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State Environmental Standard-Setting: Is There a "Race" and Is It "to the Bottom"?

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State Environmental Standard-Setting: Is There a “Race” and Is It “To the Bottom”?

by
KIRSTEN H. ENGEL*

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Introduction

Of the numerous theoretical rationales used to justify federal environmental regulation, perhaps the most broadly compelling is the argument that without such regulation, states would engage in a welfare-reducing "race-to-the-bottom" in environmental standard-setting. The term "race-to-the-bottom" refers to a progressive relaxation of state environmental standards, spurred by interstate competition to attract industry, that also occasions a reduction in social welfare below the levels that would exist in the absence of such competition. The widely accepted theoretical model for the race-to-the-bottom is non-cooperative game theory, of which the classic Prisoner's Dilemma is perhaps the most well-known example. According to this model, although all states would be better off if they each cooperated with each other by collectively maintaining optimally stringent environmental standards, the incentives are such that each state will instead relax its standards in an ultimately unsuccessful bid to attract industry.

Recently, in the wake of a widely cited article by Professor Richard Revesz,¹ scholars have begun to question the very existence of a race-to-the-bottom in environmental standard-setting. Swimming against the tide of prior scholarship,² these revisionist critics contend that the effects of state competition upon state environmental standard-setting are welfare-*enhancing*, rather than welfare-*reducing*.³

1. Richard L. Revesz, *Rehabilitating Interstate Competition: Rethinking the "Race-to-the-bottom" Rationale for Federal Environmental Regulation*, 67 N.Y.U. L. REV. 1210 (1992) (finding race-to-the-bottom argument unsupported and federal intervention inappropriate).

2. See, e.g., Richard B. Stewart, *Pyramids of Sacrifice? Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L. J. 1196, 1211-12 (1977) [hereinafter *Pyramids*]; Richard B. Stewart, *The Development of Administrative and Quasi-Constitutional Law in Judicial Review of Environmental Decisionmaking: Lessons from the Clean Air Act*, 62 IOWA L. REV. 713, 747 (1977); Craig N. Oren, *Prevention of Significant Deterioration: Control-Compelling Versus Site-Shifting*, 74 IOWA L. REV. 1, 29 (1988); Vicki Been, "Exit" as a Constraint on Land Use Exactions: Rethinking the Unconstitutional Conditions Doctrine, 91 COLUM. L. REV. 473, 509 (1991); Susan Bartlett Foote, *Administrative Preemption: An Experiment in Regulatory Federalism*, 70 VA. L. REV. 1429, 1462 (1984).

3. See, e.g., James E. Krier, *On the Topology of Uniform Environmental Standards in a Federal System—And Why it Matters*, 54 MD. L. REV. 1226, 1236-37 (1995) (arguing that the race-to-the-bottom does not exist); Alvin K. Klevorick, *Reflections on the Race-to-the-bottom* (Jan. 2, 1995) (unpublished paper presented at the American Association of Law Schools Annual Meeting, on file with the author) (elaborating upon Revesz' argument that

Revesz, for example, concludes that "the forces of interstate competition, far from being conclusively undesirable" in environmental law, "are at least presumptively beneficial."⁴ These revisionists contend that any welfare loss resulting from reduced environmental quality is more than made up for by compensating gains from increases in economic activity.

The theoretical basis for the revisionist argument is neoclassical economics, according to which each state's individual rational pursuit of its own best interest, when set in the context of an ideally competitive playing field, leads to allocations between environmental amenities and material goods that are socially optimal in all states. This

even if a race-to-the-bottom exists, federal intervention is not the solution); Howard F. Chang, *An Economic Analysis of Trade Measures to Protect the Global Environment*, 83 GEO. L. J. 2131, 2146 (1995) (citing Revesz for the proposition that, in the absence of international environmental externalities, competition in trade and investment will be efficient); Steven G. Calabresi, "A Government of Limited and Enumerated Powers": *In Defense of United States v. Lopez*, 94 MICH. L. REV. 752, 781 n.88 (1995) (citing Revesz for "disproving the race-to-the-bottom thesis in environmental law"); John C. Coffee Jr., *Competition Versus Consolidation: The Significance of Organizational Structure in Financial and Securities Regulation*, 50 BUS. LAW. 447, 475, n.130 (questioning the race-to-the-bottom theory and citing Revesz's article as an "excellent critique" of the argument). Other commentators citing Revesz's 1992 article do not take a position either way as to whether or not Revesz has demonstrated that the race-to-the-bottom exists, but acknowledge that Revesz has posed a challenge to the theoretical validity of the race-to-the-bottom rationale. See, e.g., Thomas W. Merrill, *Panel III: International Law, Global Environmentalism, and the Future of American Environmental Policy*, 21 ECOLOGY L.Q. 485, 487 (1994); Vicki Been, *What's Fairness Got to Do With It? Environmental Justice and the Siting of Locally Undesirable Land Uses*, 78 CORNELL L. REV. 1001, 1085, 1059 (1993). A few commentators have expressed skepticism of Revesz's conclusions, but fail to take issue with either Revesz' choice of or reliance upon the neoclassical economic literature to challenge the race-to-the-bottom rationale. See, e.g., William W. Buzbee, *Remembering Repose: Voluntary Contamination Cleanup Approvals, Incentives, and the Costs of Interminable Liability*, 80 MINN. L. REV. 35, 110-15 (1995) (arguing that Revesz's analysis fails to resolve whether "different political dynamics at the state and federal level might nonetheless in particular contexts lead one to favor a federally imposed standard over state choice".); Joshua D. Sarnoff, *The Continuing Imperative (but Only from a National Perspective) for Federal Environmental Regulation*, __ DUKE ENVTL. L. & POL'Y FORUM __ (forthcoming 1997) (arguing that even if correct, Revesz' argument relies upon the efficiency of state-aggregated preferences which may not be "efficient" from a national perspective); Adam Babich, *Our Federalism, Our Hazardous Waste, and Our Good Fortune*, 54 MD. L. REV. 1516, 1533 n.64 (1995) (arguing, from personal experience, that states do in fact relax environmental standards to attract industry, but not addressing Revesz's arguments for why such relaxation does not necessarily signal a reduction in social welfare). Even Richard Stewart, perhaps the first to propound the race-to-the-bottom argument as a rationale for federal environmental law, appears largely to defer to Revesz's argument. See Richard B. Stewart, *Environmental Regulation and International Competitiveness*, 102 YALE L.J. 2039, 2058-61 (1993) (listing several ways that a race-to-the-bottom could occur, despite Revesz' argument).

4. Revesz, *supra* note 1, at 1253.

theory stands in stark contrast to the game theoretic approach underlying the Prisoner's Dilemma, according to which the very same behavior—rational pursuit by individual states of their own best interest—leads to the opposite result: *inefficient* allocations, suboptimal environmental standards, and reduced overall welfare.

The stakes of this debate for environmental policy are high and the repercussions far-reaching. If the accepted view is right, the framework of federal environmental laws instituted by Congress during the 1970s contributes to overall welfare-enhancement as well as to environmental protection for its own sake. The federal minimum standards that are the mainstay of such laws brake destructive state competition by preempting state environmental quality standards below a federal "floor." Uniform technological requirements for categories of industrial operations, also prevalent in federal environmental laws, reduce interstate competition in environmental standard-setting by making geographic location all but irrelevant to the cost of environmental compliance. If, on the other hand, the revisionists are correct, then such competition-stifling federal environmental laws are leading to a reduction in, rather than a maximization of, social welfare. Consequently, according to the revisionist view, any federal environmental law incapable of being justified on any ground other than the race-to-the-bottom ought to be repealed *post haste*. In other words (and to put the above stakes in a more immediate and contemporary context), if the traditionalists are right, the attempts of the 104th Congress to dismantle the current framework of federal environmental laws were misguided⁵ and many of the Supreme Court's

5. Among other provisions that reduce the capacity of the federal government to carry out its historic mandate to protect the environment, the 104th Congress enacted drastic appropriations cuts for the Environmental Protection Agency, exempted timber-harvesting on national forest lands from compliance with environmental laws, prohibited the use of federal money for listing a species as threatened or for designating a critical habitat, and imposed procedural restrictions upon congressional consideration and passage of federal laws that require the expenditure of funds by state and local governments and fail to appropriate federal funds to cover the costs. See Emergency Supplemental Appropriations for Fiscal Year Ending Sept. 30, 1995, Pub. L. No. 104-19, 240 Stat. 194 (1995) (containing the "Timber Salvage" rider); Emergency Supplemental Appropriations and Rescissions for the Department of Defense to Preserve and Enhance Military Readiness Act of 1995, Pub. L. No. 104-6, tit. II, ch. IV, 109 Stat. 73, 86 (1995) (endangered species legislation); Unfunded Mandates Reform Act of 1995, Pub. L. No. 104-4, 109 Stat. 48 (to be codified in scattered sections of 2 U.S.C.) (1995). See generally Zygmunt J. B. Plater, *Environmental Law as a Mirror of the Future: Civic Values Confronting Market Force Dynamics in a Time of Counter-Revolution*, 23 B. C. ENVTL. AFF. L. REV. 733, 734-35 (1996) (discussing environmental legislation of the 104th Congress); ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 113-14 (2d ed. 1996) (same).

recent rulings restricting the power of the federal government vis-à-vis the states should be viewed apprehensively;⁶ if the revisionists are right, these developments should be looked upon favorably.

The question is thus acutely posed: who is right? Which theoretical approach—neoclassical economics or game theory—best captures what is actually going on in the real world? This is a question that can only be resolved by theoretically informed appeals to evidence and empirical arguments that attempt to match up real world conditions with one approach or another. Insofar as economic efficiency is an object of environmental regulation, the choice of theoretical approach is important. Only by reference to the proper approach is it possible to determine whether a race-to-the-bottom exists and hence whether federal regulation is necessary to achieve economic efficiency. It is important to point out, however, that environmental policy did not have the same narrow focus on economic efficiency as it does today. When Congress developed our current framework of environmental laws during the 1970s, economic efficiency was only one of several justifications for federal regulation to which Congress was responding, and even so, it is not at all clear that Congress considered it primary. While the legislative histories of the federal acts clearly demonstrate Congress's conviction that states' failure to adequately protect the environment was attributable to interstate competition for industry, congressional action seems to have been motivated as much by the need to reduce the resulting threats to human health and the environment than to overcome any economic inefficiency resulting from states' inactivity.

