, both the Carter and Reagan administrations reduced the number of minor violations cited by OSHA (Centaur Associates 1985; Noble 1986). Second, the Reagan emphasis on minimizing overall citations and penalties had a greater impact on federal states than Carter's more neutral emphasis on shifting citations from minor to serious violations (Scholz and Wei 1986).

The other political variables and task variables included to control for differences in enforcement environments were not significant. As noted previously, the aggregated analysis, small sample size, and measurement problems associated with the research design limit the ability of the study to detect more subtle relationships. For example, less aggregated analysis of similar data (Scholz and Wei 1986) found significant influences of the party of the governor, injury rates, and unemployment on some enforcement measures. In short, only the most robust relationships were likely to pass significance tests, so that the lack of significance of state officials and task variables should not lead to the conclusion that they had no influence on enforcement.

As noted, the positive impact of labor involvement on enforcement levels might offset the two previously discussed negative impacts of labor involvement on effectiveness, since enforcement level has a

significant influence on effectiveness. A crude approximation of the combined impact of labor involvement on effectiveness can be obtained by multiplying the coefficients for labor's impact on cooperation (Table 2) and on enforcement levels (Table 3) by the probit coefficients for the respective impacts of these levels on effectiveness (Table 1). The positive impact through higher levels of enforcement (.75 × 1.66 = 1.24) does not fully counterbalance the negative impact through the third-party participation problem (the direct effect of −1.25). Applying the same method to representatives, the positive impact of Democratic congressional representation through the level of enforcement (.21 × 1.66 = .35) does not counterbalance the negative impact through cooperation due to the principal-agent problem (−.30 × 1.64 = −.49). On the other hand, the positive direct impact of Democratic governors on effectiveness more than compensates for this difference. Furthermore, the level of enforcement has a direct impact on injury rates, as analyzed in the first stage, apart from the impact on effectiveness. In short, the main point is *not* that the net labor influence on enforcement perversely harms labor's own interests but that their influence *substantially reduces* the *potential* effectiveness of enforcement. The primary reason for this loss in effectiveness stems from the effectiveness–control trade-off imposed by the cooperative enforcement strategy.

Summary and Conclusion

Interests are not always as clear as applications of interest group theory suggest, particularly when we look into the intricacies of effective policy implementation. This study has investigated the seemingly perverse impact of policy beneficiaries on the effectiveness of regulatory enforcement. An analysis of OSHA en-

forcement confirmed that labor interests and their liberal representatives significantly increased state-level enforcement activities, as interest group theory would predict. However, these same interests were also found to reduce enforcement effectiveness, thereby decreasing the potential reduction in injuries that could have been obtained for the given level of enforcement activities.

I have argued that beneficiaries may ironically oppose effective implementation strategies primarily because of the control problems accompanying these strategies. A cooperative enforcement strategy that concentrated on more serious violations and on chronic non-compliers was shown to enhance the effectiveness of enforcement actions as compared with the classical deterrence strategy that treated firms randomly.

But the cooperative strategy required greater administrative discretion and trust in the enforcement agency, which led to the effectiveness–control trade-offs clarified by two relevant policy control games. In the principal–agent game, the potential gain to beneficiaries from granting necessary discretion to the enforcement agency may be offset by a greater risk that the agency will be captured by business interests. Thus, liberal congressional representatives, the political principals representing labor, were negatively associated with state-level cooperative enforcement. In the third-party participation game, workers in a given plant may prefer short-term gains to uncertain long-term gains that depend on future agency actions. Thus, labor participation in the enforcement process was negatively related to enforcement effectiveness.

The critical point is that problems of control should be recognized along with technical and political problems as an important cause of bureaucratic ineffectiveness. In the case of cooperative enforcement, the possibility of mitigating ineffectiveness depends on the perceptions of beneficiaries, not just on the political strength of business opposition or on the skills and interests of the bureaucracy. If beneficiaries always assume that their opponents will soon control the enforcement bureaucracy, as Moe (1989) argues, it appears unlikely that they would ever trust the bureaucracy with long-term discretion required for effective enforcement. But the problems Moe describes might be due to the combination of historical factors (primarily, the distrust of bureaucracy [Bardach and Kagan 1982] and the institutional split between Democratically controlled Congress and Republican presidents) during the creation of social regulatory agencies and not be a perennial feature of the U.S. political system.

