ASSESSING STATE SUSCEPTIBILITY TO ENVIRONMENTAL REGULATORY COMPETITION[1]

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Abstract

Recent empirical research examining the environmental race to the bottom argument in U.S. states has focused on whether states engage in regulatory competition. The findings from this emerging area of research are mixed. While studies find robust support of state responsiveness characteristic of regulatory competition, the evidence as to whether this responsiveness reflects a race to the bottom pattern is contested. In this paper, I examine a potential reason for these indeterminate findings. I hypothesize that variation in state economies should help predict how states respond to interstate economic competition. I frame this heterogeneity in terms of state susceptibility to downward regulatory pressure and develop several measures of state susceptibility to race to the bottom pressures. Specifically, I consider four attributes of states' economies: size, growth, capital mobility, and pollution intensity. I find modest evidence that states with smaller economies are more likely to respond to economic competitors' regulatory behavior, but overall states theoretically more susceptible to interstate economic competition are not more likely to engage in the type of regulatory competition suggested by race to the bottom theory. These results provide little evidence supportive of an environmental race to the bottom in U.S. state environmental regulation.

1. Introduction

Recent empirical research examining the environmental race to the bottom argument in U.S. states has focused on whether states engage in regulatory competition - that is, whether they modify the stringency of their regulation in response to the regulatory decisions of economic competitor states (Konisky, n.d.; Woods, 2006; Levinson, 2003; Fredriksson and Millimet, 2002). This type of strategic interaction behavior is fundamental to race to the bottom theory. The findings from this emerging area of research are decidedly mixed. While researchers have generally found robust evidence of state responsiveness characteristic of regulatory competition, the pattern of this responsiveness remains unclear. Some studies have found evidence of a pattern of responsiveness reflective of a race to the bottom (Woods, 2006), others of a race to the top (Fredriksson and Millimet, 2002), and still others of both (Konisky, n.d.).

In this paper, I examine a possible reason for these indeterminate findings. Current approaches aiming to detect the degree of regulatory interdependence among states assumes that all states respond uniformly to interstate economic competition. However, states may differ in important ways that make them more or less susceptible to the forces of competition. Differences in the economic structures of states, in particular, should help to explain when we observe environmental regulatory competition of the form that produce a race to the bottom-type dynamic. In the analyses to follow, I consider four attributes of state economies: size, growth, capital mobility, and pollution-intensity. I hypothesize that states with smaller, slower-growing, more capital mobile, and more pollution-intensive economies are *more* likely to engage in regulatory competition behavior consistent with a race to the bottom. To test this prediction, I estimate a series of strategic interaction or spatial lag models using data from state enforcement of three federal pollution control laws - the Clean Air Act (CAA), the Clean Water Act (CWA), and the Resource Conservation and Recovery Act (RCRA). By considering variation across state economic structure, this analysis provides a more precise test of the race to the bottom argument by examining a specific set of conditions in which we should observe interstate economic pressures affecting state regulatory behavior.

To summarize the results, I find that only weak support that state susceptibility helps predict state regulatory responsiveness. Of the four measures of state susceptibility that I consider, only the size of the state economy seems to help explain the pattern of strategic interaction among states in regulatory enforcement behavior, and the evidence here is modest. In fact, in several cases, the only evidence of strategic responsiveness comes from states theoretically least susceptible to downward regulatory pressures stemming from interstate economic competition.

The paper proceeds as follows. In section 2, I discuss the limitations of the current literature examining strategic interaction in environmental regulation, and argue that more attention needs to be paid to the varying levels of state susceptibility to interstate economic competition. In section 3, I describe that data and empirical approach I use to test this state susceptibility hypothesis. I discuss the results from my analysis in section 4, and conclude in section 5.

2. State Susceptibility to Regulatory Competition

The environmental race to the bottom argument, as it applies to the U.S. states, suggests that states respond to the regulatory behavior of the states with which they compete for economic investment. In particular, faced with competition for mobile capital, states may be tempted to adopt excessively lax environmental standards as a means to attract (or retain) economic investment. If all states reason similarly, the result will be a continued lowering of standards across the country to the level of the least stringent state, which is a suboptimal outcome since states would be better off collectively maintaining their standards.

The race to the bottom theory, therefore, suggests that states will engage in regulatory competition through the strategic choice of their environmental regulatory effort vis-a-vis their competitors. Although this a central prediction of the theory, scholars have only recently turned to empirically testing this prediction.[1] A few studies have attempted to explicitly detect strategic interaction in environmental regulatory behavior.[2] Three studies

[1] Most of the research in this area has analyzed whether firm economic investment decisions are sensitive to interstate differences in the stringency of environmental regulation. The first generation of this research found sparse evidence that this was the case (see Jaffe, et al. 1995 for a summary), but more recently scholars have demonstrated that economic investment does systematically respond to inter-jurisdictional differences in environmental regulatory stringency (e.g., Becker and Henderson 2000; Greenstone 2002; List, et al. 2003).

[2] Scholars have examined strategic interaction in state behavior in other areas as well, including expen-

– Fredriksson and Millimet (2002b), Levinson (2003), and Konisky (n.d.) – estimate spatial lag models, in which a state's environmental regulation (measured variably) is modeled as a function a set of economic competitor states' environmental regulations (defined variably).

Fredriksson and Millimet (2002b) detect interdependence in environmental abatement costs – their measure of environmental regulatory stringency – incurred by manufacturing industries in competitor states. In particular, they find that these interactions occur within a two-year window for contiguous neighbors and within a five-year window for more distant states. They also find an asymmetric pattern of responsiveness – states react to changes in abatement costs in competitor states that have initially more stringent environmental policy, but not to states with initially less stringent environmental policy. Their findings are more consistent with a race to the top-type dynamic, not a race to the bottom.

Levinson (2003) extends Fredriksson and Millimet's analysis by examining whether regulatory competition became more pronounced in the 1980s, testing the hypothesis that competition should be more intense during periods of greater state control of environmental policy.[3] Levinson replicates Fredriksson and Millimet's basic finding regarding states responsiveness to changes in the abatement costs of neighboring states, but he does not find convincing evidence that competition steepened after the Reagan took office. Levinson reaches a similar conclusion in tests for regulatory competition in hazardous waste disposal taxes.

Konisky (n.d.) demonstrates strong evidence of strategic interaction in state environmental regulatory behavior, using state enforcement of three federal pollution control laws (the CAA, the CWA, and the RCRA) to measure state regulatory effort. However, he finds weak support for the asymmetric pattern of strategic interaction predicted by the race to the bottom theory. States respond to the regulatory practices of their economic competitors, both in cases when doing so should give them a comparative advantage for attracting economic investment and when doing so would presumably put themselves in a worse-off

ditures (Case, et al., 1993), taxation (e.g., Hernández-Murillo, 2003; Brueckner and Saavedra, 2001; Besley and Case, 1995), and welfare benefits (e.g., Saavedra, 2000; Figlio, et al., 1999).

[3] As part of its New Federalism initiative, the Reagan Administration devolved some authority in environmental policy from the federal government to state governments, mostly through cuts in state grants and various administrative reforms.

position for attracting mobile capital. These findings suggest a more complicated pattern of regulatory competition, and equally as compelling a case for a race to the top in state environmental regulatory effort as a race to the bottom.

In related work, Woods (2006) uses a slightly different empirical approach to evaluate states responsiveness to economic competitor states in the area of enforcement of federal mine safety regulation. Woods constructs an "enforcement gap" measure in a time-series cross-sectional regression model to assess the responsiveness of states to the difference of their own enforcement levels with an average of their competitors' enforcement. He finds that states adjust their enforcement efforts when it exceeds that of their competitors, but not when competitors' enforcement is more stringent, which is consistent with race to the bottom logic.

