SOURCES OF REGULATORY COMPLIANCE BIAS AND ITS IMPLICATIONS FOR ENVIRONMENTAL JUSTICE

David Konisky
Georgetown Univversity

Chris Reenock
Florida State University

Abstract

Recent research finding race- and class-based disparities in government enforcement of environmental laws has failed to provide a theoretically-grounded account of this bias' origin. We address this shortcoming by providing a micro-level explanation of how demographic characteristics influence the dual-agent – firm and regulatory officer – production function of regulatory compliance. Central to our argument is that compliance bias derives, at least in part, from bureaucrats' incentive structures. To empirically test our argument, we use an original dataset on community mobilization and agency structure that carefully delineates the local decision-making contexts of regulatory officers implementing the U.S. Clean Air Act and detection controlled estimation to correct for and model compliance bias. We find that while Hispanic communities are particularly vulnerable to compliance bias, such bias is mitigated in the presence of either politically mobilized communities or decentralized enforcement authority with the implementing agency.

Equal protection under the law is a fundamental principle of democratic public policy. When governments fail to treat citizens equally, the very legitimacy of democracy is threatened. Accordingly, the roots of equal protection extend deeply and broadly in the discipline. Scholars recognize its importance as a key component of the rule of law and the civil liberties protected in society (Maravall and Przeworski 2003). Bureaucracy scholars refer to doctrines of administrative fairness and representation (Meier 1993) and judicial scholars to that of impartiality and neutrality (Raz 1977). The fundamental question on issues of equal protection turns on whether government is treating citizens differently, and, if so, why?

In approaching this question, scholars have investigated policy domains that are ripe for violations of equal protection such as housing, pay, education, and employment. Environmental protection is another area where these types of violations may occur. Advocates for "environmental justice" often allege that minority and low-income communities experience disproportionate environmental hazards, in part, as a result of biased local land use decisions and unequal enforcement laws (Bryant 1995; Bullard, 1993; Bullard & Johnson 2000; Collins 1993). Only recently, however, have scholars explicitly tested whether the enforcement of environmental laws itself is inequitable (Dion, Lanoie & Laplante 1998; Earnhart 2004a, 2004b; Gray and Shadbegian 2004; Helland 1998b; Konisky 2009; Konisky and Schario 2010; Scholz and Wang 2006). These studies have, with mixed results, focused on establishing correlations between community demographics and regulatory enforcement outputs. Establishing these correlations is useful for diagnosing the presence of bias, but past research has neither identified the source of bias nor provided an explanation for why bureaucrats perform their administrative duties in a fashion that results in race- and class-based disparities.

To address this shortcoming, we develop an original theoretical account to explain how the demographic composition of a jurisdiction shapes bureaucrats' incentives to carry out enforcement activities, and specifically decisions about the compliance status of firms. We argue that in establishing their enforcement strategies, regulatory officers seek to minimize their transaction costs. Correctly determining the compliance status of firms is a costly process, and bureaucrats will dedicate less attention to where the consequences of being wrong are lower. One factor that influences the costs of being wrong is the political resources of the communities in which firms are located. Politically powerful and organized communities are less likely to stand by quietly if firms are failing to meet their environmental obligations. Because poor and minority communities tend to have fewer of these resources, bureaucrats have less incentive to carefully review the compliance status of firms located in these communities. Observed patterns of bias, therefore, need not result from overt discrimination, but rather regulatory officers rationally responding to their incentives.

We further argue that bureaucrats serving in agency management roles have an additional reason to characterize noncompliant firms as compliant. Firm compliance rates are an important metric by which political officials evaluate the performance of regulatory agencies. Senior bureaucrats have a strong incentive to over-report compliance rates, since they shape external evaluations of agency performance. We characterize this process as motivated, non-detection of compliance, and posit that high level managers are more likely to engage in this type of strategic behavior when a firm is located in a poor or minority area, since these communities have fewer political resources, and are therefore less likely to detect the bureaucrats' behavior.

The empirical setting for our analysis is firm-level compliance with the federal Clean Air Act (CAA). Using a novel dataset that carefully delineates the decision making environment of the state regulatory officers responsible for implementing the CAA, we employ detection controlled estimation (DCE) to model the effects of community demographic characteristics on both individual firm and regulatory officer compliance decisions. We find that while certain community demographics are vulnerable to compliance bias, such bias is mitigated in the presence of either politically mobilized communities or decentralized enforcement authority.

The paper proceeds as follows. We begin by reviewing the existing literature examining race- and class-based disparities in regulatory enforcement, arguing that compliance is a fertile area to investigate the origins and sources of such bias. We then develop a set of theoretical expectations about why this bias is likely to be associated with the demographics of the communities living around firms. Next we discuss our research design, and explain the usefulness of using a DCE approach to test these expectations. We then discuss our empirical analysis of compliance bias in the case of enforcement of the CAA, and conclude with a discussion of the implications of the study.

Compliance, Enforcement, and Environmental Justice

Existing research investigating the relationship between the demographic attributes of communities surrounding firms and environmental regulatory enforcement has generated mixed findings. Several studies have found that inspections of facilities regulated under the Clean Water Act (CWA) are less likely when the facilities are located in an area with a high percentage of poor (Konisky 2009; Konisky and Schario 2010) or low-income populations (Earnhart 2004a, 2004b; Helland 1998b; Scholz and Wang 2006). Moreover, facilities in areas with large poor populations tend to be associated with fewer punitive enforcement measures under both the CAA and the CWA (Gray and Shadbegian 2004; Konisky and Schario 2010). There are, however, notable exceptions to this pattern (Dion, Lanoie & Laplante 1998; Gray and Shadbegian 2004).

With respect to race and ethnicity, results are similarly mixed, with some showing a negative association between the percentage of African-American and Hispanic residents in an area and the likelihood of an inspection, and others finding little such evidence (Konisky 2009; Konisky and Schario 2010; Scholz and Wang 2006). This pattern extends to punitive actions taken by agencies in response to firms' violations. One study found that CAA facilities located in high-percent minority areas were less likely to experience administrative orders compared to facilities in low-percent minority areas (Mennis 2005), while other work has found that CWA facilities tend to be associated with more punitive actions when located in areas with more minorities (Gray and Shadbegian 2004; Konisky and Schario 2010).

These studies share a common goal of identifying correlations between demographic indicators and regulatory outputs, and many have invested in empirical advances such as more comprehensive data, more precise measures of demographic "communities," and more appropriate statistical estimators. However, we believe that studying regulatory outputs complicates identifying the causal mechanisms at work for two reasons. First, regulatory enforcement actions rely upon an initial determination of firm compliance, which is generally ascertained through government detection efforts, then used by regulatory agencies to inform their enforcement strategy. As a result, observed correlations between community demographics and many types of enforcement actions (e.g., administrative orders, penalties) may be evidence of bias originating in the administrative agency's decision-making for that enforcement action *or* evidence of bias originating in the initial compliance determination.