If alternative institutional arrangements could be introduced to overcome the control problem by transforming the payoffs to beneficiaries, greater efficiency might be possible. For example, several analysts (e.g., Bardach and Kagan 1982) suggest that the principal–agent control problem could be mitigated through alternative management and monitoring techniques. Ayres and Braithwaite (1989) argue that the third-party participation game could be transformed into a tripartite game between the firm, its workers, and the enforcement agency that would provide plant-level labor participants with incentives to favor long-term cooperation.

One of my primary goals here has been to emphasize the advantages of simultaneously analyzing both interest group politics and the technical aspects of policy effectiveness. Interest group theory presumably focuses on policy outcomes and therefore cannot focus on bureaucratic outputs without considering how effectively these outputs are translated into the outcomes desired by interest groups. And public administration theory cannot realistically analyze policy effectiveness without considering the complex incentives of political, as well as administrative, actors to pursue policies that are "technically"

most effective.

The last two decades of implementation research have uncovered a broad landscape of seemingly perverse incentives affecting administrative effectiveness. The nested game framework provides a means for systematically exploring the interaction between the narrow administrative game that emphasizes policy effectiveness and the broader political games that emphasize political interests. By systematically analyzing the structural sources of perverse incentives, political science may be able to produce a more orderly map of this terrain.

Appendix: Summary of Variables

All variables are calculated as the mean of annual state-level measures for the period 1976 to 1985 except where otherwise indicated.

Effectiveness Rank

Effectiveness Score. Categorical variable equal to zero for 23 states (68%) with negative coefficients only for serious citations; equal to one for 7 states (21%) with negative coefficients for inspections and citations; and equal to two for 4 states (12%) with negative coefficients for inspection, citations, and penalties.

Enforcement Characteristics

Cooperation Level. Mean of two standardized measures: (1) percentage of all violations that are serious and (2) percentage of all penalties imposed for serious violations.

Enforcement Level. Mean of sum of standardized measures for inspections, citations, and penalties.

Interest Groups

Labor Involvement. Complaint inspections per worker.

Business Strength. Number of firms in manufacturing sector. Several alternative proxies for business strength are analyzed and reported in the text, including value added in manufacturing sector, number of employees in manufacturing sector, and value added per firm. All are calculated as the mean from the 1977, 1982, and 1986 Census of Manufactures, from the U.S. Bureau of the Census.

Elected Officials

Presidential Administration. Dummy variable equaling one for states with federal enforcement and zero for states with state enforcement.

Congress. Mean difference between union (COPE) and business (NAM) rating for state delegation to Congress.

Party of Governor. Percentage of years in period for which governor was a Democrat.

State Legislature. Mean percentage of state legislators (in both houses) who were Democrats.

Enforcement Environment
(Control Variables)

Resources for Safety. Value added per employee in manufacturing.

Injury Rates. Lost workday injury and illness rates from annual Bureau of Labor Statistics survey.

Unemployment. Rate of unemployment.

Income. Per capita income.

Notes

1. Economists might argue that even greater efficiency might result if regulatory standards were replaced by tax incentive schemes, such as an injury tax. It should be noted, however, that the enforce-

ment and collection of taxes impose comparable sets of difficulties and inefficiencies (Roth, Scholz, and Witte 1989).

2. There is a built-in compliance escalator in the dynamic process of converting minimal compliers to flexible compliers (Scholz 1984a). As firms switch to flexible compliance, the agency can focus its limited prosecutorial resources on a decreasing number of minimal compliers. This, in turn, increases the expected penalty for the noncompliers, which in turn can increase the standard of flexible compliance acceptable to the agency. It can be shown that there is an optimal flexible compliance standard that would provide the highest level of desired policy outcome for the lowest combination of compliance and monitoring–prosecutorial costs.

3. The measure of concentrated enforcement initially included the mean penalty per serious citation, but this component was dropped because it was more closely correlated to the level of enforcement variable than to the other measures of concentration. Other useful measures that would focus on the differential treatment of firms were not available in the aggregated data set.