What accounts for these mixed findings? One possible explanation is that existing studies examining the race to the bottom argument do not consider the potential that there is underlying variation in state susceptibility to interstate economic competition. States may face similar threats of capital mobility, yet react very differently due to important differences in intrastate economic and political factors. The strategic interaction studies summarized above, each implicity assume that all states have an equal propensity to engage in the type of regulatory competition that may lead to a race to the bottom type-dynamic in state environmental regulation. These models, in essence, consider the average effect of interstate economic competition on state regulatory effort, which may mask important heterogeneity across states in the relationship between perceptions of competitiveness and environmental regulation.[4] A stricter test of the environmental race to the bottom argument would account for the possibility that states differ in important ways that might help differentiate their responses to interstate economic competition – that is, identify those states more likely to respond to their economic competitors in a manner consistent with a race to the bottom.

Harrison (2006) argues that the prospects of regulatory competition (upward or downward) are contingent on three factors: the credibility of an actor's threat of relocation, the

[4] Extant studies do, of course, statistically control for state-level factors that help to explain variation in state environmental regulatory choices, but they do not directly consider dissimilarities in state responses to similar economic competition pressures.

impact of that actor's relocation, and the political opportunity costs of modifying public policy to attract new investments and/or to prevent existing capital from relocating. First, regulatory competition theory inherently assumes that government actors respond to relocation threats of capital (or act preemptively before these threats manifest). In the context of environmental regulation, while pollution abatement costs typically are modest relative to other production costs, the expense of complying with environmental regulations have been found to matter for some industries (Levinson, 1996; Feiock and Rowland, 1988), and there is a growing evidence suggesting that firms to do, all else equal, prefer areas with less stringent environmental standards (List, et al. 2003; Becker and Henderson, 2000; Henderson, 1996). While business lobbies likely push for regulatory policies that minimize compliance costs, using a message that business climate is an important concern in siting decisions (Davis and Davis, 1999), the credibility of this message will depend on whether it is genuine or just cheap talk. Firms are not equally footloose due to differences in factors such as fixed plant costs, proximity to natural resources and transportation infrastructure, and availability of labor, and state regulators are likely to factor in these considerations when deciding whether to weaken environmental regulations in an effort to attract new (or retain) mobile capital.

Second, the potential impact of an actor's relocation on the jurisdiction in question is another important factor. Threats of re(location) should be met differently by states, depending on a variety of factors. While it is safe to assume that all states pursue economic development opportunities with some degree of effort, the effect of a particular actor's location decision should depend on its relative importance to the state. States with small or struggling economies may pursue mobile capital with more vigor due to the relative large benefits of each additional increment of economic investment, perhaps leading them to use their environmental regulation as a competitive instrument. States with large or fast-growing economies, by contrast, would seem less likely to engage in the type of regulatory competitive behavior reflective of a race to the bottom, since they could more easily absorb a loss of capital.

Third, there may be substantial political opportunity costs to a state if it uses environmental regulation as a competitive instrument to attract new or retain existing economic investment. While job creation and economic development rank high on most voters lists of policy priorities, it is not to the exclusion of other priorities such as environmental protection. In fact, when asked about the "jobs v. environment" tradeoff in surveys, the public generally responds that some loss of jobs and industry competitiveness is necessary to adequately protect the environment.[5] Basinger and Hallerberg (2004) make a similar argument in their recent study of international tax competition. They argue and demonstrate that two factors internal to jurisdictions (in their case, countries) counteract the effects of competition for mobile capital on policy decisions. There are "constituency" costs that stem from interest groups that oppose policy changes, and there are "transaction costs" that stem from the intransigence or stickiness of political institutions. Because the strength of these mitigating effects will vary across jurisdictions, state susceptibility to downward regulatory pressure should too vary by state.

The objective of this paper is to take an initial step toward identifying the characteristics of states that make them more vulnerable to destructive regulatory competition. To evaluate the role of susceptibility to interstate economic competition, I test the effects of four attributes of state economies. First, I consider the size of the state economy. States with small economies states should feel more pressure to use their regulatory practices as an instrument for attracting mobile capital, since on the margin, they gain more by adding new economic investment than would a larger state. States with smaller economies also stand to lose more, if existing capital moves to states with less stringent environment regulations. By contrast, states with large economies should be relatively more immune from the pressures of interstate economic competition. States with large economies are also likely to have more diversified economies, which further should alleviate the pressure to respond to interstate economic competition by using their environmental regulation as a competitive instrument to attract economic investment.

[5]The American National Election Study has asked the following question as part of its survey: "Generally speaking, some people think we need much tougher government regulations on business in order to protect the environment. (Suppose these people are at one end of the scale, at point 1.) Other people think that current regulations to protect the environment are already too much of a burden on business. (Suppose these people are at the other end of the scale, at point 7.) And, of course, some other people have opinions somewhere in between, at points 2, 3, 4, 5, and 6. Where would you place yourself on this scale?" The mean response to this question from 1996 to 2000 was 3.23.

A second attribute potentially affecting a state's response to competition for mobile capital is the health of its economy. The size of state's economy is more or less a static measure that does not change much over time, relative to other states. However, state economies follow varying trajectories depending on their portfolio of industries. This suggests that there might be variation within states over time, based on their changing economic conditions, not just variation across space. States with slow-growing or receding economies should be more willing to use their environmental regulation as competitive instrument to attract (or retain) mobile capital, whereas states with fast-growing economies should feel less pressure to sacrifice environmental protections for economic investment.

A third attribute of state economic structure that should help predict how states respond to interstate economic competition is the mobility of capital. Although regulatory competition theory often is conceptualized in terms of competition for new economic investment, the logic also holds strongly in terms of competition to retain existing capital. The mere threat of capital flight may be sufficient to cause state regulators – or state elected officials using political controls of the bureaucracy to affect regulatory behavior – to modify their regulatory climate in manner such that the state remains an attractive place for industries to do business. On the state-level, thus, the degree to which a state's economy is comprised of "footloose" industries that can more easily move to new locations should help predict the extent to which a state uses policy tools as competitive instruments. States with economies consisting of large proportions of mobile capital should be more likely to respond to the pressures of interstate economic competition than states with economies consisting of large proportions of fixed capital.

A final characteristic worth considering is the "pollution-intensity" of the state economy. States with economies comprised largely of industries most affected by pollution control regulations (e.g., manufacturing), may have more inclination to use these regulations as a competitive instrument. By contrast, states with economies consisting more of agriculture or service-oriented industries would seem less likely to use their environmental regulation this way, since it would not be an efficacious strategy for bringing in (or retaining) this type of economic investment.[6] States already relying on pollution-intensive industries are likely to be less resistant to new pollution-intensive capital moving into their state, or keeping that which is already present.

As noted above, the use of environmental regulation as a competitive instrument does not go without possible costs, and there is likely to be varying levels of opposition to such a policy choice. First, states with more environmentally-inclined elected officials are likely to resist the relaxation of environmental regulatory effort as a means to attract mobile capital. Second, states with strong environmental interest groups (or comparatively weak manufacturing interest groups) too may influence this policy choice. Last, states with citizens holding more intense preferences for stronger environmental protection measures will be less inclined to support an economic development strategy that includes weakening of environmental regulation as an instrument for attracting (and retaining) mobile capital. In these states, voters may be more inclined to penalize elected officials for pursuing such a strategy. In the analysis to follow, I will include several variables to control for these countervailing forces.

For the race to the bottom argument to hold, in sum, we should observe more downward regulatory pressure on states with smaller, slower-growing, more capital mobile, and more pollution-intensive economies than for states with larger, faster-growing, less capital mobile, and less pollution-intensive economies, all else equal. In other words, states with these characteristics should be more susceptible to race to the bottom-type behavior – that is, more responsive to the regulatory choices of their economic competitors and more . The converse should also be true. Less susceptible states should be less likely to engage in regulatory competition – that is, these states should be less responsive to changes in the regulatory behavior of their economic competitors. If these states are already out-vying their competitors, they should be less likely to see a need to use their environmental regulation as a competitive instrument for attracting mobile capital. If less susceptible states do respond strategically to their economic competitors, it may indicate a pattern of regulatory competition more reflective of an regulatory race to the top.

[6]This is not to say that these state do not actively respond to interstate economic competition for these less pollution-intensive industries, it is just more likely that they would use other policy tools as competitive instruments (e.g., tax incentives, worker training programs).