Second, bias in regulatory outputs is generated from a process that involves the strategic interaction of *both* firms and regulatory officers. Observed correlations between demographic attributes of a community and regulatory outputs can therefore originate with a firm's decision to be compliant, an officer's decision to accurately identify and catalogue non-compliant firms, or both. When studying regulatory outputs alone, these sources of bias are observationally equivalent. In sum, establishing correlations between demographics and most regulatory outputs, while useful for identifying the presence of disparities in government enforcement behavior, are less helpful for revealing the causal process and sources of the bias.

For these reasons, we believe a more productive path is to focus on compliance itself. Because compliance is the foundational process upon which other regulatory outputs are based, firm compliance is not vulnerable to the first problem noted above. In this sense, exploring environmental justice issues within a compliance framework highlights the core process within which we believe demographic bias is likely to originally arise.[1] Second, while compliance does entail dual agent (firm and officer) production, we can econometrically separate the origins of firm-based and officer-based bias in compliance. In other words, we can explicitly model each data generation process, allowing us to identify the source of bias.

The idea that regulatory officers' compliance determinations are associated with features of their decision-making contexts is not new. Scholars have long portrayed regulatory officers as responsive to the demands of stakeholders and political principals (Potoski 1999, 2002; Rinquist 1993; Scholz and Wei 1986; Scholz, Twombly & Headrick 1991; Scholz and Wood 1998, Thompson and Scicchitano 1985). Moreover, given finite resources, bureaucrats are selective in their enforcement, developing strategies to satisfy both policy and political goals (Huber 2007; Ringquist 1993; Scholz and Wood 1998; Whitford 2002). Limited resources and the competing demands of various policy and political actors provide regulatory officers with incentives that are not necessarily compatible with reliable detection of noncompliance (Helland 1998a; Scholz and

Wang 2006). Previous work, however, has not sufficiently theorized about community demographics as a source of compliance bias, and it is to which we now turn.

Theory and Hypotheses

Most models of regulatory compliance recognize two distinct processes: Firms make decisions over compliance and regulatory officers make choices over enforcement strategies. In nearly all of these models, firms and bureaucrats base their behavior on an implicit expected utility calculation in which each attempts to maximize their expected payoffs given their beliefs about what the other actor is likely to do (Braithwaite and Makkai 1991; Scholz 1991; Winter and May 2001). This standard deterrence model with repeated interaction provides basic expectations that are easily adapted for our purposes here.

We assume that firms are interested in maximizing their individual profit at the lowest cost of compliance. Deterrence models suggest that, when firms expect agency officials to pursue less rigorous enforcement strategies, they will have greater incentive to avoid full compliance. This is because of both the lower probability of being caught as well as the expectation of lenient treatment if they are discovered to be violating the law. Alternatively, when firms believe that agency officials are more likely to pursue a maximal deterrence strategy, firms will have greater incentive to stay in compliance. There are several potential signals in a policy environment that may inform a firm’s expectations about an agency’s enforcement strategy, including the current political regime, policy tasks factors, and agency characteristics (Hunter and Waterman 1996; Potoski 1999; Ringquist 1993; Scholz and Wei 1986; Scholz, Twombly and Headrick 1991; Wood 1992). We argue that community characteristics are another one of these signals. For reasons we specify below, bureaucrats are less likely to devote their limited resources to correctly detecting noncompliance when the firms are located in less politically active areas. Because large minority and poor communities tend to have fewer political resources with which to engage in advocacy, detection efforts will be less aggressive in these communities. Strategic firms respond accordingly, and should be more inclined to risk noncompliance.

For their part, bureaucrats will pursue enforcement strategies that are responsive to the demands placed on them by their policy and political communities. There exists a combination of features in bureaucrats' decision making environments that influence the vigor with which they pursue accurate compliance determinations, by which we mean either dedicating resources to detecting violations or building a case to characterize a firm suspected of violations as noncompliant. We argue that the demographics of the community in which the firm is located is one such important feature.

We begin with an assumption that bureaucrats seek to minimize their transaction costs, by which we mean they do the best job they can with limited resources (Meier and Krause 2003; Williamson 1985). Even if bureaucrats are motivated primarily by functional or intrinsic preferences (Brehm and Gates 1997; Wilson 1989), they are constrained by practical limits. In the context of firm compliance, they are unable to fully and regularly assess the behavior of regulated entities. For this reason, bureaucrats may engage in some satisficing behavior as a decision-making shortcut (Simon 1976), or, alternatively, choose to strategically allocate more effort to accurately determining the compliance status of some firms more than others.[2] This could take the form of directing agency efforts to easier cases (Wilson 1989), or directing resources to cases depending on the estimation of the political costs of a wrong decision.

There are two mechanisms by which the likelihood of making accurate compliance determinations may be influenced by demographic attributes. First, because determining the compliance status of firms is a costly process, rational bureaucrats will devote fewer resources to cases where the consequences of being wrong are lower, and conversely dedicate more attention to those cases where the benefits of being correct are higher. In this sense, the cost of a false negative (i.e., a noncompliant firm being coded compliant) vary, depending on the probability that an incorrect compliance determination will be revealed. We argue that community characteristics enter this decision-making equation because some communities are more likely than others to have the capacity to identify and dispute an incorrect compliance decision. In particular, poor and minority communities tend to have fewer political resources, and they should be less likely to demand and secure accurate compliance decisions from bureaucrats.

A second mechanism regards the identification of potential violations. In policy contexts in which bureaucrats rely in part on third-party monitoring of behavior to help them detect problems in need of resolution (be it crime or pollution), problems are more likely to come to light when communities have the time and resources to serve in this role. Poor and minority communities are less likely to have this capacity, and, as a result, there is more likely to be mischaracterization of noncompliant firms as compliant when the firms are located in these areas. One can think of this as public "police patrol" oversight, where the process discussed above reflects public "fire alarm" oversight (McCubbins and Swartz 1984; Hamilton and Viscusi 1999). In either case, the end result is the same – we should expect to see higher incidences of inaccurate determinations of compliance for firms located in poor and minority areas.

An important implication of this argument is that one need not assume that bureaucrats behave in an intentionally discriminatory way to produce an unequal pattern of regulatory enforcement. The consequences of bureaucratic decision-making may have discriminatory effects, but it may be the result of bureaucrats pursuing a rational strategy given their incentive structures. For the question of environmental justice, this reasoning provides an explanation for disparities in regulatory outputs rooted in the political mobilization capacity of communities, rather than intentional discriminatory practices of government officials.