On the economic efficiency front, Professor Revesz has made a significant contribution to the literature by stimulating an important debate about shortcomings in the race-to-the-bottom justification for federal environmental law. However, while he and the other revisionists claim that the shortcomings are theoretical (e.g., that the race-to-the-bottom rationale for federal environmental law "is without theoretical foundation"), I argue in this Article that the problem is not a

6. See *Seminole Tribe of Fla. v. Florida*, 116 S. Ct. 1114 (1996) (holding that the 11th Amendment prevents Congress from authorizing suits against states to enforce legislation enacted pursuant to the Indian Commerce Clause); *United States v. Lopez*, 115 S. Ct. 1624 (1995) (invalidating a federal statute prohibiting firearms in schools); *New York v. United States*, 505 U.S. 144 (1992) (holding unconstitutional a "take-title" provision of federal act that required states to accept ownership of radioactive waste). See also John P. Dwyer, *The Commerce Clause and the Limits of Congressional Authority to Regulate the Environment*, 25 ENVTL. L. REP. 10421 (1995) (discussing the impact of *Lopez* on environmental legislation).

lack of theory (there is, in fact, an extensive theoretical basis for understanding the dynamics of how a race-to-the-bottom could work), but too little empirical evidence. In short, arguments based on the mere explication of a favored model or theoretical approach, with no reference to real world evidence which might support or undermine the theoretical claims, should be without persuasive force.⁷ I contend that the existing theoretical foundation for race-to-the-bottom claims (based upon non-cooperative game theory) is sound; thus, the main contribution of this Article is to sketch, for the first time in the legal literature, an empirical framework for deciding which of the existing theoretical approaches best captures the dynamics of state competition over environmental standard-setting.

In this article, I argue that (1) the preponderance of the evidence available at this time does not support the simple neoclassical framework favored by the revisionists, but instead suggests that the game-theoretic approaches are likely to be more appropriate for understanding interstate conflicts; and (2) even if a neoclassical framework is used to analyze interstate competition, evidence suggests that the interstate market for industrial development and environmental benefits is substantially distorted. Indeed, I will argue that the very neoclassical model favored by the revisionists to support their claims,⁸ when combined with empirical realities, tends to undermine the claim that interstate competition leads to efficiency, indicating instead that such competition in the real world should, in fact, be viewed as presumptively detrimental to social welfare. Thus, there is little reason to believe that state environmental standards established in the absence of a federal framework will be optimal.

In Part I of this Article, I discuss the role of the race-to-the-bottom rationale in explaining the current structure and content of fed-

7. See, e.g., *Pyramids*, *supra* note 2, at 1211-12 (using a model, unaccompanied by empirical data on real world conditions, to claim that the race-to-the-bottom exists); Revesz, *supra* note 1, at 1238-42 (same). But cf. Wallace E. Oates, *The Invisible Hand in the Public Sector: Interjurisdictional Competition in Theory and Practice*, 17-31 (University of Md. Dep't of Econ.) (Working Paper No. 95-17, 1996) [hereinafter Working Paper] (presenting a model of interstate competition and then using empirical data on real world interstate competition to assess the model's predictions and suggesting needed future empirical research to better understand the welfare implications of interjurisdictional competition).

8. Wallace E. Oates & Robert M. Schwab, *Economic Competition Among Jurisdictions: Efficiency Enhancing or Distortion Inducing?*, 35 J. PUB. ECON. 333 (1988), cited in Revesz, *supra* note 1 at 1238-42. See *infra* text accompanying notes 97-111 for a detailed explanation and critique of the neoclassical economic model of interstate competition set forth by Oates and Schwab.

eral environmental laws.⁹ Part II is devoted to the theoretical issues underlying the race-to-the-bottom debate.¹⁰ It first describes the two contrasting theoretical approaches to understanding the effects of interstate competition in environmental standard-setting by reference to two idealized models that capture the essential features of each: the Prisoner's Dilemma model versus a simple model of perfect competition. The remainder of Part II examines the key assumptions that distinguish these two theoretical approaches, and follows with a careful consideration of the conditions necessary for a market in industrial development and environmental benefits to be efficient. This sets the stage for Part III, in which I introduce empirical evidence relevant to answering the theoretical questions raised in Part II, to wit: which assumptions—those underlying game theory, or those underlying neoclassical competition—appear most plausible in light of real world data? And secondly, even if we accept the general neoclassical framework, do the conditions for efficiency actually hold, or does the evidence indicate that in the absence of federal involvement, states will reach suboptimal outcomes?¹¹ Chief among the evidentiary sources discussed in Part III are the results from a survey that I conducted (on issues related to the race-to-the-bottom debate) of over 400 state environmental and economic development officials, state legislators, and interest groups influential in state environmental standard-setting.

The empirical studies presented in the first section of Part III provide two bases for presuming that the results of states environmental standards will be suboptimal, each of which is discussed at length in Part IV.¹² First, while numerous studies indicate that environmental standards are only a minor factor in firm location decisions, a survey that I conducted of persons influential in the state standard-setting process demonstrates that a substantial minority of states relax their environmental standards in order to attract industrial firms. If (1) states compete for industry by lowering environmental standards, but (2) industry location is substantially unaffected by this competition, it logically follows that (3) states' welfare will be reduced because there will be no economic gain to compensate for the environmental quality losses. My survey provides support for (1) and the firm location studies described in this Part provide support for (2). Hence I contend that my data together with the location studies provide *prima facie*

9. See *infra* text accompanying notes 14-70.

10. See *infra* text accompanying notes 71-122.

11. See *infra* text accompanying notes 123-233.

12. See *infra* text accompanying notes 234-274.

evidence of a race-to-the-bottom. Furthermore, empirical data demonstrate that the *assumptions* underlying the particular model used by critics to predict efficient outcomes are unlikely to hold true in the real world.

In Part V, I make two main recommendations based upon the results of Parts II, III, and IV:¹³ federal minimum standards should be retained, and federal regulators should experiment with methods to induce cooperation between states in environmental standard-setting. I suggest that such experimentation include promoting uniform standard-setting on behalf of small groups of states to address regional environmental problems. Such an approach would prevent a state race-to-the-bottom, and yet avoid some of the economic inefficiencies of federal environmental standard-setting that have spurred criticism of federal involvement in environmental protection.

I. The Influence of the "Race-to-the-Bottom" Rationale upon the Development of Federal Law

A. Constitutional History of the Race-to-the-Bottom Argument

The term "race-to-the-bottom" seems to derive from Justice Brandeis' dissent from a 1933 majority opinion overturning a discriminatory state tax upon corporate chain stores.¹⁴ At about the same time, the United States government began to use the race-to-the-bottom rationale to fight off Commerce Clause challenges to New Deal legislation.¹⁵ Initially, the Court rejected this rationale (and the validity of the New Deal legislation), holding that Congress's authority under the Commerce Clause was limited to the regulation of those activities having a "direct" effect upon interstate commerce.¹⁶ When

13. See *infra* text accompanying notes 275-293.

14. *Louis K. Liggett Co. v. Lee*, 288 U.S. 517, 559 (1933) (Brandeis, J., dissenting) (criticizing the removal, by leading industrial states, of limitations upon the size and powers of business corporations and remarking that "[t]he race was one not of diligence but of laxity").

15. *A. L. A. Schechter Poultry Corp. v. United States*, 295 U.S. 495, 509 (1935) (argument for the United States) (defending National Industrial Recovery Act code of fair competition as eliminating the economic advantages enjoyed by states with more relaxed poultry standards).

16. *Hammer v. Dagenhart*, 247 U.S. 251, 273 (1918) (striking down a federal child labor law upon holding that the Commerce Clause did not grant Congress general authority to prevent possible unfair competition among the states by reason of one state's economic advantage over others); *Schechter Poultry Corp.*, 295 U.S. at 549-50 (striking down law providing for promulgation of national "fair codes of competition" upon holding, *inter alia*, that the authority vested by the Commerce Clause did not encompass preventing commerce from being diverted from states with high labor standards).

the Court's hostility to the New Deal subsided, however, so did its rejection of the race-to-the-bottom rationale.¹⁷ The Court has since argued that the prevention of destructive competition was the traditional role of congressional action under the Commerce Clause.¹⁸

The justification for federal regulation based upon a race-to-the-bottom rationale remains somewhat distinct from the traditional justification for the exercise of Congress's Commerce Clause authority. Whereas the traditional justification looks to the interstate effects of an intrastate activity, the race-to-the-bottom rationale looks to the local effects of interstate competition.¹⁹ Nevertheless, the current constitutional validity of congressional power to prevent a state regulatory race-to-the-bottom can be justified on at least two grounds. First, it appears that the framers intended that the Commerce Clause power extend to the regulation of commercial transactions where such regulation is in the general interest of the Union as a whole and where individual state action would be ineffective.²⁰ Interpreted thus, the

17. See *United States v. Darby*, 312 U.S. 100, 117, 122 (1941) (overruling *Hammer* and upholding the Fair Labor Standards Act of 1938 on the grounds that the Act prevents the "spread of substandard labor conditions through the use of the facilities of interstate commerce for competition by the goods so produced with those produced under the prescribed or better labor conditions . . .").

18. *Hodel v. Virginia Surface Mining and Reclamation Ass'n*, 452 U.S. 264, 282 (1981) (upholding nationwide surface mining and reclamation standards as necessary to prevent interstate competition among sellers of coal from undermining the ability of states individually to maintain adequate coal mining standards on the basis that "[t]he prevention of this sort of destructive interstate competition is a traditional role for congressional action under the Commerce Clause").

19. See, e.g., *Wickard v. Filburn*, 317 U.S. 111, 125 (1942) (holding that Congress may regulate any intrastate activity that has a substantial cumulative effect on interstate commerce).

20. The strongest evidence of this "framer's intent" argument rests upon the adoption, at the Constitutional Convention of 1787, of a resolution concerning the scope of the powers of the new national legislature and the relation of this resolution to the Convention's adoption of the Constitution's Commerce Clause. According to this resolution, originally drafted by Governor Randolph of Virginia, the delegates resolved that the new Congress ought "2. . . . to legislate in all cases for the general interests of the Union, and 3. also in those to which the states are separately incompetent." MADISON'S DEBATES 389-90. Upon amendment by a Convention Committee, and without challenge or debate by the delegates, this resolution became Art. 1, § 8 of the Constitution, the Commerce Clause. *Id.* at 475. See Robert L. Stern, *That Commerce Which Concerns More States Than One*, 47 HARV. L. REV. 1335, 1338 (1934) (recounting the above Constitutional history to argue that Congress had the power to redress the economic difficulties besetting the Depression era). *But cf.* Jacques LeBoeuf, *The Economics of Federalism and the Proper Scope of the Federal Commerce Power*, 31 SAN DIEGO L. REV. 555, 602-07 (1994) (recounting the same history of the Commerce Clause's origins but concluding somewhat paradoxically that, because the framers intended the Clause as a negative power to prevent state abuses as opposed to an affirmative grant of power to the federal government to regulate for the general welfare, the Commerce Clause is limited to regulating state externalities).

Commerce Clause power would seem to include the prevention of reductions in social welfare resulting from individually-rational state regulatory determinations. Second, *stare decisis* supports the Court's continued adherence to prior precedents upholding the race-to-the-bottom rationale for federal regulation.²¹ And indeed, in the course of the last fifty years, the need to prevent the states from engaging in a welfare-reducing competition to deregulate in order to attract industry has been used repeatedly to support the tremendous growth of federal control in areas of labor law,²² corporate law,²³ and environmental law,²⁴ among others.