I will test these hypotheses in the context of state environmental enforcement behavior. This approach extends my previous research (Konisky, n.d.), which used these same data to establish patterns of strategic interaction in state environmental regulatory behavior. Environmental enforcement is a useful area of environmental regulation to consider for a couple of reasons. First, most U.S. pollution control programs have been designed under a system of regulatory federalism, in which responsibility for providing environmental protection is to be shared by multiple levels of government. The federal government (i.e., the EPA) generally has responsibility for establishing national standards, while state governments take on the duties of implementation and enforcement. The key principle defining this regulatory federalism structure is partial preemption, under which federal officials establish national regulatory standards and the procedures by which these standards are to be enforced. States are then invited or required to develop regulatory programs that are consistent – that is, at least as stringent – with federal standards as a precondition for authorization to enforce these standards within their borders. If a state fails to obtain or chooses not to seek authorization, the EPA carries out the programs itself through one of its ten regional offices.

Although the EPA has attempted to instill some uniformity, there is significant variation in enforcement performance across the states (Rechtschaffen and Markell, 2003; U.S. GAO, 2000; Mintz, 1995). Sigman (2003) concludes in her discussion of state authorization that "once authorized, states have quite a free hand to conduct (or ignore) the program." This degree of extraordinary state discretion fulfills an important criterion of the race to the bottom argument, since states can only be vulnerable interstate competition if they have meaningful autonomy (Harrison, 2006). Second, regulators in state environmental agencies perceive there to be a relationship between environmental enforcement and firm location decisions. In a recent survey of senior-level officials working in state environmental agencies, Konisky (2006) found that almost 50% believed that environmental enforcement was an important factor considered by industry when they made decisions about where to locate a new facility.

3. Data and Methods

In this section of the paper, I discuss the environmental enforcement data I use to measure my dependent variables, the state economic data I use to operationalize state susceptibility to interstate economic competition, and the state political control variables. I also describe the statistical models I estimate to test the susceptibility hypotheses.

Dependent Variables

I have compiled data on state enforcement of three federal pollution control programs: the CAA, the CWA, and the RCRA. State enforcement of these programs provides a useful setting for studying patterns of state environmental regulatory competition. First, enforcement of these federal statutes is carried out through the partial preemption and state authorization system discussed above. Due to the discretion afforded states, they can use their enforcement effort (or lack thereof) to shape their state's regulatory climate. Second, studying variation in state enforcement of federal programs provides a built-in control – that is, there is a common framework from which to examine state agency behavior. Third, state-level enforcement is substantively important. Although the EPA does independently carry out enforcement actions, these largely come in support of state efforts.[7]

With these data,[8] I construct two measures. The first measure is the annual number of sampling inspections taken by state governments divided by the number (or an estimate of the number) of regulated facilities under the CAA, the CWA, and the RCRA.[9] The second measure is the unweighted sum of informal and formal enforcement actions (informal actions include notifications of violation, while formal actions include measures to move violators back into compliance such as administrative orders, consent decrees, and civil penalties), again standardized by the total number of regulated facilities, taken by state environmental agencies in a given year. The unit of analysis is a state-year, and the time period I consider

[7] In 2003, for example, state environmental agencies conducted 96% of the inspections and 88% of the punitive actions in enforcement of the CWA.

[8] The enforcement data I compiled for this project come from EPA's Integrated Database for Enforcement Analysis database.

[9] I use the number of manufacturing establishments as an estimate of the number of regulated facilities under the CAA. I compiled these data from the U.S. Census Bureau's *Annual Survey of Manufactures*, and used linear interpolation to impute data for missing years. For the CWA, I obtained data on the number of active facilities directly from the IDEA database. Last, for the RCRA, I use the number of waste handlers, which I compiled from various years of the EPA's *National Biennial RCRA Hazardous Waste Report*, again using linear interpolation to impute the values for missing years.

generally covers 1985-2000, though it varies somewhat due to the data available for constructing the susceptibility measures, as discussed below. In the case of the CWA and the RCRA, I only include state-year observations for years in which the EPA had authorized the state to administer the programs.[10] I present descriptive data for these measures in Table 1.

Susceptibility Measures

I consider four attributes of state economies to measure a state's susceptibility to race to the bottom pressures: size, growth, capital mobility, and pollution-intensity. The economic size and growth measures are straightforward. To measure the size of the state economy, I use each state's gross state product.[11] The first column in Table 2 presents state gross product data for each state in 2000 (excluding Alaska and Hawaii), with their rankings in parentheses. Although state gross product varies from year to year, the rank ordering of state economies does not change too much during the 1985-2000 time period I consider here, so the rankings in Table 2 are generally representative of the relative size of the state economies in any given year in the time-series.[12]

I also use the state gross product data to construct a state economic growth variable. Economic growth is measured as the percentage change in state gross product from the previous year. I present mean growth rates for each state over the 1985-2000 period in the second column of Table 2 to demonstrate that there has been considerable variation across the states. (Of course, these mean growth rates disguise temporal variation within states.)

To measure the geographic-mobility of capital in a state's economy, I adapt a measure employed by Ederington, et al. (2005) in their study of the effect of environmental regulations on trade flows. In this study, they argue that it is necessary to account for the fact that pollution-intensive industries also tend to be less geographically mobile or footloose, when studying the effects of regulations on trade patterns. In their statistical models, they consider three measures of geographic immobility: transportation costs in product markets, plant

[10] In the period I study, all states had authority to enforce the CAA.

[11] These data are available on an annual basis from the Bureau of Economic Analysis, at: http://www.bea.gov/bea/regional/data.htm.

[12] The spearman rho correlation is about .99 between gross state products in 1985 and 1990, 1990 and 1995, and 1995 and 2000.

fixed costs, and agglomeration economies. In my analyses, I used a modified version of their measure of plant fixed costs. While companies in all industries could threaten to leave a state for another state with lower environmental compliance costs, for companies in some industries, this is unlikely to be a credible threat, since it simply would not pay to move locations to reduce environmental compliance costs due to the large fixed costs of their existing operations. Thus, industries with large fixed costs should be less sensitive to environmental regulations. In contrast, companies in industries with low fixed costs may find that moving does have financial benefits. Following Ederington, et al. (2005), I measure plant fixed costs with industry-level (manufacturing industries only (SIC codes 20-39)) data on real capital structures, normalized by the total value of industry shipments.[13] These data are available for 1985 through 1996 only. To account for the fact that industrial composition of state economies differ, I then construct a weighted average of this measure, where the weights are the gross state product of each manufacturing industry divided by the total gross state product of all manufacturing industries. This measure, thus, captures the degree to which the manufacturing base in each state is comprised of mobile industries.

I present the state averages for the mobility measure over the 1985-1996 period in the third column of Table 2. Higher values represent higher proportions of manufacturing base of state economy in industries with large fixed costs. The five states with economies with the most geographically-immobile industrial bases according to this measure are (in order) West Virginia, Louisiana, South Carolina, Delaware, and Indiana, while the five states with economies with the most geographically-mobile industrial bases are (in order) Washington, Kansas, South Dakota, Nebraska, and North Dakota.

To measure the pollution-intensity of a state economy, I modify a measure developed by Templet (1993a, 1993b). Templet created an "emissions-to-jobs" ratio measure by dividing the annual, total toxic discharges by the chemical industry in a state (SIC 28) by the number of workers in the chemical industry. I compute a similar measure, although I use all industries, rather than just the chemical industry.[14] Specifically, I use annual toxic emissions

[13]These data come from Bartelsman, et al. (2000)'s NBER-CES Manufacturing Industry Database, available at http://www.nber.org/nberces/nbprod96.htm.

[14]The spearman rho correlation between the rank of total emissions/total workers and chemical emissions/chemical works (Templet's measure) is 0.63. I chose to use the more general measure because of the

aggregated to the state level as reported in the Toxic Release Inventory (TRI)[15] divided by the total number of employed individuals in the state.[16] In essence, this is a measure of toxic emissions per state worker, and is a measure that is commensurate across states over time.[17]

The last column of Table 2 shows the average toxic emissions per state worker over the period of 1987-2000 (TRI data were first reported for year 1987). The mean pollution-intensity across the states was approximately 46 pounds of toxic discharges per worker (standard deviation of about 87.4 pounds per worker). The states with the most pollution-intensive economies are those with either low population densities (e.g., Nevada, Utah, Montana) and/or considerable chemical manufacturing bases to their economies (e.g., Louisiana, Alabama, Mississippi). States with the least pollution-intensive economies include primarily northeastern states such as Vermont, New York, Massachusetts, and New Jersey.