In sum, bureaucrats have less incentive to actively pursue noncompliant firms in communities with fewer political resources. As a result, the likelihood of a firm being wrongly classified as compliant should be higher in poor and minority communities, leading to our first hypothesis:

> *H1: Bureaucrats are less likely to code violating firms as noncompliant when these are located in minority (or poor) neighborhoods.*

And firms, expecting relatively less rigorous enforcement in minority or poor neighborhoods, should be more likely to risk noncompliant behavior, producing our second hypothesis:

> *H2: Firms in minority (or poor) neighborhoods will be more likely to be in noncompliance.*

Following directly from this argument, political mobilization of communities should alter the incentives of bureaucrats making compliance determinations. That is, these decisions should be more accurate when firms are located in areas that exercise their political voice. Some past work has demonstrated that communities with higher political capacity are better able to fend off environmentally-unfavorable actions (Hamilton 1993, 1995; Hamilton and Viscusi 1999), and we argue that a similar dynamic should exist when it comes to firm compliance. Community demographics provide signals to bureaucrats (and firms) about *potential* political mobilization, but they do not account for the effects of *actual* mobilization. Communities that overcome collective action problems and exercise their political voice should increase the costs to a bureaucrat of making an incorrect decision, and reduce the likelihood of them wrongly classifying a firm violating the law as compliant. Two specific political mobilization hypotheses follow from this logic:

> *H3: Bureaucrats are more likely to code violating firms as noncompliant when these firms are located in politically mobilized communities.*

> *H4: Bureaucrats are more likely to code violating firms in minority (or poor) communities as noncompliant when these communities are politically mobilized.*

To this point, we have implicitly assumed that all bureaucrats share similar incentive structures when it comes to making firm compliance determinations – that is, their effort to detect noncompliance will be similarly influenced by the local political mobilization capacity of the communities surrounding firms. There is, however, strong reason to believe that where a bureaucrat sits in an administrative agency may further influence their motivation to correctly characterize the compliance status of firms. Specifically, we posit that bureaucrats serving in agency management roles have additional incentives to inaccurately characterize noncompliant firms as compliant. Compliance rates are a key indicator by which political officials (and other stakeholders) evaluate the performance of regulatory agencies, including agencies responsible for implementing pollution control laws.[3] In many areas of policy, where it is difficult to precisely measure bureaucratic performance, for reasons of both asymmetric information and causal ambiguity between agency action and policy outcomes, political officials will rely on these types of metrics to evaluate agency performance. Often this materializes in the assessment of the policy outputs that agencies produce, rather than more relevant policy outcomes. Knowing this, some bureaucrats, and particularly those in positions responsible for crafting impressions of agency performance, have a strong incentive to over-report compliance rates.

We refer to this behavior as motivated, non-detection of compliance, and it is analogous to Bohte and Meier's (2000) idea of organizational cheating in public agencies. Although bureaucrats enjoy informational advantages over political officials, there are potentially severe consequences to being caught manipulating evaluations of agency performance in such a way. For this reason, strategic bureaucrats are more likely to engage in motivated, non-detection of compliance, when the risks of being caught are smaller. It is here again that we return to the important role of community characteristics. Bureaucrats will be more likely to deliberately mischaracterize a firm violating the law as compliant, when the community in which the firm is located has fewer political resources, since there is a higher probability of the deception not being detected. Again, because poor and minority communities tend to be less politically mobilized, we should expect higher level managers engaging in more motivated, non-detection of compliance when the firms are located in these areas. To be clear, this incentive is above and beyond the reasons stated previously regarding the political mobilization capacity of these communities, leading us to our final hypothesis:

> *H5: Bureaucrats serving in positions higher up in an agency making compliance determinations, will be more likely than bureaucrats serving in positions lower in an agency to mischaracterize violating firms as compliant when these firms are located in minority (or poor) communities.*

Research Design

To test our expectations we employ detection controlled estimation (DCE), an statistical technique that enables us to jointly model the dual production – firm and regulator – of firm compliance status. Originally developed by Feinstein (1990, 1999) to address compliance bias deriving from non-detection, DCE statistically controls for the possibility that some portion of noncompliant firms may remain undiscovered by regulatory officers. As a result, facilities may be entered into a database as being compliant when in actuality they are violating the law. DCE estimates the likelihood of a firm being noncompliant, as well as the likelihood that a given entity was correctly coded as noncompliant by a regulatory officer. Failure to account for the two reasons for observing compliance (actual compliance and the failure to detect noncompliance), which is implicitly done when compliance is modeled with a single equation probit or logistic regression specification, can bias inferences.

We utilize Feinstein's (1990) DCE model, which consists of two binary choice models: one that models the likelihood of a violation (1=violation, 0=compliance) and a second that models the likelihood of detection (1=detection, 0=nondetection). Because the likelihood of a violation and the likelihood of detection are separately unobservable, these likelihood functions are estimated jointly via maximum likelihood estimation. Details of the estimator are available elsewhere (Feinstein 1990), but the model is the same as a bivariate probit model with partial observability (Abowd and Farber 1982; Poirier 1980).[4]

DCE techniques have been utilized to correct for compliance bias in a variety of settings, including taxpayer compliance (Feinstein 1999; Mete 2002), and firm compliance with environmental (Brehm and Hamilton 1996; Helland 1998a, 1998b; Scholz and Wang 2006), Occupational Safety and Health Administration (Feinstein 1990) and Food and Drug Administration (Olson 1995) regulation. The DCE approach has two specific benefits for our purposes. First, it corrects for bias in compliance models, allowing for more accurate estimations of the relationship between important demographic attributes of communities and firm compliance. Second, it enables us to explicitly account for the dual-agent production problem. With DCE we can consider the precise sources of bias in the data, including but not limited to these same demographic attributes. As a result, we can test whether community demographics affect not only firm decisions on compliance, but also regulatory officers' determinations of facility compliance.

The empirical setting for our analysis is the regulatory compliance of individual firms within the context of air pollution control across the U.S. states. We use an original dataset that combines firm-level compliance under the federal CAA with data on community characteristics and contextual variables across county, state administrative region, and U.S. states.[5] To best capture the policy and political demands on regulatory officers, we use novel data on state pollution control agencies' regional offices. Most work ignores the administrative structure of state regulatory officers' decision making environment. However, given our effort to capture with greater precision state regulatory officers' incentives, we must be able to delineate the political and policy pressures of different officers within the agency. This is best accomplished by documenting how each state pollution control agency divides enforcement responsibilities among bureaucrats internal to the agency. We discuss these data in greater detail below.

Our attention to the details of administrative program structure does, however, generate a tradeoff. Given the demands of gathering these data, we are only able to examine a limited time frame (2001-2004) for which we have compiled administrative data. However, we do not believe that this tradeoff compromises our ability to draw valid inferences because our hypotheses only require cross-sectional variance. Moreover, by limiting our analysis to a single Presidential term, we can hold constant variations in federal enforcement patterns. Of course, we must be cautious extending our inferences beyond this temporal domain.

Measuring Compliance

The dependent variable, *HPV Status*, reflects whether a regulated facility was designated as being a High Priority Violator (HPV) of the CAA between 2001-2004. *HPV Status* is a dichotomous variable that takes a value of one if the facility was designated as a HPV at any time during the year, and zero otherwise. Facilities designated as HPVs represent air polluters that are failing to meet important CAA obligations, usually core pollution performance standards. Noncompliance of this sort, compared minor paperwork violations, can trigger significant punitive sanctions, and getting the compliance coding correct on an HPV flag carries higher political and policy relevance for a regulatory officer. We obtained these data for all "federally-reportable" facilities from the EPA's Integrated Data for Enforcement Analysis database. The result is a cross-sectional dataset that includes a total of 160,887 cases, or 40,222 firms per year. Of these firms, approximately 5.7% were designated as HPVs.