21. *Cf.* *Planned Parenthood of Southeastern Pa. v. Casey*, 505 U.S. 833, 854-55 (1992) (discussing the importance of *stare decisis* to the rule of law underlying the Constitution).

22. *See, e.g.*, Occupational Safety and Health Act, 29 U.S.C. § 651-678 (1994); Katherine Van Wezel Stone, *Labor and the Global Economy: Four Approaches to Transnational Labor Regulation*, 16 MICH. J. INT'L L. 987, 992-94, 1021-27 (1995) (comparing the effectiveness of domestic and international regulatory approaches to the race-to-the-bottom in labor standards); SUSAN ROSE-ACKERMAN, *RETHINKING THE PROGRESSIVE AGENDA* 85-90 (1992) (listing the prevention of destructive interjurisdictional competition as a policy justification for the Occupational Safety and Health Act).

23. *See, e.g.*, William L. Cary, *Federalism and Corporate Law: Reflections upon Delaware*, 83 YALE L.J. 663 (1974) (discussing the need for federal corporate law); Lucian Arye Bebchuk, *Federalism and the Corporation: The Desirable Limits on State Competition in Corporate Law*, 105 HARV. L. REV. 1437 (1992) (advocating for an expansion of federal regulation to counter the failures of corporate market competition); Roberta Romano, *Competition for Corporate Charters and the Lessons of Takeover Statutes*, 61 FORDHAM L. REV. 843 (1993) (noting that while federalism provides a safety net against self-serving management decisions, the current state-based system of incorporation is preferable to a national regime); John C. Coffee, Jr., *The Future of Corporate Federalism: State Competition and the New Trend Toward De Facto Federal Minimum Standards*, 8 CARDOZO L. REV. 759 (1987) (proposing that federal minimum standards are affecting corporations because of a general heightened concern for fiduciary standards); David Charny, *Competition Among Jurisdictions in Formulating Corporate Law Rules: An American Perspective on the "Race to the Bottom" in the European Communities*, 32 HARV. INT'L L.J. 423, 430-31 (1991) (discussing interjurisdictional competition for incorporations).

24. It should be noted, that with the recent lowering of barriers to international trade resulting from the Uruguay Round of the General Agreements on Tariffs and Trade and the North American Free Trade Agreement, much of the concern over a domestic race-to-the-bottom has shifted to a concern about a global "race-to-the-bottom" in which developed nations relax their labor and environmental standards and enforcement efforts in order to compete for industries that might otherwise locate in developing countries with less stringent regulations. *See, e.g.*, Frederick M. Abbott, *International Trade and Social Welfare: The New Agenda*, 17 COMP. LAB. L. 338, 368 (1996) (Introductory Remarks) (commenting that the largest "race-to-the-bottom" threat concerns the relaxation of environmental and labor law standards by developed nations in response to competition by developing nations); Senator John F. Kerry, *Trade and Environment: Charting a New Course*, 27 CORNELL INT'L L.J. 447, 452 (1994) (outlining the risk of an international race-to-the-bottom).

B. Terminology of the Race-to-the-Bottom Debate and Significance to Current Federal Environmental Laws

It is generally acknowledged that competition from other states for the location of industry causes states to relax their environmental standards.²⁵ For many scholars and policy makers, the simple lowering of state environmental standards constitutes a “race-to-the-bottom.” For purposes of the current scholarly debate, however, a “race-to-the-bottom” refers in particular to a lowering of state environmental standards that also occasions a lowering in net social welfare.²⁶ In arguing that there is *no* “race-to-the-bottom,” Professor Revesz is claiming not that states fail to relax their standards as a result of interstate competition, but that the relaxation of standards does not occasion any lessening of social welfare.²⁷ This could be because standards were too high in the first place—i.e., lowered standards occasion sufficient additional economic benefits to more than “cancel out” the welfare losses that follow from lowered environmental quality.

The distinction between a simple lowering of state environmental quality and a lowering of environmental quality that also lowers social welfare is important, not only to an understanding of the terminology of the current debate over the existence of the race-to-the-bottom, but also to the significance of the debate to the justifiability of the federal environmental laws currently on the books. The revisionists’ critique extends *only* to federal regulation that is justified solely on the basis that it corrects for the suboptimal state environmental standards resulting from interstate competition. Thus, the recent critique has no bearing upon federal standards deemed necessary to prevent *any* lowering of state environmental standards caused by interstate competi-

25. In addition to revising existing standards to make them less stringent, “relaxation” in this context also refers to the failure to adopt an environmental standard in the first place, or to delay the adoption of a standard. Given that the existence of lowered standards in response to interstate competition rests upon anecdotes rather than a systematic study, it is in some sense surprising that both policy makers and scholars alike assume that the relaxation of standards is the natural state response to interstate competition. In Part IV of this Article, I present data from a survey which tested this presumption. *See infra* text accompanying notes 181-221.

26. According to Professor Revesz:

[A] race-to-the-bottom requires not just the existence of a “race,” but also that the race be “to the bottom.” This latter element requires, first, that a competitive jurisdiction adopt a less stringent pollution control standard than an otherwise identical island jurisdiction would have adopted. Second, it requires that the less stringent standards that emerge from the competitive process be socially undesirable.

Revesz, *supra* note 1, at 1219.

27. *Id.* at 1241.

tion, *regardless* of the impact upon total social welfare.²⁸ Moreover, as will be discussed in the following section, the race-to-the-bottom is only one of several justifications for federal environmental law. To the extent that any current or future law is founded on some other basis, the justifiability of the law is unaffected by the current debate.

C. The Role of the Race-To-the-Bottom Justification in the Development of Federal Environmental Law

Consistent with the nation's strong tradition of localism, environmental protection was traditionally the domain of states, municipalities, and counties.²⁹ As a consequence, the burden has rested upon those advocating federal displacement of local authority to justify the basis for federal involvement in environmental policy-making. The "nationalization" of environmental law began in the 1970s with Congress's enactment of several major federal pollution control statutes.³⁰ The regulatory approaches employed demonstrate that Congress considered *federal* involvement in environmental regulation justified and, indeed necessary, because of at least four distinct needs: (1) the need to reduce interstate spillovers; (2) the need to reap the benefits of centralized administration, including the economies of scale that can be achieved in areas vital to environmental protection such as scientific expertise; (3) the need to guarantee a minimum standard of human health and ecological integrity as a right of all Americans by ensuring a minimum level of environmental quality everywhere in the

28. For example, like many Americans, congressional policy-makers might believe that environmental and economic goods are nontransferable and hence that a loss of environmental quality or irreplaceable natural resources or species cannot be "made up for" *regardless* of the number of jobs or other remunerative benefits such a loss occasions. Cf. Mark Sagoff, *Economic Theory and Environmental Law*, 79 MICH. L. REV. 1393, 1411-12 (1981) (basing degree of environmental protection upon "willingness to pay" constitutes a "category-mistake" since public preferences for environmental quality "do not involve desires or wants, but opinions or beliefs").

29. See, e.g., PETER S. MENELL & RICHARD B. STEWART, ENVIRONMENTAL LAW AND POLICY 241 (1994) ("Legislative and administrative control of air pollution was long the preserve of municipalities, counties, and states."); PERCIVAL ET AL., *supra* note 5, at 104-05 (discussing that federal programs during 1950s and 1960s were premised on notion that environmental problems were the responsibility of state and local government); David L. Markell, *States as Innovators: It's Time for a New Look at Our "Laboratories of Democracy in the Effort to Improve Our Approach to Environmental Regulation,"* 58 ALBANY L. REV. 347, 356 (1994) (listing several reasons state and local laws are primary sources for new environmental legislation).

30. See, e.g., National Environmental Policy Act, 42 U.S.C. §§ 4321-4370d (1994); Clean Water Act, 33 U.S.C. §§ 1251-1387 (1994); Clean Air Act, 42 U.S.C. §§ 7401-7671q (1994); Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k (1994); Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464 (1994).

nation, and (4) the need to prevent a lowering of environmental standards resulting from interstate competition for industry, including (but not limited to) competition based on the advantage of geographic location. I list this last purpose of federal regulation separately because it has sometimes been referred to as a need to prevent a "race-to-the-bottom." I do not use that term here, however, because, as I argue below, Congress's intent in blocking interstate competition over environmental standards was clearly broader and more complex than just preventing economic inefficiency (which is an essential component of the definition of the term "race to the bottom" as used in this Article). Although Congress was clearly concerned, in part, about the possibility of competition-induced inefficiencies (the classic race to the bottom), the record shows that in the formulation of legal approaches to standard-setting and enforcement mechanisms, this was inextricably linked to concerns about preserving environmental rights to minimum levels of environmental quality that go beyond simple economic considerations. The following section discusses each of the four rationales for federal environmental regulation in more detail.

(1) Prevention of Interstate Spillovers

The interstate spillover rationale is the classic economic efficiency argument that federal intervention is necessary to prevent the environmental, social, and economic losses that accrue when air and water pollution originating in one state are carried by natural forces into other states. States from which the pollution originates have little incentive to curb interstate pollution because they benefit from having the harmful effects of pollution externalized while they enjoy the economic benefits of the polluting activity.³¹ Bargaining between the source state and the injured states to minimize losses occasioned by the spillovers is costly, and the position of the injured states may have

31. For example, during the early 1970s, many states allowed industries to externalize air pollution through the use of tall smokestacks that disperse the pollutants high into the atmosphere, exporting them to other states and to Canada. 123 CONG. REC. 18,026 (1977) (remarks of Sen. Muskie). Congress intervened to prevent such spillovers in 1977 by amending the Clean Air Act to remove industry's incentive to export pollution. 42 U.S.C. § 7423 (1994) (prohibiting states from taking stack-height and dispersion techniques into account in calculating emission limits). After several court challenges, EPA regulations implementing § 123 of the Clean Air Act as amended were finally upheld by the District of Columbia Court of Appeals. *Natural Resources Defense Council v. Thomas*, 838 F.2d 1224 (D.C. Cir. 1988), *cert. denied*, 488 U.S. 888 (1988); *Sierra Club v. EPA*, 719 F.2d 436 (D.C. Cir. 1983), *cert. denied*, 468 U.S. 1204 (1984).

been weakened by the dispersion of the pollutants.³² The federal government, however, which was created in part to resolve interstate conflicts, is presumably a neutral party that can regulate to eliminate the more harmful forms of interstate spillovers.³³ While concern over interstate spillovers explains much of the earliest federal pollution laws,³⁴ it is responsible for only a small portion of the current structure of federal environmental regulation.³⁵ Until the 1990 Amendments to the Clean Air Act, for example, only three provisions of that Act directly addressed interstate externalities.³⁶ In creating an interstate transport commission to deal with common pollution problems of the East Coast,³⁷ and a tradable permit scheme to control the interstate pollution problems of acid rain,³⁸ the 1990 Amendments added significantly to the Air Act's arsenal for combating interstate pollution. While the jury is still out on the efficacy of these latest additions to the Act, the pre-1990 Amendments are generally considered to have been ineffective in preventing harmful spillovers.³⁹ Similarly,

32. See *Pyramids*, *supra* note 2, at 1216. According to the famous Coase theorem, in the absence of transaction costs, states would achieve an efficient allocation of pollution through bargaining amongst themselves. R. H. Coase, *The Problem of Social Cost*, 3 J. L. & ECON. 1, 5-7 (1960). Of course, as Coase well understood, transaction costs are *always* present, and are often high enough in many important instances to prevent bargaining alone from leading to efficient pollution levels. *Id.*

33. *Id.*; see also MENELL & STEWART, *supra* note 29, at 246; Roger H. Gordon, *An Optimal Taxation Approach to Fiscal Federalism*, 98 Q. J. OF ECON. 567 (1983) (exploring the federal government's role in reducing problems of externalities caused by individual state decisionmaking).