Control Variables

I include several measures to capture the potential political opportunity costs of states using their environmental regulation as a competitive instrument. First, one must take into account the party affiliation of state elected officials. Democrats typically favor stronger environmental regulation than do Republicans.[18] There is some limited evidence that partisan control of governors' offices and state legislatures influence decisions about state environmental regulatory behavior (Helland, 1998a; Wood, 1991). I use two variables to control for partisan differences.[19] First, I include a variable that measures the party affiliation of the governor (a dummy variable coded 1 if the governor is a Democrat and 0 if the governor is a Republican). Second, I consider the party composition of the state legislature, specif-

uneven presence of the chemical industry across the country.

[15]I would like to thank Vimla Mariwalla and Tim Antisdel at the EPA for providing me with the TRI data.

[16]I compiled these data from the Bureau of Economic Analysis.

[17]The chemicals that the EPA requires companies to report to the TRI changes from time to time. The most significant change came beginning with the 1988 TRI, when companies in the metal mining (SIC 10), coal mining (SIC 12), electric, gas and sanitary services (SIC 49), wholesale trade-nondurable goods (SIC 51), and business services (SIC 73) were required to report their emissions for the first time. Because these changes affect all states equally and at the same time, the emissions per worker issue is meaningful across states and over time.

[18]This difference is pronounced at the federal level, where representatives of the two major parties have distinct voting patterns on environmental issues (Shipan and Lowry, 2001; Kamieniecki, 1995).

[19]These data come from Klarner's (2006) "State Partisan Balance" dataset.

ically, the percentage of representatives in both chambers that are Democrats.[20] Second, to take into account the potential backlash among voters, I include Erikson, et al.'s (1993) ideology measure. More liberal states are more likely to oppose trading off environmental regulation for economic investment, all else equal. Thus, the potential political opportunity costs of states using their environmental regulation in this manner should be more severe in liberal states than in conservative states. A third factor that might influence the willingness of states to modify their environmental regulation in response to interstate economic competition is the strength of interest groups. Measuring state environmental interest group strength across space and time is difficult. In this paper, I use membership in the Sierra Club as an albeit rough measure of state environmental interest group strength.

In addition to these political measures, I include several other control variables. State fiscal conditions too might influence the degree of environmental enforcement effort. Balanced budget and other rules may lead to cuts in expenditures in years in which tax revenues are less plentiful. To control for such budgetary pressure, I include a "fiscal health" variable, which I measure by subtracting total state expenditures from total state revenues, divided by total state expenditures to normalize for the different sizes of state budgets.[21] One might also expect states to curtail their environmental enforcement effort during difficult economic times. Helland (1998b) found that the health of the local economy was an important predictor of the stringency of CWA inspections. To control for economic conditions, I include the state's unemployment rate.[22]

I also control for the scope of the bureaucratic task environment. A simple explanation for the level of enforcement effort put forth by a state is the degree to which regulatory enforcement is necessary. One way to characterize the task environment is the size of the regulated community (i.e., the number of facilities coming under the jurisdiction of a program). I use the number of manufacturing establishments in each state as an estimate of the number of regulated facilities when considering the CAA, the number of active facilities when considering the CWA, and the number of waste handlers when considering the RCRA.

[20] I exclude Nebraska from this analysis, since their state legislature is nonpartisan.
[21] These data were provided to me by the U.S Census Bureau.
[22] I compiled these data from the U.S. Bureau of Labor Statistics: http://www.bls.gov/lau/home.htm.

Last, to control for basic state-level differences in demographics and socioeconomic characteristics, I include several additional control variables – per capita income, population, population density, and urbanization.[23] I also use state fixed effects to control for any time-invariant, state-specific factors that might also relate to regulatory enforcement effort, as well as year fixed effects to control for any year-specific phenomena.

Specifications

To test the idea that a state's economic structure makes it more or less likely to engage in regulatory competition in a manner consistent with the race to the bottom argument, I estimate a series of strategic interaction models. As noted above, researchers have used these models in efforts to detect the degree of state responsiveness to the environmental regulatory behavior of economic competitor states. Here, I will specifically consider whether susceptibility to the pressures of interstate economic competition helps predict which states modify their environmental regulation in response to their competitors.

To begin this discussion, consider a standard strategic interaction model estimated in this literature:

$$E_{it} = \delta \sum_{j=1}^{48} \omega_{ijt} E_{jt} + \beta X_{it} + s_i + y_t + \epsilon_{it}, \qquad i = 1, ..., 48, j \neq i \tag{1}$$

where E_{it} is a measure of environmental policy in state i at time t, ω_{ijt} is a weight assigned to state j by state i at time t, E_{jt} is a measure of environmental policy in state j at time t, X_{it} is a vector of state-level control variables, s_i are state fixed effects, y_t are year fixed effects, and ϵ_{it} are errors uncorrelated over time, but potentially correlated across states. The variable of primary interest in this model is the term, $\sum \omega_{ijt} E_{jt}$, which represents a weighted average of competitors' environmental regulatory effort. Detecting the presence of strategic interaction of government behavior among states requires testing for the significance of δ,

[23] I compiled these data and the gross state product data noted above from the U.S. Bureau of Economic Analysis: http://www.bea.gov/bea/regional/data.htm.

where a nonzero coefficient suggests that one state's environmental regulatory effort is a function of other states' environmental regulatory efforts. The expectation is that $\delta > 0$.

There are several econometric issues that must be resolved to estimate equation (1).[24] First, the strategic interaction term, $\sum \omega_{ijt} E_{jt}$, must be defined. There are two components to this variable. First, an *a priori* assumption must be made regarding how to define a state's competitors. There is no accepted convention for defining competitor states, and past studies have generally used either contiguous states or one of two regional economic classification systems – BEA regions or regions devised by Crone (1998/1999). These regional economic classifications group together states in terms of their economic similarity, under the assumption that states compete primarily to attract more of the same type of industries. The second component of the strategic interaction term is a weight, which determines the relative importance of each designated competitor. In the analyses I report in this paper, I define competitors using BEA regions and population weights.[25]

Another econometric issue that must be addressed is the obvious endogeneity of the $E_{jt}s$. By design, modeling strategic interaction within the same year means that values of E in different states are jointly determined such that the linear combination of the $E_{jt}s$ is endogenous and correlated with the error term, ϵ_{it}. Because of this simultaneity problem, OLS estimates will be biased. One way to estimate this model is a two-stage least squared instrumental variables approach (2SLS-IV), which generates unbiased and relatively efficient coefficients (Franzese and Hays, 2004).[26] The standard application of the 2SLS-IV approach is to instrument for E_{jt} using a subset of the weighted characteristics of competitor states (Anselin, 1988).[27] I use an instrument set that includes per capita income, population,

[24]Breuckner (2003) provides an excellent overview of the issues. I give a full account of the issues in this context in Konisky (n.d.).

[25]There are eight BEA regions: New England (Connecticut, New Hampshire, Maine, Massachusetts, Rhode Island, and Vermont), Mideast (Delaware, Maryland, New Jersey, New York, Pennsylvania), Great Lakes (Illinois, Indiana, Michigan, Ohio, and Wisconsin), Plains (Iowa, Kansas, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota), Southeast (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia), Southwest (Arizona, New Mexico, Oklahoma, Texas), Rocky Mountain (Colorado, Idaho, Montana, Utah, and Wyoming), and Far West (California, Nevada, Oregon, and Washington).

[26]An alternative approach is to use a maximum likelihood estimation of the reduced form of equation (1). Spatial maximum likelihood estimation, however, can be computationally demanding due to the large matrices necessary to estimate the spatial lag term.