Measuring Community Characteristics

Environmental justice concerns typically emerge with respect to two community attributes: race and class. We use two standard measures in the literature to assess the racial composition of a community: *Percentage of African-American Population and Percentage of Hispanic Population*. The literature is less consistent when accounting for class, with most using some combination of income, poverty, and education measures. Rather than emphasize any one measure we chose to construct a scale based on four standardized variables, median household income, percent below poverty line, percent college educated, percent high school educated. Each of these measures is calculated at the zip code level, and was extracted from the U.S. Census Bureau CD-ROM (2002). The resulting scale, *Class,* obtained a Cronbach's alpha of .86. Moreover, an investigation of the dimensionality of the scale revealed a single factor with an eigen value above 1 (2.73) which accounts for 79% of the total variance. These results suggest a high likelihood that our individual variables are assessing an internally consistent uni-dimensional latent construct.

Measuring Community Mobilization

To assess the degree of community mobilization, we require a measure that captures whether citizens in a community have overcome collective action costs and specifically organized around environmental justice concerns. Standard measures of political mobilization, such as voter turnout and campaign donations, are too broad to capture our concept of interest. It is possible, and indeed likely, that it is precisely in communities where traditional political mobilization is low, that the pressures for organization around equity issues are highest. As a result, we use a more direct measure: the existence of locally-oriented environmental justice advocacy organizations.

We assembled data from the People of Color Environmental Groups Directory (Environmental Justice Resource Center 2000) to create this measure. This guide publishes a list of organizations whose activities include advocating for environmental justice issues, and we coded the presence of groups listed as "environmental justice resource groups" at the zipcode level, as well as information about the constituency served by each group and its geographic focus. Using these data, we constructed a scale based on five standardized variables, the total number of groups, the total number of groups focused on African-Americans, the total number of groups focused on Hispanic groups, the total number of groups with a neighborhood focus, and the total number of groups with a local focus.[6] The resulting scale, *Mobilization,* obtained a Cronbach's alpha of .80. Moreover, an investigation of the dimensionality of the scale revealed a single factor with an eigen value above 1 (2.54) which accounts for 92% of the total variance. These results suggest a high likelihood that our individual variables are assessing an internally consistent unidimensional latent construct.

Measuring Regulatory Officer Incentives

To assess regulatory officers incentive structures across state agencies, and particularly whether bureaucrats serving in agency management positions respond to incentives to engage in motivated, non-detection of compliance, we consider whether the authority to issue enforcement related actions rests with field officers, is centralized in the hands of high-level agency officials, or lies somewhere in between. We believe that the strongest indicator of the differential organizational performance pressures that members of an agency face is the location of where within the agency (or more precisely within whose hands) final signature authority to issue enforcement actions lies.

To assess these incentives, we measure the locational authority over three sets of enforcement actions (Reenock 2001; Reenock and Gerber 2008). For each state air pollution control agency, this *Signature Authority* measure divides (*Final Authority* – 1) by (*Vertical Depth* – 1), where *Final Authority* represents the location of final signature authority for a given action within the chain of command and *Vertical Depth* represents the number of entities in the direct chain of command from the field officer, who is responsible for carrying out inspections and the initial enforcement review, up to and including the individual or committee at the top of the chain of command. The resulting variable ranges between (0) and (1), where zero represents perfectly centralized decision-making authority and one represents authority decentralized to the field officer level. This equation yields a measure of locational authority and is available for three levels of enforcement action levels across each state – Level I actions (informal and formal notices that typically are reserved for the first step in a case of noncompliance), Level II actions (formal administrative actions, which may include penalties), and Level III actions (civil and criminal cases filed against a noncompliant entity). We standardized each of these measures and added them to construct an equally weighted scale of sign-off authority. The final measure, *Signature Authority*, has a mean of approximately zero and a standard deviation of 2.5.

Control Variables

Firms rely on a host of signals to inform their compliance decisions. Moreover, many of the factors that influence firms also shape regulatory officers' enforcement strategies and the likelihood of a bureaucrat making an accurate compliance determination. Given that these signals may be correlated with either a firm's or a bureaucrat's compliance decision, as well as with the demographic composition of the relevant community, we include several controls to avoid drawing incorrect inferences.

To account for relevant policy task factors, we include controls for the complexity and problem severity of the policy arena. We measure problem severity with the variable, *Nonattainment*, which is an additive scale that counts the number of CAA ambient air quality standards a county fails to meet on an annual basis. These data are listed in the Federal Register and have been published in the EPA's *Greenbook*. We also include *Policy Entropy*, a diversity index of the state air emissions sources in a county, where higher values represent a more complex implementation environment (Potoski 1999).[7] To calculate this measure, we retrieved data from EPA's Toxic Release Inventory database. Last, many states have decentralized their compliance monitoring activities to implement the U.S. CAA to regional offices. To control for each regional office's workload, we include *Regional Scale*, a measure of the total number of regulated firms within each region.

Firms' and bureaucrats' decisions about compliance may also be influenced by economic conditions. To control for this, we include *Unemployment Rate*, which is measured at the county-level using data from the Bureau of Labor Statistics. In addition, we include a measure of industry salience as the percentage of a given county's total non-farm income that derives from *Air Polluting Industries* (Ringquist 1993).[8] We gathered these data from the Bureau of Economic Analysis' Regional Economic Information System CD-ROM.

Political factors also may affect private and public compliance decisions. A stronger Democratic presence in state government has been associated with greater regulatory activity (Hunter and Waterman 1996; Scholz and Wei 1986; Scholz, Twombly and Headrick 1991; Wood 1992). We include two controls: *Democratic Governor,* a dummy variable reflecting gubernatorial partisan control, and *Percentage Democrats in State Legislature,* which is the total percentage of Democrats in both state houses.

Last, we include a set of firm-level controls to account for both heterogeneity in compliance costs across firm types, and for variation in the transaction costs that regulatory officers face in handling cases for different types of firms. First, firms with a recent agency inspection history are more likely to assign a higher cost to future non-compliance. To control for this possibility, we include two inspection variables in the firm compliance model, *State Inspection and Federal Inspection,* each is a dichotomous variable that indicates whether the firm has been inspected by the relevant agency in the prior year. Moreover, regulatory officers will be more likely to assign greater transaction costs to failing to detect a prior non-compliant firm. Therefore, we include two enforcement actions variables in the regulatory detection model, *State Enforcement Action and Federal Enforcement Action,* each is a dichotomous variable that indicates whether the firm has been punished with at least one enforcement action in the prior year. These data were compiled from the EPA's Integrated Database for Enforcement Analysis.

We also include firm-level dummy variables reflecting a facility's industrial classification code. We included three such dummies: *Manufacturing*, *Utilities* and *Transportation*. Last, we also included a firm-level variable reflecting the level of pollution generated by the regulated entity. This variable, *Major Source*, is a dummy variable that is coded one if the firm is classified as a major source of air pollution (generally greater than 100tons per year) and zero if it is not.