34. See, e.g., Clean Air Act, Pub. L. No. 88-206, 77 Stat. 392 (1963) (authorizing the Secretary of Health, Education and Welfare to investigate interstate air pollution problems and make recommendations for action); Water Pollution Control Act of 1948, 62 Stat. 1155 (1948) (authorizing federal research programs to address interstate water pollution).

35. See Revesz, *supra* note 1, at 1225 ("By far the bulk of the provisions of the Clean Air Act, however, are wholly unrelated to the control of interstate externalities."); John P. Dwyer, *The Practice of Federalism Under the Clean Air Act*, 54 MD. L. REV. 1183, 1220 (1995) ("Interstate air pollution, however, was not a significant concern of the Congress that enacted the 1970 Clean Air Act.").

36. The three provisions were section 110(a)(2)(D), 42 U.S.C. § 7410(a)(2)(D) (1994), which requires state implementation plans to prohibit facilities within the state from causing a violation of another state's air quality regulations; section 126, 42 U.S.C. § 7426 (1994), which provides for a remedy to states who are injured through a violation of section 110(a)(2)(D); and section 123, 42 U.S.C. § 7423 (1994), which prohibits states from allowing facilities to meet the requirements of a state implementation plan through the installation of a "tall stack" which can effectively disperse pollutants far distances.

37. 42 U.S.C. §§ 7506a, 7511c (Supp. 1994).

38. 42 U.S.C. §§ 7651-7651o (1994).

39. See Richard Revesz, *Federalism and Interstate Environmental Externalities*, 144 U. PA. L. REV. 2341 (1996); Kay M. Crider & Timothy Talkington, Comment, *Interstate Air Pollution: Over a Decade of Ineffective Regulation*, 64 CHI.-KENT L. REV. 619 (1988); Com-

only a few provisions in the Clean Water Act directly address interstate externalities.⁴⁰ Finally, the interstate spillovers rationale cannot explain federal laws such as the Safe Drinking Water Act,⁴¹ which protects a resource—public water systems—that is almost entirely local in nature.⁴²

(2) *Realization of Efficiency-Related Benefits of Centralized Administration*

Congress also saw federal involvement in environmental regulation as necessary to realize certain benefits for both states and regulated entities that accrue from centralized administration of environmental law. One such benefit is realization of economies of scale in scientific research. The federal government is in a unique position to foster and disseminate the results of scientific research on the effects of pollution and the discovery of pollution control technologies.⁴³ Arguably, it makes little sense for each of the fifty states to

ment, *Interstate Air Pollution Abatement and the Clean Air Act Amendments of 1990: Balancing Interests*, 62 U. COLO. L. REV. 957, 960-71 (1991).

40. These provisions are section 402(b), 33 U.S.C. § 1342(b) (1994), which requires, as a condition of receiving delegated authority to run a pollutant discharge permit program, that states ensure that other states whose waters may be affected by a water pollutant discharge permit issued by them receive notice of, and an opportunity to provide comments on, the permit; section 402(d), 33 U.S.C. § 1342(d) (1994), which provides the Administrator the authority to veto a permit issued by a delegated state based upon its effect upon the waters of another state; and section 401(a)(2), 33 U.S.C. § 1341(a)(2) (1994), which allows for hearings in which the issuance of a federal permit may be denied where the discharge would violate applicable state water quality standards. See *Arkansas v. Oklahoma*, 112 S. Ct. 1046 (1992) (upholding the EPA's interpretation that § 401(a)(2) prohibits the issuance of a Federal Clean Water Act permit unless compliance with state water quality standards can be assured but holding that whether the state standards will be complied with is up to EPA's interpretation, as opposed to the interpretation of the state whose standards are at issue).

41. 42 U.S.C. §§ 300f-300j-26 (1994).

42. See David H. Getches, *Groundwater Quality Protection: Setting a National Goal for State and Federal Programs*, 65 CHI.-KENT L. REV. 387 (1989).

43. See, e.g., Clean Air Act § 108, 42 U.S.C. § 7408 (requiring EPA to issue air quality criteria for air pollutants which "shall accurately reflect the latest scientific knowledge"); 33 U.S.C. § 1314(a)(1) (requiring the EPA Administrator to issue "criteria for water quality accurately reflecting the latest scientific knowledge"). Federally promulgated water quality criteria guidance is used by states in developing state water quality standards and by the EPA in approving or disapproving the state's water quality standards. EPA wavers in the degree to which it considers its scientific guidance "binding" upon the scientific judgments of state officials that go into regulatory decisions. Compare *Mississippi Comm'n on Natural Resources v. Costle*, 625 F.2d 1269 (5th Cir. 1980) (EPA disapproved a state water quality standard for dissolved oxygen because it failed to comply with EPA's recommended criteria) with *Natural Resources Defense Council v. EPA*, 16 F.3d 1395 (4th Cir. 1993) (EPA approved a state water quality standard for dioxin approximately 10,000 times less protective than the standard recommended by EPA).

duplicate the research and data collection necessary to formulate scientifically-complex environmental standards.⁴⁴ Rather, it makes much more sense to vest this research role in a central authority who can then simply disseminate the information to the various state environmental agencies. The critique of the economies-of-scale rationale maintains that a federal government unfamiliar with local industries may be a less effective and efficient regulator than state agencies, and the creation of duplicative federal bureaucracies and mandates may multiply compliance, implementation, and confusion costs.⁴⁵ In any case, the economies-of-scale argument does not explain why the federal government is needed to develop binding environmental standards, rather than simply non-binding guidance documents.

A second efficiency-related benefit of centralized, as opposed to decentralized, administration of environmental law is the ability to lower the potential barriers to interstate trade that might otherwise be posed by non-uniform state product regulation. For example, Congress has preempted state vehicle emission standards and substituted in their place (with the exception of California) a nationally-uniform set of vehicle emission standards, thereby saving automobile manufacturers from having to comply with the emissions standards of fifty different states.⁴⁶ Congress has done the same with respect to other product standards, such as the wording of required warning labels of pesticides.⁴⁷

(3) *The Environmental Rights Argument*

The structure and legislative histories of the federal pollution laws indicate that Congress considered the guarantee of minimum levels of human health protection and environmental quality a preeminent value that must at times trump considerations of cost or economic efficiency. For instance, the "spine" of the Clean Air Act is minimum ambient air quality standards, applicable throughout the

44. See *Pyramids*, *supra* note 2, at 1213-15; Dwyer, *supra* note 35, at 1222.

45. For a revealing insight into just how massive the "confusion costs" of dual federal-state regulation can be, see Joshua D. Sarnoff, *Overcoming Uncooperative Federalism*, ___ ARIZ. L. REV. ___ (1996).

46. The Clean Air Act actually gives states a choice between adhering to the federal, EPA-promulgated vehicle emission standards, or California's more stringent vehicle emission standards. Under § 209 of the Clean Air Act, all state vehicle emission standards other than California's are preempted by federal vehicle emission standards. 42 U.S.C. § 7543. Notwithstanding § 209, under § 177 of the Act, 42 U.S.C. § 7507, states are authorized to enact vehicle emission standards identical to California's.

47. Federal Insecticide, Fungicide, and Rodenticide Act § 24, 7 U.S.C. § 136v(b) (1994).

United States, and which the EPA must establish on the basis of human health without regard to cost.⁴⁸ In many ways, Congress has treated minimum health and environmental protection as a fundamental human right.⁴⁹ A strong theory of individual rights would hold that rights-based arguments trump arguments based upon economic efficiency.⁵⁰ Thus, by affording environmental quality the status of a right, environmental protection is freed from what some would consider a diversionary chore—that of economic justification.⁵¹ Although some belittle the force of the rights-based argument in environmental law by pointing to the unequal environmental quality authorized by

48. Clean Air Act, § 109, 42 U.S.C. § 7409; *see* *Lead Indus. Ass'n v. EPA*, 647 F.2d 1130, 1150 (D.C. Cir. 1980) (holding that the Administrator may not consider economic and technological feasibility when establishing national ambient air quality standards). The very cost-oblivious nature of the national ambient air quality standards is a source of a brewing controversy over the EPA's proposal to tighten the existing standards for particulates and ozone. 61 Fed. Reg. 65716 (1996) (proposed revised ozone standard); 61 Fed. Reg. 65638 (1996) (proposed revised particulate matter standard). The EPA claims that the revised standards will prevent 40,000 premature deaths and 250,000 cases of serious respiratory problems in children each year. Barred by court precedents from challenging the rules on cost grounds, industry opponents are instead questioning the validity of health studies being used by the agency to support the new standards and pressuring Congress to amend the Clean Air Act to require the agency to consider costs in promulgating ambient air quality standards. *See* Margaret Kriz, *Heavy Breathing*, 28 NAT'L J. 8, 8-12 (1997).

49. *See* Merrill, *supra* note 3, at 486; MENELL & STEWART, *supra* note 29, at 247.

50. According to the theory of individual rights espoused by Ronald Dworkin, for example, some rights of individuals against the state "are prior to the rights created by explicit legislation." RONALD DWORIN, *TAKING RIGHTS SERIOUSLY* x-xi (1978). Thus, a rights-based argument would trump an argument designed to achieve efficiency since economic utilitarianism is part of a general theory that relies upon legal positivism, which holds that law is a product of explicit social practice or institutional decision.