4. The lag actually represents only a three-month difference, obtained because the enforcement data is for the government fiscal period (October–September) and other data is for the calendar year. Simultaneous effects of injury rates on enforcement variables are assumed not to cause an estimation problem despite this relatively short delay even though injury rates have been demonstrated to affect enforcement (Scholz and Wei 1986), since this effect was also lagged by the remaining nine-month difference between the fiscal and calendar year. The observed relationship does pose the possibility of correlation between the enforcement measure and the measure of injury rates in the previous period, but the correction for serial correlation used in the current analysis ensures that this would not in turn cause a correlation between enforcement and the error term associated with the current injury measure. If such correlation occurred, an instrumental variable approach would have been required to obtain unbiased estimates.

The selected method averages efficiency over the 10-year period and must assume that efficiency remains relatively constant over the period. This assumption is supported by Viscusi's (1986) analysis demonstrating that time periods representing changes in enforcement programs and in presidential administrations during the 1973–83 period showed no significant differences in enforcement effectiveness at the national level. In any case, data on injury rates for shorter time periods than one year are unavailable, so efficiency estimates for shorter periods within the 10 years of this study could not be calculated.

5. A separate analysis was used to check the comparability of this basic equation and data set with other studies of regulatory impact. In this analysis the equation was estimated with state coefficients constrained to be equal and with all enforcement variables in a single equation. The Parks Method estimates found that only inspections were close to having a significant impact on injuries—and only at the .10 level—while unemployment had a highly significant impact. Viscusi (1986) found similar results, while Bartel and Thomas (1985) concluded that no enforcement variable affected injury rates. The omission of several (mainly insignificant) control variables used in other studies did not appear to alter the results for our analysis. As noted in the text, the low significance level applies to average enforcement and does not indicate that enforcement is not significant in individual states.

6. The impact of labor should be strongest in states with the highest level of cooperation. As noted previously, the limited data set does not permit analysis of all such interactive effects. One could argue that labor involvement decreases effectiveness in other ways, but it is generally argued that greater activities in support of enforcement activities by labor should increase the effectiveness of deterrence (Bardach and Kagan 1982). A more plausible alternative explanation for the positive effect of labor could be that inspections resulting from complaints are less productive than inspections targeted by OSHA, so that more complaints will divert more resources, resulting in lower effectiveness. This argument has been made in particular by OSHA opponents who have suggested that labor uses complaints for non-safety-oriented reasons to punish employers or strengthen negotiating positions, thereby diverting OSHA's efforts from firms with greater health problems and reducing the impact of enforcement on injury rates. While this alternative explanation was supported by indirect findings in a U.S. General Accounting Office study (1979), a careful study by Smith (1986) failed to find significant differences between complaint-initiated and other types of inspections either before or after the 1980 policy change that required OSHA to respond only to formal complaints.

7. Since the variable measures only the difference between federal and state programs, a structural explanation for the greater stringency and lesser cooperation in state agencies is also plausible. Since cooperative enforcement requires more elaborate bureaucratic controls on discretion and more professionalized inspectors than does stringent enforcement (Bardach and Kagan 1982; Scholz 1984a, 1984b; Shover, Lynxwiler, and Clelland 1983), the greater informality and political sensitivity in state agencies may be less conducive to cooperation than the less permeable, more procedurally oriented federal agency. Agencies attempting cooperative enforcement with inadequate controls are politically vulnerable to attacks from both camps; firms subjected to concentrated enforcement may claim they

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are being arbitrarily singled out for punishment, while advocates of more effective enforcement may claim that many noncompliers are being ignored. If this is the more relevant explanation, the advantage of flexible state agencies in terms of political responsiveness (Scholz and Wei 1986) may be offset by the disadvantage in terms of less cooperative effectiveness. The presidential influence hypothesis appears to have greater support in terms of the known policy emphases of the Carter and Reagan administrations.

References

Axelrod, Robert. 1984. *The Evolution of Cooperation.* New York: Basic Books.

Ayres, Ian, and John Braithwaite. 1989. "Tripartism, Empowerment, and Game-theoretic Notions of Regulatory Capture." Presented to the Law and Society Association Meeting, Madison.

Bardach, Eugene. 1977. *The Implementation Game.* Cambridge: MIT Press.

Bardach, Eugene, and Robert A. Kagan. 1982. *Going by the Book: The Problem of Regulatory Unreasonableness.* Philadelphia: Temple University Press.

Bartel, Ann, and L. Thomas. 1985. "Direct and Indirect Effects of OSHA Regulation." *Journal of Law and Economics* 28:1–26.

Bendor, Jonathan. 1987. "In Good Times and Bad: Reciprocity in an Uncertain World." *American Journal of Political Science* 31:531–58.