Results

It is useful begin with the inferences that an analyst would draw based upon a standard uncorrected probit model (Model 1), the estimates from which are presented in Table 1. With respect to community demographics, percent African American, percent Hispanic and socio-economic class, each have statistically significant associations with a firm's HPV classification. Firms located in African American communities are less likely to be classified as HPVs while firms located in Hispanic communities are more likely. We also find that firms located in communities of higher socio-economic status are less likely to be classified as HPVs. Several of the control variables included in the models are also statistically significant in predicting an HPV classification and are generally consistent with expectations in the literature.[9]

(Table 1)

The analysis in Model 1 is based on the assumption of a single agent production function, which does enable us to distinguish between sources of bias. To sort out whether the observed bias stems from firm compliance decisions, regulatory officer detection decisions, or both, we turn to the DCE model (Model 2). Model 2 consists of two sets of estimated parameters – those for the firm compliance equation (shown in the upper panel in Table 1) and those for the regulator compliance decision model (shown in the lower panel in Table 1).

The results from the DCE model suggest that a standard probit underestimates the impact of community characteristics on firm HPV status. The estimated effects of both Hispanic communities and of communities of higher socio-economic status on a firm's probability of being an HPV are in the same direction as in the standard probit but are greater in magnitude. Accounting for compliance bias, the effect for the Hispanic variable has increased from .0033 to .0058 – a change in magnitude of approximately 76%, while the effect for the class variable has increased from -.0427 to -.0913 – a change in magnitude of approximately 114%.

To determine whether demographics or other factors provide incentive for regulatory officers to accurately code noncompliant firms we must turn to the regulator detection model (the lower half of Model 2). The parameter estimates suggest that community demographics are also systematically associated with the likelihood of detecting noncompliant firms. With respect to our central expectations, African American demographics do not appear to offer compliance officers any incentive to deviate from assessing non-compliance for HPV status. However, the percentage of Hispanics in a community and a community's socio-economic class each have a statistically significant effect on regulatory officers' reliably detecting noncompliance. The results suggest that in communities comprised of a greater percentage of Hispanics and in communities lower in socio-economic status, there is a greater probability of bureaucrats not detecting an HPV. Taking the results of both models together, we now have a clearer picture of the process behind disparities in environmental regulatory outputs. Relative to those located in more upper class, non-Hispanic communities, firms are both more likely to be significant violators of the CAA, and less likely to be characterized as such as by bureaucrats.

With respect to our controls, variables included in the firm compliance model have effects generally consistent with the literature. One interesting result is the opposite signs on the prior state and EPA inspection measures. This result suggests that EPA inspections increase noncompliance costs and induce firms to return to or remain in compliance. Prior state agency inspections do not appear to have this deterrent effect, indeed they have the opposite effect. With respect to the controls in the detection model, several factors influence bureaucrats' incentives to detect noncompliant firms. When facing higher levels of unemployment or working under a Republican governor, regulatory officers expect fewer transaction costs associated with undetected violations. This is consistent with expectations from prior work emphasizing the impact that economic context or political principals have on regulatory outputs. Last, on prior state and federal punitive actions, only EPA punitive actions seem to raise transaction costs for regulatory officers. For those firms with a recent history of EPA punitive actions, regulatory officers are more likely detect noncompliance. Prior state punitive actions have no effect on officer coding.

What of the ability to shape regulatory officers' incentives via mobilization and institutional arrangements? The analysis of these questions is presented in Table 2 below. Our expectation is that in the presence of a mobilized community, firms will face greater costs associated with noncompliance and regulatory officers will face greater costs associated with failing to detect noncompliance. To the extent that discriminatory patterns exist across community demographics, these patterns ought to be attenuated in the presence of community mobilization. Given that Hispanic communities registered a significant impact in the earlier models, we would expect the interaction between mobilization and percent Hispanic to be statistically significant and negative (we would expect the same effect among African American communities but the initial analysis did not suggest any bias in those communities for this time frame).[10] The analysis is consistent with this expectation. The interaction term in both the firm and detection models suggest a diminishment of bias in Hispanic – that is, in the presence of mobilized Hispanic communities, firms are less likely to be noncompliant and bureaucrats are more likely to detect noncompliance. This finding lends additional support to a widely-held belief among scholars that community mobilization can effectively counter environmental inequities. Our findings are novel, however, in their demonstration that community mobilization can alter not only *firms'* compliance decisions, but also *regulatory officers'* compliance detection decisions.

(Table 2)

The results from Model 2 in Table 2 suggest that institutional structures also alter regulatory officers' incentives to detect noncompliance in Hispanic communities. The results from the detection model suggest a statistically significant interaction between percent Hispanic and signature authority. When enforcement authority is devolved to field officers, while a certain degree of shirking still exists, field officers are less sensitive to whether a community is Hispanic – the detection of noncompliance is relatively flat across levels of Hispanic communities. However, when enforcement authority is centralized near the top of the agency's chain of command, a different type of pressure arises. Bureaucrats near the top of the agency's structure feel greater pressure for their agency to perform and as such are more sensitive to registering noncompliance in heavily Hispanic communities. As such, with such agents the detection of noncompliance wanes in the presence of an increasingly more Hispanic community.

Figure 1 below better demonstrates the substantive effects of the findings. Each of the panels display the marginal effect of a 10% increase in the percent Hispanic in a given zipcode on the joint probability of observing a noncompliant, undetected firm. Panel A, on the left, displays the marginal effect of Hispanic across the mobilization scale, while Panel B, on the right, displays the effect across the signature authority scale.[11]

(Figure 1)

The results displayed in Figure 1 suggest that both a mobilized community and the institutional location of signature authority within a state agency are relatively powerful incentives to which regulatory officers respond. Panel A shows that regulatory officers respond to Hispanic communities differently, conditioned on whether those communities are more mobilized around environmental justice concerns. In fact, the number of undetected noncompliant firms (nationwide) can decrease from a high of approximately 240 in the absence of mobilized communities to zero in the presence of highly mobilized ones. But direct mobilization of at-risk communities is not the only incentive mechanism that affects regulatory officer decisionmaking. Panel B suggests that the location of signature authority within an agency is a powerful incentive device as well. We see that while all agency bureaucrats engage in some amount of shirking (i.e. the expected number of undetected noncompliant firms is always positive over the entire range of signature authority), those officers nearer the top of an agency's chain of command succumb to an additional disincentive to code noncompliance. At the extreme, in the presence of a more Hispanic community, when decision making over enforcement rests with high level bureaucrats nearly 100 more noncompliant HPVs will go undetected compared to when such authority rests with field officers. We believe that this is due to high level bureaucrats being more likely to engage in organizational cheating in the presence of a community that is less politically mobilized and therefore less likely or able to engage in fire alarm oversight.

Discussion and Conclusion

We began this paper by asking whether community demographics provide differential incentives for bureaucrats to reliably detect non-compliance among firms. To answer this question we moved away from the literature's dominant focus on attempting to identify *whether* discriminatory patterns exist and turned to the more critical issue of *why* they might exist. This focus led us to propose a model which captured not only firms' decisions to be compliant with the law but also regulatory officers' decisions to accurately designate them as such. We developed a theory in which bureaucrats have incentives to strategically allocate their limited resources to cases where the consequences of making an incorrect compliance determination are the lowest. We argued that one important factor that influences the costs of being wrong is a community's political resources. Communities that are less likely to exercise their political voice, in turn are less likely to pressure administrative agencies, and as a result, firms violating the law are less likely to be treated as such by regulatory officers in these areas. Because poor and minority communities tend to have fewer political resources, bureaucrats have less incentive to carefully review the compliance status of firms located in these areas.