51. Sentiment that the right to the environment ought to be considered a human right, is especially prevalent in international environmental law. *See* W. PAUL GORMLEY, *HUMAN RIGHTS AND THE ENVIRONMENT: THE NEED FOR INTERNATIONAL COOPERATION* 96 (1976) (quoting 1972 Stockholm Declaration on the Human Environment (stating "[m]an has the fundamental right to freedom, equality, and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being. . .")); R.S. Pathak, *The Human Rights System as a Conceptual Framework for Environmental Law*, in *ENVIRONMENTAL CHANGE AND INTERNATIONAL LAW: NEW CHALLENGES AND DIMENSIONS* 205 (Edith Brown Weiss ed., 1992); Dinah Shelton, *Human Rights, Environmental Rights, and the Right to Environment*, 28 STAN. J. INT'L L. 103 (1991). *But cf.* Gunther Handl, *Human Rights and Protection of the Environment: A Mildly "Revisionist" View*, in *HUMAN RIGHTS, SUSTAINABLE DEVELOPMENT AND THE ENVIRONMENT* 117-20 (A. Cancado Trindade ed., Instituto Interamericano de Derechos Humanos, San Jose 1992), *reprinted in*, ANTHONY D'AMATO & KIRSTEN ENGEL, *INTERNATIONAL LAW ANTHOLOGY* 68-69 (1995) (arguing that conceptualizing environmental protection as a generic human right "reflects a maximalist position that offers little prospect of becoming reality in the near term while its propagation diverts attention and efforts from other more pressing and promising environmental and human rights objectives").

federal laws actually enacted by Congress,⁵² absolute equality is not necessary to fulfill a minimal rights promise and thus, federally guaranteed minimum levels are not necessarily inconsistent with the rights-based approach.

While federal regulation is obviously superior to state regulation when the goal is the prevention of interstate spillovers or the realization of economies of scale, selection of federal controls to guarantee minimum levels of environmental quality seem a less obvious choice: why were states not considered competent to protect the environmental quality rights of their own citizens? According to the legislative histories of the Clean Air Act of 1970 and the Federal Water Pollution Control Act of 1972, Congress thought the answer obvious: states simply could not be trusted to impose upon industry the costs that would be necessary to adequately protect human health and the environment. To Congress, a history of state reticence to impose controls under prior federal laws demonstrated that states were too afraid that they would lose existing or new industries to other states to impose stringent controls or take an aggressive stance on environmental enforcement.⁵³ Consequently, if human health and the environment were to receive adequate protection, the job must fall to the federal government which is comparatively immune to such pressures. The legislative history of the Clean Air Act, for instance, is marked by comments such as the following, appearing in the House Committee Report:

The promulgation of Federal emission standards for new sources . . . will preclude efforts on the part of States to compete with each other in trying to attract new plants and facilities without assuring adequate control of extra-hazardous or large scale emissions therefrom.⁵⁴

52. Merrill, *supra* note 3, at 488 (“[T]he rights argument would generate a regime that tries to equalize environmental quality across jurisdictions.”). The most telling example of this is the Clean Water Act, which, despite the fishable-swimmable goal, has always allowed for states to designate the use of a water body “industrial” and thereby never achieve fishable-swimmable quality.

53. See, e.g., S. Rep. No. 92-414, 92nd Cong., 2d Sess. (1971), *reprinted in* 1972 U.S.C.C.A.N. 3671 (“The task of setting water quality standards, assigned to the States by the 1965 legislation, is lagging. More than 4 years after the deadline for submission of standards, only a little more than half of the States have fully approved standards.”).

54. H. R. Rep. No. 1146, 91st Cong., 2d Sess., 3 (1970). See also 116 CONG. REC. 33,115 (1970) (comments of Sen. Prouty) (“To be sure, minimum Federal standards are a must, as they free the 50 States from the necessity of competing for business by lowering their standards.”); *id.* at 33,116 (remarks of Sen. Cooper) (federal nationally-uniform new source performance standards will “eliminate a large element of ‘forum shopping’ that is possible if new facilities are not required to meet the level of pollution control.”); *id.* at 19,209 (remarks of Sen. Jarman) (“The promulgation of Federal emission standards for

Similarly, it was concern over the apparent inability of states—given interstate competition for mining business—to adequately protect the environment from acid mine drainage and other hazards of mining that was a primary motivation for federal regulation of the environmental effects of the mining industry.⁵⁵

Federal environmental laws were designed to capitalize upon the powers of state government while, at the same time, to preempt the states as the primary standard-setters in order to circumvent the perceived deleterious effects of interstate competition. Thus, many federal environmental statutes impose minimum environmental standards that preempt less stringent state standards.⁵⁶ In essence, the federal government sets a “floor,” below which state standards cannot sink. Significantly, few federal laws impose a “ceiling” preventing states from enacting more stringent laws, demonstrating that Congress’s concern was with lax state standards, rather than with more strict state standards.⁵⁷ This feature of environmental law supports

new sources in the aforementioned categories will preclude efforts on the part of States to compete with each other in trying to attract new plants and facilities without assuring adequate control of extra hazardous or large-scale emissions therefrom.”); *id.* at 19,213 (remarks of Rep. Preyer) (“But if we do not have national standards, we find what has happened is that States begin to bid against each other to attract polluting industries.”); *id.* at 19,218 (“National standards of pollution control would prevent another State from attracting any industries because of a greater pollution tolerance. Such competition is unfair and against the public interest.”).

55. 30 U.S.C. §§ 1201-1328 (1994). *See* 30 U.S.C. § 1201(g) (1994) (finding that nationwide “surface mining and reclamation standards are essential in order to insure that competition in interstate commerce among sellers of coal produced in different States will not be used to undermine the ability of the several states to improve and maintain adequate standards on coal mining operations within their borders”). *See* *Hodel v. Virginia Surface Mining & Reclamation Ass’n*, 452 U.S. 264, 285 (1981) (holding that the Surface Mining & Reclamation Act of 1977 is constitutional).

56. *See, e.g.*, Federal Water Pollution Control Act, 42 U.S.C. § 1370 (1994) (retaining state authority to adopt and enforce any effluent limitation, pretreatment standard or standard of performance except those less stringent than those promulgated by EPA); Clean Air Act, 42 U.S.C. § 7416 (1994) (same with respect to any standard or requirement with respect to the emission, control, or abatement of air pollution); Solid Waste Disposal Act, 42 U.S.C. § 6929 (1994) (prohibiting any state from imposing any requirement less stringent than those authorized under the Act); Surface Mining Control and Reclamation Act, 30 U.S.C. § 1254(g) (1994) (preempting state laws regulating surface mining and reclamation operations where a federal program has been promulgated for a state and insofar as the state law interferes with the federal program).

57. There are a few rare exceptions, however, such as the standards for automobile emissions, the labeling of pesticides, and the requirements for testing and manufacturing toxic chemicals, each of which preempt all state standards or preempt any state standard not identical to the federal standard. Congress has required uniformity in federal and state law, rather than just preempting less stringent state standards, where differing state laws would hinder the manufacture or distribution of nationally distributed products such as automobiles and pesticides. *See, e.g.*, Clean Air Act, 42 U.S.C. §§ 7507, 7543 (1994) (pre-

the environmental rights-based interpretation of the law's origin, but not the economic efficiency rationale. If a right to some minimum level of quality is the concern, establishing a floor is sufficient to address that concern; if economic inefficiencies are the problem, however, standards that are too stringent are just as worrisome as those that are too lax.

(4) *Prevention of Interstate Competition Via Environmental Standards*

A fourth purpose of federal environmental laws is to reduce the significance of geographical location to the level and cost of required pollution controls. The major federal pollution control statutes mitigate the significance of location in a variety of ways, the most common of which is to require that plant emission or effluent limits be established according to federally established uniform technology-based standards by industrial category. Uniform technology standards require that all plants within a particular industrial category meet emissions limits established by EPA according to the emission reductions that can be met through the application of the "best available technology," or the "maximum achievable control technology" for that source. The Clean Air Act relies upon uniform technology standards in its standards for new sources⁵⁸ and, since the 1990 Amendments, standards for emissions of toxic pollutants.⁵⁹ The cornerstone of the Clean Water Act is the requirement that all "point source" discharges conform to nationally-uniform technology standards established by the EPA by industrial category.⁶⁰ Similarly, under amendments to the Resource Conservation and Recovery Act of 1976, hazardous waste must be pretreated to uniform technological standards prior to being land-disposed.⁶¹

Nationally uniform environmental standards appear to have been Congress's response to several different perceived problems. On the

empting all state vehicle emissions except California's standards and standards adopted by other states that are identical to California's standards); Toxic Substances Control Act, 15 U.S.C. § 2617 (1994) (prohibiting any state law for the testing of a chemical substance or mixture, and prohibiting any state law governing the manufacture of hazardous chemicals other than those identical to the federal law or one prohibiting the use of the chemical within the state); Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. § 136v (1994) (prohibiting states from imposing any requirements for the labeling or packaging in addition to or different from those required by EPA under the Act).

58. 42 U.S.C. § 7411 (1994).

59. 42 U.S.C. § 7412 (Supp. 1994).

60. 33 U.S.C. § 1342 (1994).

61. 42 U.S.C. § 6924(d)-(m) (1994) (banning the land disposal of hazardous waste that fails to meet pretreatment standards or qualifies for a capacity or "no migration" variance).

practical side, uniform emissions limits based upon technological achievability were reliable and enforceable, in contrast to limits based upon the perceived assimilative capacities of the natural environment. The difficulties of relying upon models to derive site-specific effluent limits for industry had paralyzed the pre-1972 water pollution effort, for example.⁶²

A second benefit of nationally uniform standards is that they create a "level playing field" for geographically scattered industries and consequently reduce interstate competition in environmental standard-setting. Because standards are nationally uniform by industrial category, a steel plant sited on Puget Sound is subject to the same level of controls as a steel plant located on a Virginia stream; the steel plant in Washington does not gain a market advantage over the Virginia plant as a result of environmental compliance costs and Virginia is freed from the worry that its plant will relocate to Washington on the basis of more lax standards alone. An early effort to take the pollution-assimilation capacity of the receiving waters into account when establishing the new technology based limits was quickly rebuffed by a federal appeals court.⁶³

The prevention of significant deterioration (PSD) program, a major modification of the 1977 amendments to the Clean Air act,⁶⁴ can

62. See S. Rep. 92-414, 92d Cong., 2d Sess. (1971), reprinted in 1972 U.S.C.C.A.N. 3675 ("The Committee adopted this substantial change [switch from state-issued effluent limits based upon water quality standards to nationally uniform effluent limits based upon best technology standards] because of the great difficulty associated with establishing reliable and enforceable precise effluent limitations on the basis of a given stream quality. Water quality standards, in addition to their deficiencies in relying on the assimilative capacity of receiving waters, often cannot be translated into effluent limitations—defendable in court tests, because of the imprecision of models for water quality and the effects of effluents in most waters."). See also Oliver A. Houck, *The Regulation of Toxic Pollutants Under the Clean Water Act*, 21 ENV'T'L L. REP. 10528, 10531 (1991) ("What is remarkable about the Federal Water Pollution Control Act Amendments of 1972 is . . . how well informed Congress was about the failures of the water quality standards, and how united and emphatic Congress was in rejecting them as a basis for upgrading the nation's waters.").

63. *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1041-43 (D.C. Cir. 1978).