[27]More specifically, this equation is estimated: $\sum_{j\neq i} \omega_{ijt} E_{jt} = a + b \sum_{j\neq i} \omega_{ijt} X_{jt} + \mu_{it}$, where $\sum_{j} \omega_{ijt} X_{jt}$

population density, and urbanization (all population-weighted) – that is, a subset of the variables included in the X_{it} vector of state attributes in equation (1). These are appropriate instruments if they affect a state's environmental enforcement effort, but not the effort put forth in competitor states, conditional on the competitor states' efforts.[28]

A third problem that arises in estimating equation (1) occurs when ϵ_{it} includes omitted variables that are themselves spatially-dependent. In this case, states may share some unobserved, regional characteristics that are correlated with regulatory effort. Spatial dependence in the errors would bias δ in favor of a spurious relationship, leading one to potentially mistake regional correlations for strategic behavior. An advantage of the 2SLS-IV approach I employ in the analyses below is that this method generates consistent estimates even in the presence of spatial error dependence (Kelejian and Prucha, 1998).

To test the effect of state susceptibility, I modify the model in equation (1) by estimating separate slopes for states depending on whether they fall above or below their BEA regional median for each measure in each year. Specifically, I test the hypotheses that states with economies below (or equal to) the median gross state product, below (or equal to) the median economic growth rate, below (or equal to) the median capital mobility, and above (or equal to) the median pollution-intensity are *more* likely to respond to their economic competitors. Conversely, states with larger, faster-growing, more capital immobile, and less pollution-intensive economies should exhibit less (if any) responsiveness to their economic competitors' environmental regulatory efforts.

I re-specify equation (1) using an indicator variable, I_{it}, to designate whether a state is above or below the median of its economic competitors with regard to each of these susceptibility measures. Using the case of the size of the state economy to illustrate, the specification is as follows:

$$E_{it} = \delta_0 I_{it} \sum_{j=1}^{48} \omega_{ijt} E_{jt} + \delta_1 (1 - I_{it}) \sum_{j=1}^{48} \omega_{ijt} E_{jt} + \beta X_{it} + s_i + y_t + \mu_{it}, \qquad i = 1, ..., 48, j \neq i \quad (2)$$

is a weighted average of a vector of state i's competitors' characteristics. The fitted values can then be used as instruments for the spatial lag term.

[28]Konisky (n.d.), Levinson (2003), and Fredriksson and Millimet (2002) use a similar set of instruments in their strategic interaction models of state-level environmental regulation.

where

$$I_{it} = \begin{cases} 1, & \text{if gross state product}_{it} \leq \text{median gross state product}_{kt}; \\ 0, & \text{otherwise.} \end{cases}$$

where k = all BEA regional states ($k \neq i$), and the rest of the variables are defined as discussed above. With this specification, the degree of strategic interaction is measured by δ_0 for states with less than (or equal to) the regional median gross state products, and by δ_1 for states with above the regional median gross state products. If states with smaller economies are, in fact, more likely to respond to the regulatory behavior of competitor states, we should find that $\delta_0 > 0$, while δ_1 should not be statistically different than zero. I consider analogous models for the other three attributes of state economic structure.

To provide a clearer picture of what the susceptibility hypothesis suggests, consider the data in Figures 1 and 2. Each graph presents one of the susceptibility measures for the most recent year in each time-series. A couple of things are particularly noteworthy looking across the four graphs. First, there is considerable variation on these measures. While in a few of the regions for specific measures (for example, economic growth in the Plains region) the states are bunched, in most cases there are differences. Second, the four measures separate states differently – that is, few states are below the regional median on all of the measures.

4. Results

In this section, I report the results from estimating model (2) as described above. To ease interpretation, I estimate the models after a natural log transformation of both the dependent variable and the strategic interaction terms, so the coefficients of primary interest can be interpreted as elasticities.[29] The results are presented in Tables 3 through 6. I will first discuss the results for these coefficients for each susceptibility measure, and then the

[29] In some years, a few states did not perform inspections or take punitive enforcement actions. My correspondence with the EPA officials that manage the IDEA database and the program specific databases that IDEA compiles its data from, indicated that there were no major problems with missing data for the years I consider. To address these values of zero, I added a small constant (1) to all observations to enable the logarithmic transformation, which is a standard solution to this problem (Cameron and Trivedi, 1998). The results are not sensitive to this transformation.

results for the control variables overall.

The results shown in Table 3 present some modest evidence that the size of a state's economy is a good predictor of whether they respond to the regulatory behavior of competitor states. In half of the regressions, the only statistically significant evidence of strategic interaction is for states with smaller economies – that is, the coefficient on the strategic interaction term for states with below the regional median size of the economy is statistically significant, but the coefficient for states with economic sizes above the regional median is not. I find elasticities in the range of .7 to 1.4 in these cases, suggesting that these states respond to a 10% increase (decrease) in their competitor states' enforcement efforts with a 7% to 14% increase (decrease) in their own enforcement efforts. The strongest evidence comes when considering enforcement of the RCRA, in which case the pattern of strategic interaction is consistent with the idea of state susceptibility for each measure of state enforcement (although only at a 10% significance level for the punitive enforcement actions measure).

Contradicting these findings are the results for the other three regressions that consider the size of the state economy. In the model using punitive actions taken by state governments to enforce the CAA and in each model using state enforcement of the CWA, the pattern of strategic interaction is inconsistent with the susceptibility hypothesis. In these regressions, it is states with economies larger than the regional median that demonstrate strategic responsiveness to their economic competitors.

Turning to the results for state economic growth shown in Table 4, there is not much support for the state susceptibility hypothesis. In each of the regressions in which there is evidence that states with below regional median economic growth responded to their economic competitor states, so too did states with above regional median economic growth. Moreover, in two of these models – each of the enforcement actions taken under the RCRA – the coefficients are only marginally statistically significant (10% level). Moreover, in the regressions using CAA inspections and CWA punitive actions, states with *above* regional median levels of economic growth are more likely to respond the regulatory behavior of their economic competitor states than are their counterparts with slower growing economies. The coefficients of 1.26 and 1.58 imply these states respond to a 10% increase (decrease) in their competitor states' enforcement efforts with approximately a 12% to 16% increase (decrease) in their own enforcement efforts. These findings contradict the susceptibility hypothesis.

There is also not much evidence that susceptibility matters in terms of the mobility of capital. In none of the regressions did states with above regional median capital mobility show any signs of strategic responses to the environmental regulatory behavior of their economic competitor states. In fact, as shown in Table 5, in five of the six regressions, states with higher than the regional median fixed plant costs (i.e., those with less mobile capital) respond to the regulatory enforcement behavior of their economic competitor states. I find elasticities ranging from about .7 to 1.3 (some of the coefficients are only statistically significant at the .10 level). Thee results too contradict the susceptibility hypothesis.

Last, I consider the case of the pollution-intensity of state economies. My findings here, presented in Table 6, do not suggest that the pollution-intensity of the economy matter for predicting strategic interaction. I find support for the susceptibility hypothesis in only one of the regression models, and in the CWA models, there is evidence indicating that states with less pollution-intensive economies are more likely to respond to the regulatory enforcement effort of their economic competitors.

Looking across the models, there is not much consistency in the performance of the control variables – some are in line with expectations, while others are not or do not reach conventional levels of statistical significance. The set of four variables I included in the regressions to control for the political opportunity costs of states using their environmental regulation as a competitive instrument generally do not help predict state enforcement behavior. Whether or not a state has a Democratic governor does not seem to matter too much – in only three of the models does a states with Democratic governor help explain state environmental enforcement behavior and only at a .10 significance level. The partisan composition of state legislatures is consistently statistically significant in the regressions. All else equal, states with more Democratic state legislators perform less environmental enforcement behavior, which, while counter to expectations, is consistent with my previous findings (Konisky, n.d.). The other two measures of political opportunity costs – state ideology and environmental interest group strength – do not provide much explanatory power.

Overall, the other control variables I include in the model perform poorly. I think there are a couple of explanations. First, many of the variables to do not vary much from year-to-year within a state, which makes it difficult to accurately assess their independent effects. In addition, the state-fixed effects I included to capture time-invariant, state-specific factors may introduce some collinearity with some of these variables.