Our empirical findings are generally consistent with our argument. Employing a DCE model, we find evidence of systematic bias in how regulatory officials code the compliance of regulated firms. In addition to political, economic, and policy task factors, bureaucrats are less likely to detect the noncompliance of a firm, when it is located in an area with a high concentration of Hispanic and low socio-economic status residents. We also find that firms are less likely to comply with their CAA obligations when they are located in Hispanic and low socio-economic status communities, and that this effect is of much larger magnitude when correcting for compliance bias in agency data. It is noteworthy that we neither find that firms are more likely to be in noncompliance in large African American communities nor a tendency for regulatory officers to misclassify the compliance status of these firms. This runs counter to claims made by many environmental justice advocates which have often focused on the experience of African-Americans (e.g., Bullard 1993; Bryant 1995), but it may reflect the limited time period studied here. More generally, these differential effects clearly deserve further inquiry, with studies of different years of CAA compliance decisions and compliance determinations under different environmental programs the obvious next step.

Our theoretical argument suggests an explanation of disparities in U.S. environmental policy outcomes rooted in the incentives facing the regulatory officers tasked with implementation. While our findings suggest that substantial class- and race-based disparities in compliance exist, we argue that the observed patterns of bias stem from the decision-making structures of regulatory officers, not from intentional discrimination. This by no means discounts the importance of the disparate outcomes, but it does suggest that the source of bias need not rest with deliberate prejudice, but with bureaucrats' rational responses to their resource constraints.

By focusing on the incentives of bureaucrats to code firm compliance status, we were also able to consider how decisions change in the presence of variation in these incentives. We demonstrated, for example, that community mobilization increases the probability that noncompliant firms will be classified as such. Moreover, we showed that political mobilization can attenuate the bias in compliance determinations, which indicates that when minority and low socio-economic status communities overcome collective action problems, bureaucrats will dedicate more resources to the firms in their areas. But, we also showed that agency design can accentuate bias in compliance decisions. We argue and find empirical support that high ranking bureaucrats have an incentive to over-report compliance rates, since these rates are used as indicators of agency performance by external stakeholders. Because these bureaucrats are less likely to get caught engaging in this behavior when communities have fewer political resources to detect it, the outcome is likely to further disadvantage poor and minority communities since they tend to lack these resources.

In conclusion, from a policy standpoint, our study suggests multiple ways that class- and race-based disparities could be redressed. Communities could be empowered through capacity building efforts. Such efforts designed to help poor and minority areas organize around issues of environmental protection, will produce a demand for more equitable treatment from government, and put direct pressure on firms to improve their performance. Since environmental equity issues reached the national agenda about twenty-five years ago, investment in capacity building has been the central focus of government and nongovernment initiatives, with limited success (Vajjhala 2010). Second, our results suggest that changes to the institutional decision-making structure of the agencies responsible for implementing policy would be equally as effective. Specifically, our analysis suggests that decentralizing authority to regulatory officers in agencies could result in fewer cases of deliberate non-detection of compliance. That is, moving the location of compliance determinations away from high-ranking officials with incentives to over-report compliance may result in fairer – although not necessarily fair – treatment of communities hosting regulated firms.

Appendix A.1 Table of Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Compliance Indicator (DV)				
High Priority Violator Status	0.057	0.232	0.000	1.000
EJ Indicators				
% African American	11.967	19.077	0.000	100.000
% Hispanic	9.003	15.185	0.000	100.000
Class	0.003	0.856	-7.170	9.380
Mobilization	0.000	0.856	-0.254	4.650
Signature Authority	0.000	2.400	-5.065	5.411
Policy Task Factor Indicators				
Regional Scale	349.808	314.673	1.000	1310.000
Non-attainment	0.373	0.484	0.000	1.000
Policy Entropy	0.687	0.608	0.000	2.269
Economic Context Indicators				
Unemployment	5.465	1.607	1.600	19.600
% Income Air Polluting Industry	3.202	4.064	0.000	78.492
Political Context Indicators				
Democratic Governor	0.451	0.498	0.000	1.000
% Democrats in State Legislature	50.445	11.866	10.714	87.500
Firm-Level Indicators				
State Inspection (1 Year Lag)	0.452	0.498	0.000	1.000
Fed Inspection (1 Year Lag)	0.075	0.263	0.000	1.000
State Enforcement Action (1 Year Lag)	0.078	0.268	0.000	1.000
Fed Enforcement Action (1 Year Lag)	0.006	0.075	0.000	1.000
Manufacturing Firm	0.527	0.499	0.000	1.000
Utility Firm	0.152	0.359	0.000	1.000
Transportation Firm	0.023	0.149	0.000	1.000
Major Source	0.368	0.482	0.000	1.000

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Table 1. High Priority Violator Status for Individual Regulated Entities