64. Clean Air Act, 42 U.S.C. §§ 7470-7492 (1994). PSD requirements were first issued in the form of administrative regulations after the Sierra Club filed a suit against the EPA in which it successfully argued that the Administrator's approval of state implementation plans allowing for the degradation of clean air areas violated the Clean Air Act's stated purpose to "protect and enhance the quality of the Nation's air." *Sierra Club v. Ruckelshaus*, 344 F. Supp. 253, 255 (D.D.C. 1972), *aff'd by an equally divided Court*, 412 U.S. 541 (1973). In December 1974, the EPA promulgated regulations that established increments in pollution concentrations over existing levels that operated as the maximum extent to which a clean air area could pollute the air and maintain compliance under the Clean Air Act. Congress codified and revised the EPA's regulations in the 1977 amendments to the Clean Air Act.

be explained as an effort to deny industry any advantage to locating in unpolluted areas and hence to similarly reduce interstate competition. While the PSD program prevented the degradation of areas with air quality better than that mandated by the maximum ambient air quality standards, it also ensured a measure of equity among industries located in polluted and unpolluted states and among the states themselves. The congressional voting record on the PSD requirements shows that the provisions were supported by dirty air states that served to lose in the competition for industry in the absence of such amendments (northeastern and midwestern states), and opposed by states serving to gain in their absence (southern and western states). This demonstrates that passage of the requirements was at least somewhat motivated by a desire to eliminate locational competition.⁶⁵

(5) *Discussion*

Congress believed that states could not be trusted to achieve minimum levels of environmental quality because of the intense pressures they received from mobile industries to relax their environmental standards. Consequently, federal regulation was considered necessary not only to ensure a federal "floor" of minimum levels of environmental quality, but also to implement nationally-uniform industry-wide emission and effluent standards. By rendering environmental compliance costs nationally uniform across industrial categories, such technology-based standards would reduce the economic benefit of relocating to states that possess either geographic features that are actually capable of assimilating larger quantities of pollution or are governed by political administrations willing to say they do.

The federal laws and their legislative histories reveal that the effects of interstate competition upon state standard-setting is an important reason why Congress stepped up its involvement in environmental regulation during the 1970s. Nevertheless, Congress's primary concern was with the laxity of the state standards that resulted from interstate competition and not exclusively with the possible *economic inefficiency* of those state standards. Thus, the "race" which Congress intended to prevent through federal regulation was a race to low environmental quality, and not just a "race-to-the-bottom" as defined in this Article as a race to economic inefficiency.

65. See Peter B. Pashigian, *Environmental Regulation: Whose Self-Interests Are Being Protected?*, 23 *ECON. INQUIRY* 551 (1985).

Professors Revesz and Stewart have interpreted congressional intent to eliminate interstate competition in environmental standard-setting through preemptive minimum environmental quality standards and nationally-uniform technology standards as demonstrating Congress's intent to prevent economic inefficiency by eliminating suboptimally lax environmental standards.⁶⁶ Neither scholar presents evidence, however, that Congress's concern about interstate competition was limited to the *economic inefficiency* implications of that competition, as opposed to the threats to environmental rights of lax state standards. On the contrary, there is much to suggest that it was *not* economic inefficiency alone that Congress acted to prevent. In addition to the legislative history documenting Congress's concern with human health, the structure of federal regulation chosen by Congress is not such as to ensure economically efficient standards. As pointed out by Professor Revesz, minimum ambient air quality standards are unlikely to be optimal since the residents of different states might have varying preferences for environmental protection, some of which might be for lower levels of health protection.⁶⁷ Similarly, it is unlikely that Congress's concern was just economic efficiency when it enacted nationally uniform technology-based standards because *preventing* industries (and states) from capitalizing upon pollutant-assimilating geographic features actually *reduces* economic efficiency. Rather, it seems that Congress's intent was to preserve conceptions of fairness or justice that would be harmed if a state were allowed to fully use advantages conferred upon it by accidents of nature to obtain a competitive edge over other states.

Clearly, times have changed in the twenty-odd years since many of these laws were passed. Whether or not one agrees on the underlying rationales, it should be clear that "preventing an interstate competition-induced lowering of environmental standards" is not the same as "preventing a race-to-the-bottom" (at least as defined in this Article). I have argued that Congress intended, for a variety of reasons to

66. See Revesz, *supra* note 1, at 1226 ("Further evidence that the race-to-the-bottom rationale underlies much of the Clean Air Act comes from the statute's legislative history. For example, at the time that it considered the 1977 amendments to the Clean Air Act, Congress perceived the prospect of the interstate migration of industry in search of more permissive environmental standards as a serious threat . . ."); *Pyramids*, *supra* note 2, at 1212 ("The characteristic insistence in federal environmental legislation upon geographically uniform standards and controls strongly suggests that escape from the Tragedy of the Commons by reduction of transactions costs has been an important reason for such legislation.").

67. See Revesz, *supra* note 1, at 1226.

do the former, not just the latter. Revesz has carefully noted the distinction between the two, since failure to observe it has been the source of much confusion in the literature,⁶⁸ but then he (along with Stewart who preceded him) seems to contribute to the confusion by reading evidence that Congress intended to do the former as supporting the notion that its goal was the latter.⁶⁹

The above outline of the role of the race-to-the-bottom justification in federal environmental law should give some perspective to the current growing debate over what the role for economic efficiency arguments should be in state and federal environmental standard-setting. Because Congress enacted our current framework of environmental laws for purposes broader than preventing an economically inefficient race-to-the-bottom, the revisionists' questioning of the existence of an inefficient race-to-the-bottom should have little effect upon the validity of our current laws as originally conceived of by Congress. In other words, the current laws are not in place under "false pretenses." Congress knew what it was doing; and what it was doing was fulfilling valid purposes which included, but were broader than, preventing an economically inefficient race-to-the-bottom.

The historical record aside, the current prominence of economic efficiency rationales for federal regulation in general and environmental regulation in particular,⁷⁰ should nonetheless force us to examine very carefully the claim that a race-to-the-bottom inefficiency does not exist. Although I have argued that the alleged absence of such a race

68. *Id.* at 1219 ("Obviously, a race to the bottom requires not just the existence of a "race," but also that the race be "to the bottom." . . . [This] requires that the less stringent standards that emerge from the competitive process be socially undesirable."). *Id.* at 1219 n.23 ("The distinction between a race to less stringent standards and a race to lower levels of social welfare is not always well understood."); *Pyramids*, *supra* note 2, at 1212 n.67 (illustrating the effects of rationally informed emission limitations on state economies).

69. Revesz, *supra* note 1, at 1226-27; *Pyramids*, *supra* note 2, at 1212 n.67 (citing as evidence that the possibility that states might engage in a welfare-reducing "tragedy of the commons" prompted Congress to impose nationally uniform emission limitations for existing sources under the Clean Air Act, since such limitations "lessen the capacity of such areas to attract new industry while still complying with ambient standards").

70. See Executive Order 12291 (Reagan Administrative Executive Order requiring cost-benefit analysis for major agency regulations); Executive Order 12866 (Clinton Administration Executive Order requiring cost-benefit analysis of major agency regulations). The interest in economic efficiency of environmental regulations can be found in the emphasis upon market-based mechanisms of pollution control. See Clean Air Act Amendments of 1990, 42 U.S.C. §§ 7651(a)-(e) (establishing system of marketable permits for the emission of sulfur dioxide); Robert W. Hahn & Gordon L. Hester, *Marketable Permits: Lessons for Theory and Practice*, 16 *ECOLOGICAL L.Q.* 361 (1989); Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 *COLUM. J. ENVTL. L.* 171 (1988).

among states should pose no significant challenge to the existing structure of federal law (so long as its original rationales continue to be compelling), the fact is that efficiency justifications are likely to be increasingly sought by future congresses and administrations for environmental regulation. As a consequence, the rest of this Article will focus upon the question of whether such a race does, in fact, exist.

II. The Theoretical Debate: Does Interstate Competition Reduce or Enhance Welfare?

A. Theoretical Foundations for the Race-to-the-Bottom and the Revisionist Critique

The argument that interstate competition leads to a race-to-the-bottom and the revisionists' argument that it does not are both based on long-standing theoretical traditions. A principal argument for the existence of a race-to-the-bottom is based upon game theory, of which the classic Prisoner's Dilemma model is a simple but frequently cited example.⁷¹ According to this model, competition among a small number of players makes each player worse off than if he or she had not been a player in a game. The argument that interstate competition leads to socially-optimal environmental standards, on the other hand, is based upon competitive neoclassical economics, according to which competition among market participants leads to efficient outcomes for society as a whole.⁷²

Despite revisionist claims to the contrary,⁷³ the argument that interstate competition in environmental standard-setting triggers a race-

71. Commentators employing the Prisoner's Dilemma (or models similar to it) to explain the race-to-the-bottom include: MENELL & STEWART, *supra* note 29, at 246; Stewart, *supra* note 3, at 2058-59; James A. Brander, *Economic Policy Formation in a Federal State: A Game Theoretic Approach*, in INTERGOVERNMENTAL RELATIONS 33, 47-49 (Richard Simeon ed., 1985); Eli M. Noam, *Government Regulation of Business in a Federal State: Allocation of Power Under Deregulation*, 20 OSGOODE HALL L.J. 762, 767-72 (1982); Kathryn Harrison, *The Regulator's Dilemma: Regulation of Pulp Mill Effluents in the Canadian Federal State*, 29 CAN. J. POL. SCI. 469 (1996).

72. See Oates and Schwab, *supra* note 8, at 342.

73. Revesz, *supra* note 1, at 1244 ("[R]ace-to-the-bottom arguments in the environmental area have been made for the last two decades with essentially no theoretical foundation."); "There are no formal models supporting the proposition that competition among states creates a Prisoner's Dilemma in which states, contrary to their interests, compete for industry by offering progressively more lax standards." *Id.*

It [the legal literature] has not shown why when an island jurisdiction is placed in a competitive situation, it becomes a participant in a race-to-the-bottom. This part demonstrates that there is no support in the theoretical literature on interjurisdictional competition for the claim that without federal intervention there will be a race-to-the-bottom over environmental standards.

to-the-bottom is based upon a detailed theoretical literature. The Prisoner's Dilemma was applied to the generation of public goods as early as 1965 by Mancur Olson⁷⁴ and applied specifically to environmental problems in 1968 by Garrett Hardin (the "tragedy of the commons").⁷⁵ Many scholars have used a game-theoretic approach to model a race-to-the-bottom in interstate competition.⁷⁶ As stated recently, "[t]hese simple games therefore arguably provide sound theoretical basis for legal intervention."⁷⁷

The rejection of game theory in favor of neoclassical competitive economic models as the theoretical foundation for interstate competition contains a deeper irony, however. As discussed more fully below, game theory was invented fifty years ago to address shortcomings in traditional neoclassical economics, which could not handle situations in which market participants interacted strategically.⁷⁸ Thus, the revisionists' return to the neoclassical economic framework to understand interstate competition, a problem many theorists were already solving through the application of game theory, is, historically speaking, a conceptual step backward.