The findings discussed above consider cases when I classified states as more or less susceptible to engaging in regulatory competition, determined by whether they were above or below their BEA regional median for each of the four state economic attributes. To test the sensitivity of the results to this assumption, I also estimated regressions grouping states as being either below (or equal to) or above the *national* median for each indicator of state susceptibility. The results from these regressions (not reported) generally closely correspond to those discussed above.

To summarize the results from the above analyses, these initial tests of the susceptibility hypothesis provide only weak support for the idea that state economic structure helps predict whether states respond to interstate economic competition by strategically reacting to the environmental regulatory behavior of their competitor states. The results are consistent for each measure of state environmental enforcement I analyze and across each of the three federal pollution control programs I study. The best evidence (and it is still modest) comes with regard to states with small economies. Otherwise, the evidence is meager. And, in many cases states that theoretically should be less susceptible to the downward regulatory pressures are the states that I find strategically responding to their competitors' regulatory behavior.

A couple of possible inferences could be made from these results. First, the pattern of strategic interaction we observe here might reflect a regulatory race to the top. States less susceptible to interstate economic pressures are free to raise regulatory effort (in this case, perform more strict environmental enforcement) with fewer fears that it will harm their economies. This interpretation is consistent with previous analyses of strategic interaction of state environmental regulatory effort, which found a tendency for some states to increase their regulatory efforts in response to increases in the regulatory efforts of their economic competitors (Konisky, n.d.; Fredriksson and Millimet, 2002).

Second, one might infer from these results that states use their environmental regulatory behavior to improve their economies, thereby making them less susceptible to interstate economic competition. This is an issue of sequence that one might raise as a criticism to the within the same year strategic interaction assumed in model (2). However, when I estimate model (2), lagging the susceptibility measures (by one and two years), I do not find appreciably different results. This is likely due to the fact that relative to their economic competitors, states' positions in their BEA regions do not vary much over these short periods of time.

5. Conclusion

In this paper, I examined the possibility that there is underlying variation in the susceptibility of states to the forces of interstate economic competition. The logic of interstate economic competition suggest that states with smaller, slower growing, more capital mobile, and more pollution-intensive economies will be more likely to engage in the type of strategic interaction indicative of regulatory competition. I find some modest, though not uniform, evidence that the size of a state's economy matters. States with below average size economies compared to economic competitor states were at times more likely to respond to their competitors' environmental regulatory enforcement behavior than were states with above average size economies. However, when I consider the three other measures of susceptibility, the evidence is far less persuasive. Although there remains some evidence of strategic interaction, it was more likely to come from states less theoretically susceptible to downward regulatory pressures coming from interstate economic competition. Overall, the results seems to suggest that the key factor in susceptibility may be the overall size, rather than the composition, of a state's economy.

By no means does this analysis settle the debate about the existence, or lack thereof, of a race to the bottom in U.S. environmental regulation. The attempt here has been to apply what I believe is more nuanced and stricter test of the race to the bottom logic, by examining theoretically compelling reasons why some states may be more predisposed to respond to interstate economic competition with relaxations of their regulatory effort. Too often, scholars (myself included) have assumed that states have equal propensities to engage in regulatory competition, which is difficult to square with our intuitions that states vary in important ways that should have some bearing on whether they behave this way or not. While this analysis falls short of resolving this debate, it does take an initial step toward identifying (or ruling out) the factors that may make some states more likely to participate in destructive regulatory competition.

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Table 1. Summary Statistics for Environmental Enforcement Measures, 1985-2000					
	# Observations	Mean	St. Dev.	Minimum	Maximum
CAA Inspections	752	0.145	0.124	0.0001	0.699
CAA Enforcement Actions	752	0.016	0.019	0.0	0.149
CWA Inspections	593	0.041	0.058	0.0	0.796
CWA Enforcement Actions	593	0.045	0.116	0.0	0.926
RCRA Inspections	657	0.938	0.921	0.030	6.867
RCRA Enforcement Actions	657	0.671	0.531	0.0	3.957

*Data come from the EPA's Integrated Database for Enforcement Analysis system. $n = 752$ for CAA (47 states x 16 years); $n = 593$ for CWA (includes state-year combinations for states with NPDES authorization only); $n = 657$ for RCRA (includes state-year combinations for states with RCRA Subtitle C authorization only). Nebraska is excluded, as it gets dropped from analyses due its nonpartisan state legislature.

Table 2. Susceptibility Measures

State	Gross State Product 2000 ($ millions)	Avg. Econ. Growth 1985-2000 (%)	Avg. Capital Mobility 1985-1996	Avg. Pollution-Intensity 1987-2000
AL	116,265 (25)	0.0595 (29)	0.1622 (10)	81.35 (6)
AR	66,700 (34)	0.0600 (28)	0.1526 (31)	55.92 (14)
AZ	157,424 (23)	0.0819 (2)	0.1583 (16)	98.15 (5)
CA	1,296,637 (1)	0.0680 (12)	0.1517 (34)	19.59 (35)
CO	170,350 (21)	0.0737 (7)	0.1495 (39)	7.59 (45)
CT	157,988 (22)	0.0654 (20)	0.1532 (30)	9.10 (43)
DE	42,129 (40)	0.0771 (4)	0.1662 (4)	26.26 (26)
FL	469,532 (4)	0.0777 (3)	0.1502 (37)	16.82 (37)
GA	289,145 (10)	0.0757 (5)	0.1544 (27)	31.64 (21)
IA	91,488 (29)	0.0505 (44)	0.1562 (23)	26.57 (24)
ID	35,251 (42)	0.0641 (22)	0.1498 (38)	63.23 (11)
IL	466,338 (5)	0.0544 (39)	0.1589 (15)	22.34 (33)
IN	195,881 (15)	0.0556 (38)	0.1657 (5)	62.43 (12)
KS	83,617 (31)	0.0563 (34)	0.1464 (47)	30.79 (22)
KY	113,311 (26)	0.0559 (36)	0.1509 (36)	40.15 (17)
LA	131,531 (24)	0.0451 (47)	0.1704 (2)	166.61 (3)
MA	277,103 (11)	0.0660 (18)	0.1558 (24)	7.53 (46)
MD	179,929 (17)	0.0662 (16)	0.1566 (20)	12.07 (41)
ME	35,485 (41)	0.0626 (24)	0.1515 (35)	35.56 (19)
MI	337,976 (9)	0.0526 (41)	0.1482 (41)	26.42 (25)
MN	185,199 (16)	0.0650 (21)	0.1549 (26)	13.63 (40)
MO	175,948 (19)	0.0572 (32)	0.1481 (42)	30.22 (23)
MS	64,930 (35)	0.0559 (35)	0.1521 (32)	79.31 (7)
MT	21,535 (45)	0.0512 (43)	0.1520 (33)	115.92 (4)
NC	273,278 (12)	0.0725 (9)	0.1551 (25)	33.01 (20)
ND	17,936 (46)	0.0500 (45)	0.1474 (44)	24.18 (30)
NE	55,869 (36)	0.0580 (31)	0.1474 (45)	24.69 (28)
NH	42,655 (38)	0.0749 (6)	0.1614 (13)	14.84 (38)
NJ	345,519 (8)	0.0660 (17)	0.1648 (7)	8.99 (44)
NM	50,515 (37)	0.0622 (25)	0.1626 (9)	73.97 (9)
NV	73,528 (32)	0.0897 (1)	0.1571 (18)	249.49 (1)
NY	762,096 (2)	0.0565 (33)	0.1480 (43)	7.38 (47)
OH	371,952 (7)	0.0526 (40)	0.1615 (12)	38.67 (18)
OK	90,266 (30)	0.0519 (42)	0.1599 (14)	22.88 (32)
OR	112,587 (28)	0.0621 (26)	0.1533 (29)	22.88 (31)
PA	394,649 (6)	0.0559 (37)	0.1642 (8)	24.50 (29)
RI	33,504 (43)	0.0626 (23)	0.1565 (21)	9.23 (42)
SC	112,977 (27)	0.0677 (13)	0.1693 (3)	47.20 (16)
SD	23,140 (44)	0.0606 (27)	0.1471 (46)	13.97 (39)
TN	175,350 (20)	0.0658 (19)	0.1541 (28)	66.88 (10)
TX	723,842 (3)	0.0668 (14)	0.1620 (11)	49.83 (15)
UT	68,038 (33)	0.0729 (8)	0.1569 (19)	176.83 (2)
VA	258,280 (13)	0.0715 (10)	0.1485 (40)	25.87 (27)
VT	17,799 (47)	0.0667 (15)	0.1575 (17)	2.68 (48)
WA	220,459 (14)	0.0704 (11)	0.1453 (48)	21.47 (34)
WI	177,561 (18)	0.0589 (30)	0.1564 (22)	18.92 (36)
WV	42,393 (39)	0.0436 (48)	0.1876 (1)	78.87 (8)
WY	17,798 (48)	0.0486 (46)	0.1652 (6)	56.86 (13)