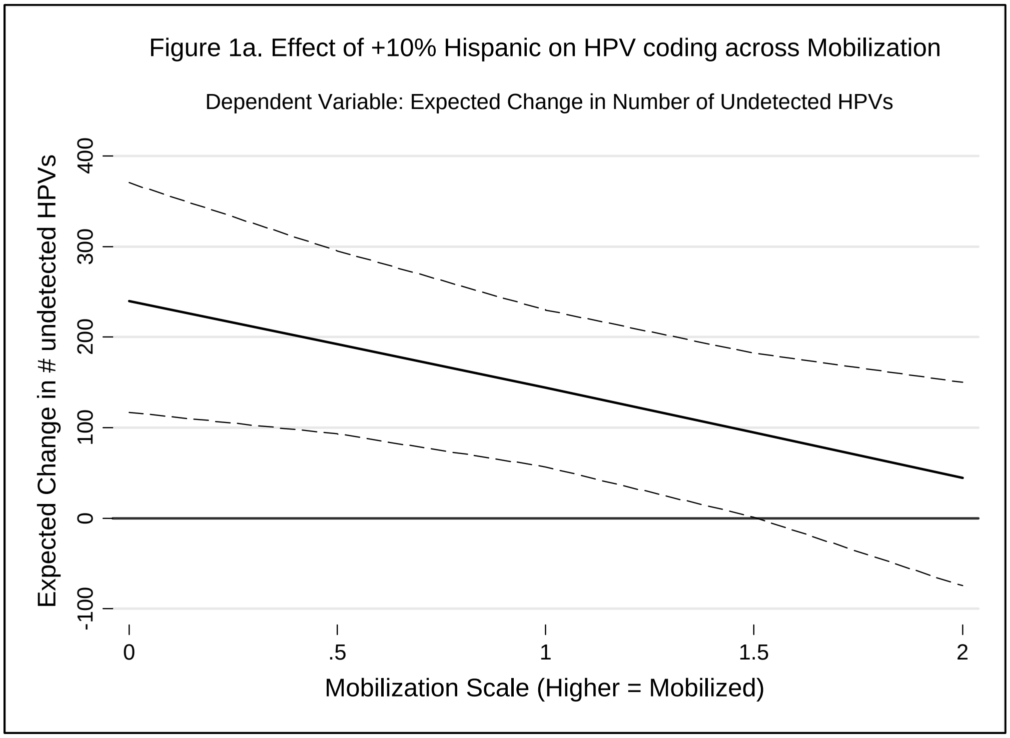
	Model 1		Model 2	
			Bivariate Probit	
	Probit		with Partial Observability	
	b	s.e. b	b	s.e. b
Firm Model, Pr(Observing an HPV)				
EJ Indicators				
% African American	-0.0007 **	0.0003	-0.0016	0.0010
% Hispanic	0.0033 ***	0.0004	0.0058 ***	0.0017
Class	-0.0427 ***	0.0087	-0.0913 ***	0.0319
Policy Task Factor Indicators				
Regional Scale	0.0003 ***	0.0000	0.0240 **	0.0110
Policy Entropy	-0.0014	0.0102	-0.0745	0.0698
Nonattainment	0.0724 ***	0.0137	0.0464	0.0440
Economic Context Indicators				
Unemployment	0.0398 ***	0.0036	0.0734 **	0.0323
% Income Air Polluting Industry	0.0068 ***	0.0012	0.0082	0.0051
Political Context Indicators				
Democratic Governor	-0.0597 ***	0.0115	-0.1767 ***	0.0586
% Democrats in State Legislature	-0.0013 ***	0.0005	-0.0030 **	0.0014
Firm-Level Factors				
State Inspection (1 Year Lag)	0.3859 ***	0.0122	0.2073 ***	0.0240
Fed Inspection (1 Year Lag)	-0.0548 ***	0.0189	-0.0520 **	0.0243
Manufacturing Firm	0.1084 ***	0.0142	-0.0229	0.0579
Utility Firm	-0.1096 ***	0.0188	-0.0207	0.0646
Transportation Firm	-0.0658	0.0417	0.0100	0.1253
Major Source	0.7517 ***	0.0130	0.6520 ***	0.0446
Year Dummy (2002)	-0.0309 *	0.0159	-0.1775 ***	0.0528
Year Dummy (2003)	-0.0687 ***	0.0166	-0.1885 ***	0.0414
Year Dummy (2004)	-0.1209 ***	0.0163	-0.2550 ***	0.0487
Intercept	-2.4702 ***	0.0350	-1.3162 ***	0.1134
Detection Model, Pr(Observing a True Zero)				
EJ Indicators				
% African American	---	---	0.0014	0.0014
% Hispanic	---	---	-0.0047 ***	0.0015
Class	---	---	0.0737 *	0.0382
Policy Task Factor Indicators				
Regional Scale	---	---	0.0020	0.0150
Policy Entropy	---	---	0.1173	0.0809
Nonattainment	---	---	-0.0290	0.0563
Economic Context Indicators				
Unemployment	---	---	-0.0672 **	0.0334
% Income Air Polluting Industry			-0.0048	0.0063
Political Context Indicators				
Democratic Governor	---	---	0.1718 ***	0.0639
% Democrats in State Legislature	---	---	0.0023	0.0018
Firm-Level Factors	---	---		
State Enforcement Action (1 Year Lag)	---	---	2.2166	2.1424
Fed Enforcement action (1 Year Lag)	---	---	1.4012 ***	0.3909
Manufacturing Firm	---	---	0.1733 **	0.0707
Utility Firm	---	---	-0.0367	0.0753
Transportation Firm			-0.0509	0.1449
Major Source			-0.1010	0.1249
Year Dummy (2002)			0.2138 ***	0.0585
Year Dummy (2003)	---	---	0.1752 ***	0.0600
Year Dummy (2004)			0.2243 ***	0.0549
Intercept			0.3162	0.3252
rho			-.762***	
Log-Likelihood	-30267.49		-27954.42	
χ^2	(19) 6677.23***		(38) 1082.60***	
Cases	153628		153628	

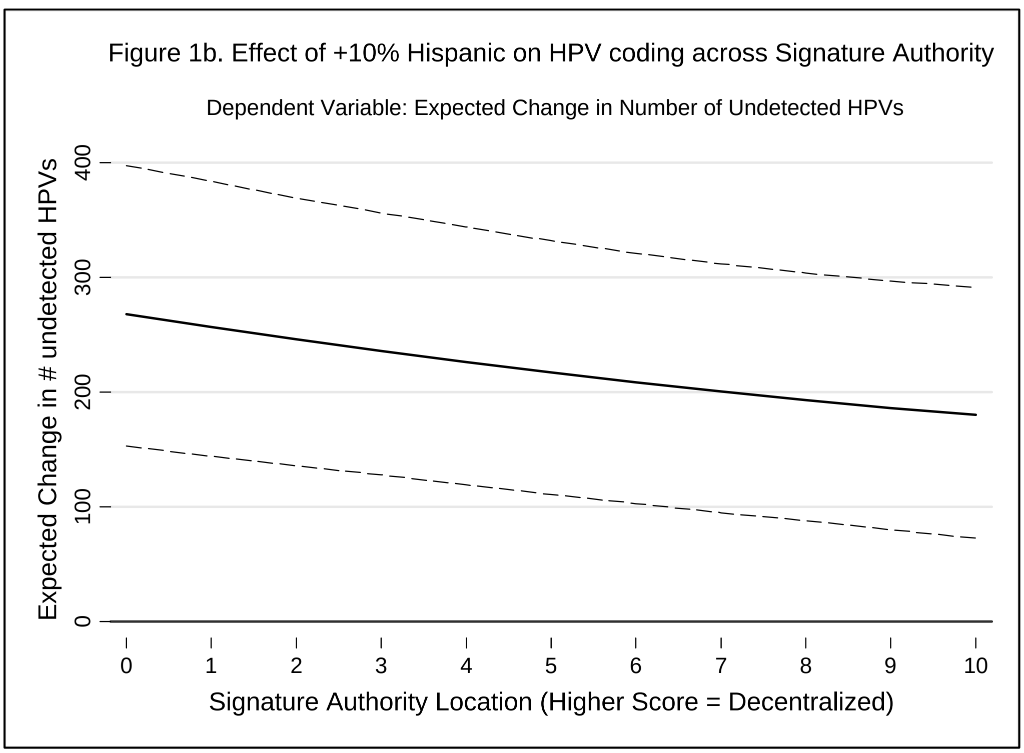
Table 2. High Priority Violator Status for Individual Regulated Entities