Id. at 1233

Revesz's claim for the theoretical vacuum underlying the race-to-the-bottom is still more puzzling given that Revesz actually constructs, in his article challenging the race-to-the-bottom thesis, a simple game-theoretic model illustrating how interstate competition might theoretically lead to a race-to-the-bottom. *Id.* at 1231 ("Thus, as a result of non-cooperative action, both states are made worse off—the race is, therefore, a race-to-the-bottom."). Revesz's purpose is to illustrate the approach he then goes on to oppose, but regardless, his model presents a theory that, if true, would show precisely why, in Revesz's words, "when an island jurisdiction is placed in competition . . . it becomes a participant in a race-to-the-bottom." *Id.* at 1233.

74. MANCUR OLSON, JR., *THE LOGIC OF COLLECTIVE ACTION* 22-36, 49-52 (1965).

75. Garrett Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243, 1244-45 (1968).

76. See, e.g., Brander, *supra* note 71, at 47-49 (using Prisoner's Dilemma to model a provincial rivalry in using tax and subsidy policy to influence firm location); Noam, *supra* note 71, at 767-69 (presenting a theoretical model in which regulation in one state affects the interests of groups in another state, triggering a "race-to-the-bottom"). Several more recent works, published after Revesz's article, model a race-to-the-bottom in state regulation using a game theoretic approach. See Harrison, *supra* note 71, at 473-78 (using the Prisoner's Dilemma and related models as the theoretical foundation for a race-to-the-bottom in environmental standard-setting among competing provinces); Jenna Bednar & William N. Eskridge, *Steadying the Court's "Unsteady Path": A Theory of Judicial Enforcement of Federalism*, 68 *S. CAL. L. REV.* 1447, 1470-75 (1995) (using the Prisoner's Dilemma as the theoretical construct for failures in federalism due to the existence of incentives to "cheat" on the federal arrangement through trade wars and the like that offer higher individual state payoffs than those that accrue from being a member of a federation).

77. BAIRD GERTNER PICKER, *GAME THEORY AND THE LAW* 188 (1994).

78. See *infra* text accompanying notes 89-96.

Inadequacies in the traditional neoclassical economic framework are reportedly what prompted John von Neumann and Oskar Morgenstern to write *Theory of Games and Economic Behavior*, the publication of which is generally considered to have given birth to modern game theory.⁷⁹ Some modern game theorists consider this book a “scathing critique” of neoclassical economics.⁸⁰ To von Neumann and Morgenstern, the first a mathematician and the second an economist, the assumptions of perfect competition were inappropriate in markets consisting of just a few participants.⁸¹ The two scholars instead believed that how any one participant acted where the total number of participants in the market was small would depend upon how that participant believed other participants would react to her actions.⁸² According to one contemporary game theorist, “[a] game is being played by a group of individuals whenever the fate of an individual in the group depends not only on his own actions but also on the actions of the rest of the individuals in the group.”⁸³ Von Neumann and Morgenstern put it this way:

79. JOHN VON NEUMANN & OSKAR MORGENSTERN, *THEORY OF GAMES AND ECONOMIC BEHAVIOR* (2d ed. 1947). Much work on strategic behavior preceded the publication of von Neumann and Morgenstern's book, however. Various aspects of strategic economic behavior were formulated by scholars such as Antoine-Augustin Cournot, Francis Ysidro Edgeworth, Frederick Zeuthen, and Emile Borel. However, *Theory of Games and Economic Behavior* “axiomatized” all of the relevant ideas of game theory, and provided a thorough discussion of zero-sum games. Philip Mirowski, *What Were von Neumann and Morgenstern Trying to Accomplish?*, in *TOWARD A HISTORY OF GAME THEORY* 114 (E. Roy Weintraub ed., 1992).

80. See Mirowski, *supra* note 79, at 136-37.

81. According to one of Morgenstern's students, “Morgenstern clearly saw the problem of strategic interaction among economic agents as the central problem and the individual maximizing model of neoclassical economics as an inadequate representation of it In order for an agent to decide how to behave rationally in [certain] circumstances, that agent must know how others are expected to behave, but these actions involve a similar expectation on the part of others.” Andrew Schotter, *Oskar Morgenstern's Contribution to the Development of the Theory of Games*, in *TOWARD A HISTORY OF GAME THEORY* 97 (E. Roy Weintraub ed., 1992). See also Mirowski, *supra* note 79, at 130-31. It has been argued that it was the anti-neoclassical message of *Theory of Games and Economic Behavior* that retarded its acceptance, and with it the development of the field of game theory. See E. Roy Weintraub, *Introduction*, in *TOWARD A HISTORY OF GAME THEORY* 9-10 (E. Roy Weintraub ed., 1992).

82. SHAUN P. HARGREAVES HEAP & YANIS VAROUFAKIS, *GAME THEORY: A CRITICAL INTRODUCTION* 2 (1995).

83. KEN BINMORE, *ESSAYS ON THE FOUNDATIONS OF GAME THEORY* 1 (1990). This definition is in fact narrower than that given by the founders of game theory, John von Neumann and Oskar Morgenstern, who defined a game as “any interaction between agents that is governed by a set of rules specifying the possible moves for each participant and a set of outcomes for each possible combination of moves.” VON NEUMANN & MORGENSTERN, *supra* note 79.

The fact that every participant is influenced by the anticipated reactions of the others to his own measures, and that this is true for each of the participants, is most strikingly the crux of the matter (as far as the sellers are concerned) in the classical problems of duopoly, oligopoly, etc. When the number of participants becomes really great, some hope emerges that the influence of every particular participant will become negligible, and that the above difficulties may recede and a more conventional theory become possible. These are, of course, the classical conditions of "free competition."⁸⁴

Admittedly, because game theory is best understood as a branch of economics, it shares with neoclassical economics several common assumptions.⁸⁵ For instance, both assume that individuals are instrumentally rational and thus have ordered preferences over various desires.⁸⁶ Additionally, both assume that the satisfaction of individual preferences yields "utility" and that individuals wish to maximize their utility.⁸⁷

But while neoclassical economics assumed that the individual had no impact upon the results of the market and that the rational pursuit of the individual's self-interest would result in society being better off, game theory assumed that, under certain circumstances, individuals could make a difference in market results and that all persons pursuing their rational self-interest might *not* result in welfare-maximization. The view of neoclassical economics by those schooled in game theory is best summarized by a modern game theorist who said of the neoclassical framework: "[i]t is as if the only game in the world were Solitaire, and all of the cards were face up."⁸⁸

The following section will sketch the theoretical bases for both the suggestion that interstate competition could lead to a race-to-the-bottom and the suggestion that it might not—as well as analyze the

84. VON NEUMANN & MORGENSTERN, *supra* note 79, at 13. It should be noted that the key distinction between market interactions to which competitive assumptions apply and those for which game theory applies, lies in the number of participants acting independently of each other, as opposed to the absolute number of participants. As von Neumann and Morgenstern recognized, a market with numerous participants may resemble a game if a sufficient number of the players are colluding with each other and the resulting number of coalitions is small. *Id.* at 15.

85. This is not to say game theory is not tremendously influential outside economics. To the contrary, game theory has transformed the social sciences. HARGREAVES HEAP & VAROUFAKIS, *supra* note 82, at 1.

86. *See id.* at 5-7. This assumption can be traced back to David Hume's *Treatise on Human Nature*, which argued that it is "passions" that actually motivate people to act and that reason is the slave of the passions. Neoclassical economics modified the Humean view by substituting preferences for passions and requiring that preferences are consistent. *See id.* at 7.

87. *See id.* at 5.

88. MICHAEL BACHARACH, *ECONOMICS AND THE THEORY OF GAMES* 3 (1976).

fundamental assumptions on which the two sides differ. Armed with an understanding of their basic differences, Part IV will explore the empirical literature to determine which theoretical construct finds the greatest factual support.

(1) *The Game-Theoretic Approach of the Classic Prisoner's Dilemma*

In everyday parlance, the Prisoner's Dilemma is simply an abstract formulation of the common situation whereby what is best for each participant individually leads to an outcome that is socially suboptimal, whereas with mutual cooperation everyone would have been better off.⁸⁹ In the usual story that accompanies the Prisoner's Dilemma, two prisoners each have the same two choices: to cooperate with each other by keeping silent with respect to his and the other prisoner's involvement in the crime or to "defect" by confessing his and the other prisoner's criminal act. Each prisoner must make his choice without knowing what the other prisoner will do. If both deny all involvement in the crime, each is sentenced to a light sentence; if both confess, each is given a sentence of medium-severity; if one confesses, the one confessing is released, but the other prisoner is handed a harsh sentence. Although collectively the prisoners would be best off if both denied the crime, each follows his own self-interest and confesses.⁹⁰

89. Technically, the Prisoner's Dilemma is an example of a two-person, variable-sum, noncooperative game in which both players have a dominant strategy. See, e.g., ERIC RASMUSEN, *GAMES AND INFORMATION* 17 (2d ed. 1994) ("The strategy s_i^* is a dominant strategy if it is a player's strictly best response to *any* strategies the other players might pick, in the sense that whatever strategies they pick, his payoff is highest with s_i^* "). The name "Prisoner's Dilemma" was first used in 1950 by Melvin Dresher and Merrill Flood at the RAND Corporation. When presenting the basic game to a seminar at Stanford University, Albert W. Tucker created the prosecutor-prisoner story to go with the game, which gave it the name of "Prisoner's Dilemma." See PHILIP D. STRAFFIN, *GAME THEORY AND STRATEGY* 73 (1993). For excellent discussions of the Prisoners' Dilemma, see ROBERT AXELROD, *THE EVOLUTION OF COOPERATION* 7-10 (1984); R. DUNCAN LUCE & HOWARD RAIFFA, *GAMES AND DECISIONS: INTRODUCTION AND CRITICAL SURVEY* 94 (1967); HARGREAVES HEAP & VAROUFAKIS, *supra* note 82, at 146-66; ROBERT V. PERCIVAL ET AL., *supra* note 5, at 48-52.