Table 3. Strategic Interaction for States with Small Economies, 1985-2000						
	Clean Air Act		Clean Water Act		RCRA	
	Insps. (1)	Enfs. (2)	Insps. (3)	Enfs. (4)	Insps. (5)	Enfs. (6)
Competitors' enforcement for states with economies *below* regional median (δ_0)	1.195 (1.046)	0.746** (0.272)	-0.296 (0.681)	0.385 (1.249)	1.367** (0.427)	0.966† (0.539)
Competitors' enforcement for states with economies *above* regional median (δ_1)	1.864* (0.815)	0.446 (0.460)	2.038* (0.950)	1.613* (0.699)	-0.354 (0.685)	0.725 (0.451)
Dem. Governor	0.115 (0.076)	0.066 (0.093)	-0.045 (0.113)	0.126 (0.203)	-0.001 (0.053)	0.028 (0.050)
Dem. Legislature (% both chambers	1.077 (0.710)	1.360† (0.718)	-2.437** (0.907)	-2.251* (1.107)	-2.097** (0.600)	-1.052 (0.649)
State ideology	-0.000 (0.005)	0.002 (0.005)	-0.002 (0.004)	0.013 (0.008)	-0.001 (0.004)	0.002 (0.004)
Sierra Club membership (1000s)	0.000 (0.000)	0.001** (0.000)	0.001† (0.000)	-0.001* (0.000)	0.000 (0.000)	0.000 (0.000)
Fiscal health	0.468 (3.162)	8.859* (4.005)	-10.290 (6.813)	-12.821 (8.198)	-1.187 (3.527)	-5.916† (3.521)
Unemployment	-0.112 (0.435)	0.260 (0.467)	0.180 (0.604)	0.297 (1.237)	0.044 (0.365)	-0.033 (0.406)
No. facilities (1000s)	0.183* (0.088)	0.036 (0.097)	-0.059 (0.063)	0.255** (0.096)	-0.632** (0.143)	-0.546** (0.151)
Per capita income (1000*s*)	-0.168** (0.060)	-0.176* (0.072)	-0.013 (0.090)	-0.139 (0.206)	-0.021 (0.036)	0.031 (0.034)
Population (millions)	-0.006 (0.157)	0.494** (0.190)	-0.003 (0.102)	-0.342 (0.308)	0.204 (0.159)	-0.080 (0.068)
Population density (per sq. mile)	0.009 (0.007)	0.006 (0.006)	0.019** (0.004)	0.008 (0.011)	0.001 (0.005)	0.003 (0.007)
Urbanization (%)	-3.337* (1.693)	-3.034 (2.862)	-0.122 (3.084)	5.708 (5.217)	-1.565 (2.187)	-3.374† (1.982)
n	752	752	593	593	657	657
R^2	0.66	0.67	0.68	0.62	0.64	0.58

Coefficients in first two rows are elasticities. Robust standard errors in parentheses. Significance levels: †.10, *.05, and **.01. Coefficients for state and time fixed effects are not reported.

Table 4. Strategic Interaction for States with Slow Growing Economies, 1986-2000						
	Clean Air Act		Clean Water Act		RCRA	
	Insps. (1)	Enfs. (2)	Insps. (3)	Enfs. (4)	Insps. (5)	Enfs. (6)
Competitors' enforcement for states with economies *below* regional median (δ_1)	1.487 (1.043)	0.078 (0.761)	0.617** (0.196)	0.932 (0.567)	1.160† (0.622)	1.031† (0.613)
Competitors' enforcement for states with economies *above* regional median (δ_0)	1.584** (0.520)	1.213 (0.740)	0.839** (0.212)	1.258** (0.411)	0.724** (0.239)	0.827* (0.323)
Dem. Governor	0.120 (0.074)	0.035 (0.251)	-0.126 (0.091)	0.306† (0.165)	0.072 (0.072)	0.029 (0.057)
Dem. Legislature (% both chambers)	1.112 (1.712)	-1.354 (3.214)	-2.454* (0.952)	-3.373† (1.910)	-1.630* (0.786)	-0.854 (0.861)
State ideology	-0.002 (0.004)	0.004 (0.012)	-0.002 (0.004)	0.013 (0.009)	0.000 (0.004)	0.002 (0.004)
Sierra Club membership (1000s)	-0.000 (0.001)	0.000 (0.001)	0.000 (0.000)	-0.001* (0.000)	0.000 (0.000)	0.000 (0.000)
Fiscal health	-1.134 (17.120)	-28.324 (35.530)	-6.459 (6.363)	-17.565 (11.290)	-2.252 (5.253)	-4.221 (7.100)
Unemployment	0.059 (2.218)	5.335 (4.744)	1.560† (0.885)	1.345 (1.914)	0.113 (0.318)	-0.127 (0.493)
No. facilities (1000s)	0.138 (0.285)	-0.538 (0.584)	-0.081 (0.063)	0.291** (0.110)	-0.489** (0.142)	-0.535** (0.148)
Per capita income (1000*s*)	-0.146† (0.076)	-0.056 (0.190)	-0.048 (0.077)	0.062 (0.116)	-0.023 (0.036)	0.030 (0.035)
Population (millions)	0.065 (0.081)	0.409 (0.268)	0.099 (0.093)	-0.159 (0.202)	-0.095 (0.090)	-0.098 (0.071)
Population density (per sq. mile)	0.007 (0.008)	-0.016 (0.026)	0.018** (0.005)	0.004 (0.014)	0.002 (0.004)	0.003 (0.005)
Urbanization (%)	-3.092 (3.668)	6.125 (11.457)	3.793 (3.372)	9.370 (5.961)	-1.948 (2.112)	-3.864† (2.224)
n	752	752	593	593	657	657
R^2	0.66	0.64	0.69	0.57	0.67	0.55