	Model 1				Model 2			
	HPV Status				HPV Status			
	Bivariate Probit, with Partial Observability				Bivariate Probit, with Partial Observability			
	Firm Model		Detection Model		Firm Model		Detection Model	
	Pr(Observing HPV)		Pr(True Zero)		Pr(Observing HPV)		Pr(True Zero)	
	b	s.e. b	b	s.e. b	b	s.e. b	b	s.e. b
EJ Indicators								
% African American	-0.0018 *	0.0010	0.0018	0.0013	-0.0017	0.0015	0.0017	0.0020
% Hispanic	0.0063 ***	0.0013	-0.0052 ***	0.0015	0.0081 ***	0.0022	-0.0072 ***	0.0022
Class	-0.0963 ***	0.0263	0.0790 **	0.0335	-0.1082 ***	0.0350	0.0959 **	0.0411
Mobilization	0.0791 *	0.0466	-0.0925	0.0570	0.0703	0.0570	-0.0598	0.0640
Mobilization X African American	-0.0010	0.0008	0.0006	0.0010	-0.0009	0.0010	0.0003	0.0011
Mobilization X Hispanic	-0.0025 ***	0.0008	0.0026 **	0.0010	-0.0033 **	0.0017	0.0028 *	0.0015
Signature Authority					---	---	-0.0238 ***	0.0073
Sig. Authority X Hispanic					---	---	-0.0001	0.0003
Sig. Authority X African American					---	---	0.0011 ***	0.0003
Policy Task Factor Indicators								
Regional Scale	0.0230 ***	0.0070	0.0020	0.0010	0.0003 **	0.0001	-0.0001	0.0001
Policy Entropy	-0.0665 *	0.0354	0.1112 **	0.0437	-0.1162 *	0.0689	0.1563 **	0.0662
Nonattainment	0.0418	0.0421	-0.0204	0.0535	0.0319	0.0624	0.0093	0.0816
Economic Context Indicators								
Unemployment	0.0686 ***	0.0194	-0.0604 **	0.0249	0.1004 **	0.0400	-0.0874 ***	0.0284
% Income Air Polluting Industry	0.0082 *	0.0044	-0.0051	0.0054	0.0086	0.0088	-0.0055	0.0102
Political Context Indicators								
Democratic Governor	-0.1669 ***	0.0319	0.1600 ***	0.0427	-0.2005 ***	0.0596	0.1782 ***	0.0572
% Democrats in State Legislature	-0.0030 **	0.0013	0.0023	0.0017	-0.0022	0.0024	0.0003	0.0036
Firm-Level Factors								
State Inspection (1 Year Lag)	0.2110 ***	0.0239	---	---	0.2279 ***	0.0478	---	---
Fed Inspection (1 Year Lag)	-0.0507 **	0.0245	---	---	-0.0572 **	0.0289	---	---
State Enforcement Action (1 Year Lag)	---	---	3.1305	5.4440	---	---	1.6408 ***	0.3235
Fed Enforcement Action (1 Year Lag)	---	---	1.4594 ***	0.2620	---	---	1.2607 ***	0.1839
Manufacturing Firm	-0.0076	0.0406	0.1577 ***	0.0553	-0.0221	0.0615	0.1637 **	0.0797
Utility Firm	-0.0179	0.0542	-0.0420	0.0636	0.0303	0.0875	-0.1006	0.0990
Transportation Firm	0.0013	0.1166	-0.0419	0.1369	-0.0118	0.1592	-0.0221	0.1770
Major Source	0.6509 ***	0.0350	-0.0903	0.1010	0.5803 ***	0.1121	0.0728	0.3126
Year Dummy (2002)	-0.1696 ***	0.0392	0.2054 ***	0.0537	-0.1961 ***	0.0499	0.2111 ***	0.0764
Year Dummy (2003)	-0.1848 ***	0.0399	0.1714 ***	0.0529	-0.1860 ***	0.0594	0.1420	0.0964
Year Dummy (2004)	-0.2456 ***	0.0399	0.2121 ***	0.0536	-0.2551 ***	0.0584	0.1844 *	0.1056
Intercept	-1.3259 ***	0.1128	0.2777 ***	0.3364	-1.3598 ***	0.1566	0.1587	0.5526
rho	-0.972***				-0.846**			
Log-Likelihood	-27943.04				-27916.23			
χ^2	(44) 1072.64***				(47) 946.32***			
Cases	153628				153628			

Note: '*p<.10, **p<.05, ***p<.01, two-tailed tests. For the Bivariate Probit model, standard errors clustered on zipcode.

Figure 1. Effect of Percent Hispanic on Undetected HPVs across Mobilization and Signature Authority





Note: Dashed lines represent 95% confidence intervals for marginal effect.

Notes

[1] While a few compliance studies have included demographic attributes, environmental justice questions are of secondary concern. Indicators of income disparities have been associated with greater non-compliance among municipal wastewater plants (Earnhart 2004a; 2004b), CAA facilities (Mennis 2005) and CWA permit holders (Scholz and Wang 2006). Racial demographic indicators have been linked to fewer notices of violations among CAA facilities (Mennis 2005) and a greater likelihood among CWA permit holders (Scholz and Wang 2006).

[2] The same basic logic applies to other administrative contexts, such as a bureaucrat determining the eligibility status of a potential beneficiary of a social assistance or disability program.

[3] As an example, in its annual enforcement report to Congress, the U.S. EPA reports on the number of violators of major federal environmental statutes such as the Clean Air Act and the Clean Water Act.

[4] Identification requirements for the bivariate probit with partial observability suggest an exclusion requirement of at least one exogenous variable to ensure that the parameters being estimated in each model are not identical. Moreover, identification is enhanced when the exogenous variable exhibits sufficient variation over the sample. This condition is likely to be met by ensuring that the exogenous variable is continuous variable (212-215, Poirer 1980). In our final model, our signature authority model is a continuous exogenous variable restricted to the detection model. Moreover, while the other exogenous variables, the firm-level inspection and abatement variables, presented in the results are dichotomous, we also coded them as continuous variables and re-estimated the models, producing nearly identical results.

[5] Alaska was excluded from the analysis due to difficulties matching demographic data and state regional enforcement offices and Nebraska was excluded due to its non-partisan state legislature.

[6] These characterizations are based on self-reported information from the groups themselves.

[7] This measure is calculated with the following formula $E = -\sum_{i=1}^{n} p_i \ln(p_i)$, where p represents the probability of the *i*th Standard Industrial Classification source category for a given county within each state (Potoski 1999).

[8] Air polluting industries, with their Standard Industrial Classification (SIC) in parentheses include: Paper and Allied products (26), Chemicals and Allied Products (28); Petroleum and Coal Products (29); Rubber and Miscellaneous Plastics Products (30); Stone, Clay and Glass Products (32); Primary Metal industries (33); Transportation Equipment (37) (Ringquist 1993).

[9] It is important to note that while the estimated effects of Hispanic and wealthy communities are consistent with our expectations, the effect of African American communities is not. This finding does not hold however when we estimate the DCE models and as such we believe is linked to the unobservables related to the detection process generally.

[10] Our measure of mobilization is primarily a measure of groups mobilized to represent persons of color. As such, it may not represent a valid measure of community mobilization around class issues. When we interact mobilization and class, the coefficient is null.

[11] The figures were created by estimating the mean expected probability and associated standard errors from 10,000 draws off of the parameter matrix of the bivariate normal distribution. To display a substantively interesting outcome, we multiplied the marginal probability for a given condition by the subset of the firm population for whom an additional 10% Hispanic gain is reasonable (approximately 18%, or 6913 firms for our data). This calculation produced the expected change in the number of undetected noncompliant firms.