Bendor, Jonathan, and Terry M. Moe. 1985. "An Adaptive Model of Bureaucratic Politics." *American Political Science Review* 79:755–74.

Bianco, William T., Peter C. Ordeshook, and George Tsebelis. 1990. "Crime and Punishment: Are One-Shot, Two-Person Games Enough?" *American Political Science Review* 84:569–87.

Braithwaite, John. 1985. *To Punish or Persuade: Enforcement of Coal Mine Safety.* Albany: State University of New York Press.

Centaur Associates. 1985. *The Impact of OSHA Enforcement Activities.* Report to the Occupational Safety and Health Administration.

Cook, William N., and F. Gautschi. 1981. "OSHA, Plant Safety, Programs, and Injury Reduction." *Industrial Relations* 20:245–57.

Downs, Anthony. 1967. *Inside Bureaucracy.* Boston: Little, Brown.

Gormley, William T. 1983. *The Politics of Public Utilities Regulation.* Pittsburgh: Pittsburgh University Press.

Grabosky, Peter, and John Braithwaite. 1986. *Of Manners Gentle: Enforcement Strategies of Australian Business Regulatory Agencies.* Oxford: Oxford University Press.

Graetz, Michael J., Jennifer F. Reinganum, and

Louis J. Wilde. 1986. "The Tax Compliance Game: Toward an Interactive Theory of Law Enforcement." *Journal of Law, Economics, and Organization* 2:1–32.

Greenberg, J. 1984. "Avoiding Tax Avoidance: A (Repeated) Game-theoretic Approach." *Journal of Economic Theory* 32:1–13.

Kagan, Robert A. 1978. *Regulatory Justice: Implementing a Wage-Price Freeze.* New York: Russell Sage Foundation.

Kagan, Robert A., and John T. Scholz. 1984. "The 'Criminology' of the Corporation and Regulatory Enforcement Strategies." In *Enforcing Regulation,* ed. Keith Hawkins and John M. Thomas. Boston: Kluwer-Nijhoff.

Kelman, Steven. 1982. *Regulating America, Regulating Sweden.* Cambridge: MIT Press.

McCaffrey, David. 1982. *OSHA and the Politics of Health Regulation* New York: Plenum.

McCaffrey, David. 1983. "An Assessment of OSHA's Recent Effects on Injury Rates." *Journal of Human Resources* 18:131–46.

McCubbins, Mathew D. 1985. "The Legislative Design of Regulatory Structure." *American Journal of Political Science* 29:721–48.

Marlow, Michael. 1981. "The Impact of Different Government Units in the Regulation of the Workplace Environment." *Public Choice* 37:349–56.

Marvel, Mary K. 1982. "Implementation and Safety Regulation: Variations in Federal and State Administration under OSHA." *Administration and Society* 14:15–33.

Mazmanian, Daniel A., and Paul A. Sabatier. 1983. *Implementation and Public Policy.* Glenview, IL: Scott, Foresman.

Mendelhoff, John. 1979. *Regulating Safety: An Economic and Political Analysis of Occupational Safety and Health Policy.* Cambridge: MIT Press.

Miller, Gary, and Terry M. Moe. 1983. "Bureaucrats, Legislators, and the Size of Governments." *American Political Science Review* 77:297–323.

Mitnick, Barry. 1980. *The Political Economy of Regulation.* New York: Columbia University Press.

Moe, Terry M. 1982. "Regulatory Performance and Presidential Administration." *American Journal of Political Science* 26:197–224.

Moe, Terry M. 1984. "The New Economics of Organization." *American Journal of Political Science* 28:739–77.

Moe, Terry M. 1985. "Control and Feedback in Economic Regulation: The Case of the NLRB." *American Political Science Review* 79:1094–1116.

Moe, Terry M. 1989. "The Politics of Bureaucratic Structure." In *Can Government Govern?* ed. John Chubb and Paul Peterson. Washington: Brookings.

Muir, William K. 1977. *Police: Streetcorner Politicians.* Chicago: University of Chicago Press.

Noble, Charles. 1986. *Liberalism at Work: The Rise and Fall of OSHA.* Philadelphia: Temple University Press.

Nonet, Phillipe, and Phillip Selznick. 1978. *Law and Society in Transition: Toward Responsive Law.* New York: Harper Colophon.