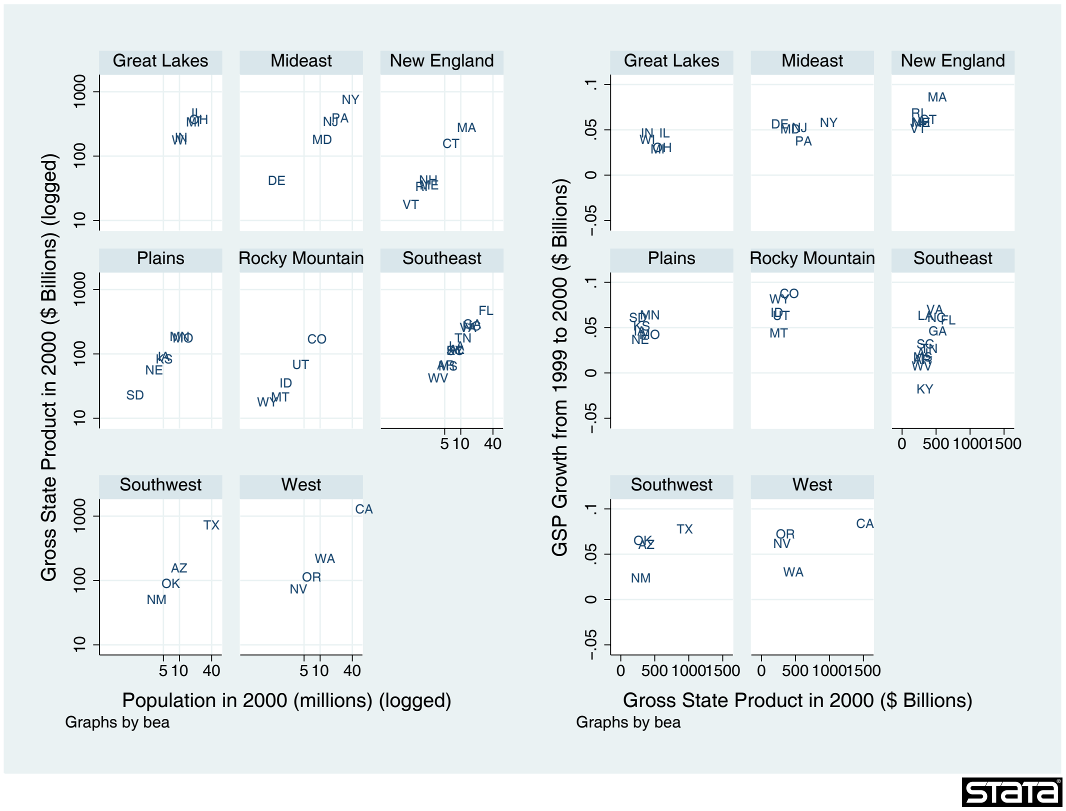
Coefficients in first two rows are elasticities. Robust standard errors in parentheses. Significance levels: †.10, *.05, and **.01. Coefficients for state and time fixed effects are not reported.

Table 5. Strategic Interaction for States with High Capital Mobile Economies, 1985-1996	Clean Air Act		Clean Water Act		RCRA	
	Insps. (1)	Enfs. (2)	Insps. (3)	Enfs. (4)	Insps. (5)	Enfs. (6)
Competitors' enforcement for states with economies *below* regional median (δ_1)	0.823 (0.649)	0.724 (0.540)	0.485 (0.360)	0.721 (0.537)	0.357 (0.883)	-0.164 (0.492)
Competitors' enforcement for states with economies *above* regional median (δ_0)	0.950† (0.540)	0.704** (0.230)	0.687** (0.198)	1.338† (0.684)	0.889* (0.403)	0.746 (0.573)
Dem. Governor	0.118 (0.085)	-0.005 (0.145)	-0.217 (0.136)	-0.170 (0.261)	-0.049 (0.116)	-0.022 (0.096)
Dem. Legislature (% both chambers)	1.085† (0.624)	1.214 (0.911)	-0.898 (1.216)	-3.011† (1.678)	-1.727** (0.551)	-2.113* (0.862)
State ideology	-0.002 (0.003)	0.004 (0.005)	-0.002 (0.004)	0.011 (0.010)	0.002 (0.005)	0.008 (0.005)
Sierra Club membership (1000s)	-0.000 (0.000)	0.001* (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Fiscal health	1.700 (3.748)	10.988* (5.385)	-9.072† (5.380)	-6.378 (11.483)	-6.482† (3.717)	-10.886* (4.545)
Unemployment	0.501 (0.594)	0.419 (1.129)	0.127 (0.915)	-1.785 (1.989)	0.578 (0.560)	0.901 (0.754)
No. facilities (1000s)	0.280* (0.128)	0.317 (0.339)	-0.343† (0.196)	-0.027 (0.326)	-0.233 (0.268)	-0.471* (0.217)
Per capita income (1000*s*)	-0.117† (0.064)	-0.218* (0.087)	-0.183 (0.114)	0.220 (0.254)	-0.075 (0.071)	-0.054 (0.091)
Population (millions)	0.121 (0.148)	0.484 (0.388)	0.234 (0.284)	0.187 (0.359)	-0.064 (0.138)	-0.141 (0.164)
Population density (per sq. mile)	0.015* (0.007)	0.008 (0.009)	0.027** (0.009)	-0.001 (0.016)	0.003 (0.008)	0.000 (0.008)
Urbanization (%)	-6.575 (4.148)	-10.497 (8.538)	5.064 (4.794)	14.703 (10.538)	-3.376 (3.756)	-0.655 (5.031)
n	564	564	431	431	473	473
R^2	0.77	0.69	0.74	0.42	0.69	0.46

Coefficients in first two rows are elasticities. Robust standard errors in parentheses. Significance levels: †.10, *.05, and **.01. Coefficients for state and time fixed effects are not reported.

Table 6. Strategic Interaction for States with Pollution-Intensive Economies, 1987-2000						
	Clean Air Act		Clean Water Act		RCRA	
	Insps.	Enfs.	Insps.	Enfs.	Insps.	Enfs.
	(1)	(2)	(3)	(4)	(5)	(6)
Competitors' enforcement for states with economies *below* regional median (δ_0)	0.218 (0.676)	-0.149 (0.433)	0.434 (0.377)	0.485 (0.551)	0.797 (0.518)	1.017** (0.368)
Competitors' enforcement for states with economies *above* regional median (δ_1)	0.450 (0.645)	0.479 (0.466)	1.360** (0.494)	0.642† (0.372)	0.421 (0.610)	0.223 (0.970)
Dem. Governor	0.095 (0.069)	0.136 (0.129)	-0.227 (0.150)	0.200† (0.105)	0.099† (0.054)	0.081† (0.047)
Dem. Legislature (% both chambers	0.336 (0.477)	1.544 (1.197)	1.234 (2.247)	-2.894† (1.522)	-1.961** (0.559)	-0.866 (0.833)
State ideology	-0.004 (0.003)	0.003 (0.007)	-0.005 (0.009)	0.011 (0.009)	0.001 (0.003)	0.005 (0.004)
Sierra Club membership (1000s)	-0.000 (0.000)	0.001** (0.000)	0.001 (0.000)	-0.001* (0.000)	0.000 (0.000)	0.000 (0.000)
Fiscal health	-6.737† (3.488)	9.139 (6.905)	-5.610 (9.366)	-10.664 (10.353)	0.123 (2.673)	-2.029 (4.604)
Unemployment	0.193 (0.418)	1.726† (0.925)	2.627† (1.533)	0.710 (1.581)	-0.123 (0.365)	-0.237 (0.377)
No. facilities (1000s)	-0.056 (0.082)	-0.255 (0.165)	0.004 (0.099)	0.239* (0.097)	-0.653** (0.112)	-0.521** (0.135)
Per capita income (1000*s*)	-0.246** (0.056)	-0.221** (0.085)	-0.188† (0.101)	-0.122 (0.098)	-0.002 (0.034)	0.095† (0.054)
Population (millions)	0.199† (0.120)	0.678** (0.240)	0.283 (0.284)	-0.088 (0.228)	-0.043 (0.075)	0.009 (0.102)
Population density (per sq. mile)	0.011† (0.006)	0.002 (0.010)	0.033* (0.014)	0.002 (0.015)	0.003 (0.003)	0.003 (0.005)
Urbanization (%)	-0.640 (1.566)	-3.331 (4.055)	-6.855 (6.064)	1.468 (9.485)	-0.009 (1.935)	-2.413 (1.940)
n	658	658	525	525	616	616
R^2	0.73	0.27	0.28	0.76	0.78	0.5

Coefficients in first two rows are elasticities. Robust standard errors in parentheses. Significance levels: †.10, *.05, and **.01. Coefficients for state and time fixed effects are not reported.


Great Lakes
Mideast
New England
Plains
Rocky Mountain
Southeast
Southwest
West
Gross State Product in 2000 ($ Billions) (logged)
Population in 2000 (millions) (logged)
Graphs by bea
GSP Growth from 1999 to 2000 ($ Billions)
Gross State Product in 2000 ($ Billions)
Graphs by bea


Great Lakes
Mideast
New England
Plains
Rocky Mountain
Southeast
Southwest
West
Capital Mobility Manufacturing Industry (logged)
.1
.11
.12
.13
10
100
1000
Gross State Product in 1996 ($ Billions) (logged)
Graphs by bea
Toxic Emissions per Worker in 2000 (logged)
Toxic Emissions in 2000 (Millions of Pounds) (logged)
Graphs by bea