Quirk, Paul J. 1989. "The Cooperative Resolution of Policy Conflict." *American Political Science Review* 83:905-21.

Rasmusen, Eric. 1989. *Games and Information: An Introduction to Game Theory.* Cambridge: MA: Basil Blackwell.

Reinganum, Jennifer F., and Louis J. Wilde. 1986. "Equilibrium Verification and Reporting Policies in a Model of Tax Compliance." *International Economics Review* 27:739-60.

Roth, Jeffrey A., John T. Scholz, and Ann Dryden Witte. 1989. *Taxpayer Compliance: An Agenda for Research.* Philadelphia: University of Pennsylvania.

Scholz, John T. 1984a. "Cooperation, Deterrence, and the Ecology of Regulatory Enforcement." *Law and Society Review* 18:601-46.

Scholz, John T. 1984b. "Voluntary Compliance and Regulatory Enforcement." *Law and Policy* 6:385-404.

Scholz, John T. 1989. "Federal Versus State Regulation: Does It Matter?" In *Power Divided*, ed. Malcolm Feeley and Harry Scheiber. Berkeley: Institute of Governmental Studies.

Scholz, John T., and Wayne B. Gray. 1990. "A Behavioral Approach to Compliance: OSHA Enforcement's Impact on Workplace Accidents." *Journal of Risk and Uncertainty* 3:283-305.

Scholz, John T., Jim Twombly, and Barbara Headrick. 1988. "Home Style Political Controls over Federal Bureaucracy: OSHA Enforcement at the County Level." Presented at the annual meeting of the American Political Science Association.

Scholz, John T., and Feng-heng Wei. 1986. "Regulatory Enforcement in a Federalist System." *American Political Science Review* 79:1249-70.

Seidman, Harold. 1980. *Politics, Position, and Power.* New York: Oxford University Press.

Shover, Neil, Donald Clelland, and John Lynxwiler. 1983. *Developing a Regulatory Bureaucracy: The Office of Surface Mining Reclamation and Enforcement.* Washington: National Institute of Justice.

Sigler, Jay A., and Joseph E. Murphy. 1988. *Interactive Corporate Compliance: An Alternative to Regulatory Compulsion.* New York: Quorum Books.

Silbey, Susan. 1984. "The Consequences of Responsive Regulation." In *Enforcing Regulation*, ed. Keith Hawkins and John Thomas. Boston: Kluwer-Nijhoff.

Smith, Robert S. 1979. "The Impact of OSHA Inspections on Manufacturing Injury Rates." *Journal of Human Resources* 14:145-70.

Smith, Robert S. 1986. "Greasing the Squeaky Wheel: The Relative Productivity of OSHA Complaint Inspections." *Industrial and Labor Relations Review* 40:35-47.

Thompson, Frank J., and Michael J. Scicchitano. 1985. "State Implementation Effort and Federal Regulatory Policy: The Case of Occupational Safety and Health." *Journal of Politics* 47:687-703.

Tsebelis, George. 1989. "The Abuse of Probability in Political Analysis: The Robinson Crusoe Fallacy." *American Political Science Review* 83:77-92.

Tsebelis, George. 1990. *Nested Games: Rational Choice in Comparative Politics.* Berkeley: University of California Press.

U.S. General Accounting Office. 1979. *How Effective Are OSHA's Complaint Procedures?* Comptroller General's Report to Congress HRD-79-48.

Viscusi, W. Kip. 1979. "The Impact of Occupational Safety and Health Regulation." *Bell Journal of Economics* 10:117-40.

Viscusi, W. Kip. 1986. "The Impact of Occupational Safety and Health Regulation, 1973-1983." *Rand Journal of Economics* 17:567-80.

Weingast, Barry R., and Mark J. Moran. 1983. "Bureaucratic Discretion or Congressional Control: Regulatory Policymaking by the Federal Trade Commission." *Journal of Political Economy* 91:765-800.

Williams, Bruce A., and Albert R. Matheny. 1984. "Testing Theories of Social Regulation: Hazardous Waste Regulation in the American States." *Journal of Politics* 46:428-58.

Wood, B. Dan. 1988. "Principals, Bureaucrats, and Responsiveness in Clean Air Enforcement." *American Political Science Review* 82:213-37.

John T. Scholz is Associate Professor of Political Science, State University of New York, Stony Brook, NY 11794.