90. In order for a dilemma to be a Prisoner's Dilemma, several relationships must hold. First, the size of the payoffs to an individual player must follow a prescribed order whereby T (*temptation to defect*) $> C$ (*mutual cooperation*) $> D$ (*mutual defection*) $> S$ (*sucker's payoff*). In other words, a player receives the highest return when she defects and the other player cooperates (T), the lowest return when the other player defects while she cooperates (S), and a higher reward for mutual cooperation (C), than mutual defection (D). See RASMUSEN, *supra* note 89, at 30 n.1.2; AXELROD, *supra* note 89, at 9-10. Second, the following relationship must hold: $2C > T + S > 2D$. The players' combined payoffs are highest when they both cooperate, the second largest when one of them cooperates while

The real world state interactions in environmental standard-setting are undoubtedly more complex than the simple Prisoner's Dilemma. For example, environmental standard-setting in the real world is complicated by the participation of a large number of governmental and non governmental organizations; real life environmental standard-setting is an on-going, dynamic process⁹¹ that provides states with opportunities for intergovernmental negotiation and for revising existing standards; and, in the real world, whatever game states are playing in environmental standard-setting is "nested within a larger constitutional game" concerning questions of jurisdiction between state and federal governments.⁹² Nevertheless, the Prisoner's Dilemma model provides a simple, useful heuristic that captures the essence of incentives that might be faced by state actors engaged in interstate competition for mobile capital, and thus provides a useful starting place for understanding the more complicated real world interstate interactions.⁹³

To best understand how state environmental standard-setting might be similar to a Prisoner's Dilemma, it is first necessary to understand how a welfare-maximizing state would approach environmental regulation were it an island jurisdiction. Once this basic "economic logic" of environmental regulation is established in the island jurisdiction context, we can see how this same economic logic can create a Prisoner's Dilemma, given certain conditions governing interstate competition for industry. The simple mathematical model used to illustrate this dynamic should not be taken too literally, but rather as a cartoon picture illustrating the logical possibility of such an interaction.

the other defects, and the lowest when they both defect. Thus, collectively the players are worst off when they follow strategies maximizing their individual well-being.

91. This opens the way for cooperation between the players when the game is played an infinite number of times, i.e., an iterated Prisoner's Dilemma. In a celebrated contest, Robert Axelrod discovered that the strategy of "tit for tat" was the best strategy for use in an iterated Prisoner's Dilemma. "Tit for tat" is a strategy of starting with cooperation and thereafter doing whatever the other player did (cooperate or defect) in his previous move. See AXELROD, *supra* note 89, at viii.

92. Harrison, *supra* note 71, at 470.

93. See Brander, *supra* note 71, at 48 ("The value of this description [the application of the Prisoner's Dilemma to interstate competition for industrial firms] is that it does capture, in the purest possible setting, non-cooperative incentives faced by provincial governments. Real policy decisions certainly have an element of this rivalry, leading to outcomes that reduce national welfare.").

(a) The "Logic" of Environmental Regulation

The economic rationale for regulating waste emissions in the first place is the enhancement of net social benefits. In order to justify environmental regulation on economic grounds (though not necessarily ecological, moral, or equity grounds), the emissions standard chosen must make society better off than were emissions left uncontrolled. Consider that net social benefits are just the benefits of the waste-producing activity (jobs, etc.) less the costs of the pollution damages from the activity, and less the costs of complying with the emissions standard. This can be expressed as:

net benefit = benefit - cost of damages - cost of compliance.

This can plausibly be expressed in more precise form as:

$$\text{net benefit} = bk - c(1-s)ek - a(sek)^2$$

where k = amount of capital; s = pollution standard (expressed as a required fractional reduction in uncontrolled emissions such that $0 \leq s \leq 1$); b k = economic benefit from capital (where b is the benefit per unit of capital); e k = unregulated pollution emissions (where e is amount emitted per unit of capital); c = cost of damages from a unit of pollution (and hence, c e k is the total costs imposed by unregulated emissions); s e k = amount of pollution reductions mandated by pollution standard s (notice that as s increases, emissions reductions result in a proportionate reduction in the cost of damages from emissions; this reduction in damage costs, equal to c s e k , is the benefit of the standard); and $a(sek)^2$ = costs of complying with pollution standard s (expressed as a quadratic to allow marginal costs of compliance to increase as the standard becomes more stringent).

The "job" of an environmental regulator of "island" jurisdiction State A, where the amount of capital is fixed, is to choose a standard, s , that maximizes net benefits. For example, let capital, $k = 50$ units; the benefits, $b = \$10$ per unit of capital; pollution costs, $c = \$9$ per unit of pollution emitted; compliance costs, $a = \$0.1$ per unit of emissions squared; and emissions per unit of capital, $e = 1$ unit of pollution per unit of capital. In this case, the net social benefits of industrial activity in the absence of environmental regulation will be \$50, but net social benefits can be increased if an emissions standard is imposed, and these net benefits will reach a maximum value of \$250 with the optimal emissions standard of $s=0.9$ — i.e. a 90% reduction in waste emis-

sions (if these benefit values seem small, they might be thought of as accruing per unit of output).⁹⁴

(b) The Environmental Regulator's "Dilemma"⁹⁵

If we relax the "island jurisdiction" assumption, and assume the existence of a second state B as well as state A in the above example, these states are suddenly faced with a choice as to whether to alter their environmental standards or keep them the same. This choice can be simplified and summarized as the choice between two strategies: (1) maintain existing environmental standards, or (2) relax existing environmental standards. The dilemma arises if, by the relaxation of pollution standards, one state can attract at least some industries from the other state. Where the jurisdiction relaxes its pollution standards across the board (i.e., relaxes the standards applicable to relocating facilities as well as for existing facilities), both the jurisdiction's newly locating plants and its existing plants will produce more pollution at the same time that they produce more products and economic benefits.

The example below (Figure 1) gives a concrete illustration of how the dilemma arises when the "island jurisdiction" assumption is relaxed in our simple example. Assume that, by cutting its emission standard in half, one state can attract half of the other state's industrial capital. This assumption, together with the underlying model and numerical values already described in the island case, generates the payoffs depicted in Figure 1.⁹⁶ With these payoffs, the incentives will push both States A and B to relax their emission standards to the suboptimal standard of 45%.

94. The optimal standard is determined by choosing the value of s that makes the marginal benefit of the standard equal to its marginal cost. Simple differentiation of the benefit $csek$ with respect to s gives the marginal benefit cek , while differentiation of the cost $a(sek)^2$ gives the marginal cost $2as(ek)^2$. Setting these equal gives the optimal solution: $s = c/2aek$, or 0.9 when the above numerical values for c , a , e , and k are plugged in. The specific numerical values were rather arbitrarily selected to give round numbers for purposes of simple illustration. I am grateful to Scott Saleska for suggesting the form of this simple model and for working through its mathematical details.

95. This phrase is borrowed from Harrison, *supra* note 71, at 469.

96. The payoffs are generated by simply calculating the net benefit for each state from the equation in the previous section, plugging in the appropriate values for capital, k (50 or 25), and environmental standard, s (90% or 45%), according to the state's position in the payoff matrix.

Figure 1

		State B	
		Maintain Std at 90%	Relax Std to 45%
State A			
Maintain Std at 90%	Mutual Coop. (\$250, \$250)	Sucker/Unilat. Defect (\$175, \$265)	
Relax Std to 45%	Unilat. Defect/Sucker (\$265, \$175)	Mutual Defection (\$200, \$200)	

Note: payoffs in each square are listed in order (payoff to state A, payoff to state B)

The order of the payoffs here complies with the formula for the classic Prisoner's Dilemma: a State receives its highest payoff when it unilaterally "defects" by dropping its standard to 45% while the other state retains its standard at 90% (thus gaining, at the expense of the other state, extra capital and associated economic benefits which outweigh the environmental quality losses of lower standards by the \$15 difference between \$265 and \$250); the second highest payoff when it cooperates with the other state and maintains its 90% standard (receiving the same net benefit of \$250 as it would in the island jurisdiction case); the third highest payoff when it defects by dropping its standard to 45% but the other state does the same (in which case neither state attracts the other's capital but both states suffer because their standards are suboptimally low); and the lowest payoff when it maintains its standard at 90% while the other state drops its standard to 45% (thereby losing capital and its associated benefits to the other state). Fearful that they will be left the "sucker," and tempted by the possible extra benefits of unilateral defection, both states will rationally choose to "defect" (unless there is a mechanism—such as a federal power—for imposing the optimal standard or for enforcing agreements between the states not to defect). Thus, according to this simple Prisoner's Dilemma-like "environmental regulator's dilemma" model, the result of interstate competition is a "race-to-the-bottom."

(2) *The Neoclassical Economic Model of Perfect Competition*

The revisionists suggest that interstate competition might better be modeled as a perfectly competitive neoclassical market, and that the game-theoretic approach embodied by the Prisoner's Dilemma is not necessary after all. Professor Revesz, for instance, relies upon a neoclassical economic model developed by Wallace Oates and Robert Schwab.⁹⁷ In the Oates and Schwab model, jurisdictions have the choice of competing for a mobile stock of capital using either or both

97. Revesz, *supra* note 1, at 1238-42, citing Oates & Schwab, *supra* note 8.

of two different mechanisms: lowered taxes or lax environmental standards. Oates and Schwab were motivated to develop their model in response to a rift in the literature on local public finance between Tiebout-driven models, according to which interjurisdictional competition leads to the efficient provision of local public goods⁹⁸ and the models driven by a second body of literature that contends that interjurisdictional competition distorts public choices.⁹⁹ Oates and Schwab decided to explore the conditions under which jurisdictions

98. Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416 (1956). Tiebout's "vote with your feet" model is a cornerstone of the literature of local public finance. According to this model, when mobility is costless, residents will move to and settle down in the community that best satisfies their preferences for schools, parks, fire and police protection, and other local public goods. *Id.* at 418. Precisely because these goods are "public," in that it costs the community no more to provide the good to all residents than it does to provide it to one, jurisdictions will compete for more residents to share the costs of the good's initial provision. (Additional residents cost the community while lowering the costs of public goods for all.) In equilibrium, the residents of all communities have identical preferences and consequently, all communities are homogeneous. This sorting process supposedly results in an efficient allocation of public goods without the intervention of a federal authority. *Id.* at 420. Criticism of the Tiebout model has taken two forms: a questioning of the model's underlying assumptions and a questioning of the desirability of the "efficient" Tiebout-world. Regarding the former critique, see Edwin S. Mills and Wallace E. Oates, *The Theory of Local Public Services and Finance: Its Relevance to Urban Fiscal and Zoning Behavior*, in EDWIN S. MILLS & WALLACE E. OATES, *FISCAL ZONING AND LAND USE CONTROLS* 3 (1975) (because additional residents increase the demand for more schools, roads, police protection, etc., most services provided by local government are not "pure" public goods); JOE B. STEVENS, *THE ECONOMICS OF COLLECTIVE CHOICE* 333-34 (1993) (quantity and quality of local public goods are not very important in explaining why people move from community to community and that no-growth advocates have waged political battles with growth advocates in many cities and towns); Stewart E. Sterk, *Competition Among Municipalities as a Constraint on Land Use Exactions*, 45 VAND. L. REV. 831, 837-39 (1992) ("[M]unicipalities . . . will not compete for [poor residents or residents who are] unwilling or unable to cover the marginal cost of the public services they consume."). The latter critique asks, even if Tiebout is correct, would we want to live in communities populated solely by persons like ourselves and in which rich communities would be isolated from poor communities? See STEVENS, *supra*, at 333. These shortcomings of the Tiebout model elevate the importance of a second body of literature that also sees interjurisdictional competition as efficiency-enhancing, but bases this conclusion on alternative grounds. The so-called "leviathan" literature sees interjurisdictional competition as restraining the undesirable expansionary tendencies of government. See GEOFFREY BRENNAN & JAMES M. BUCHANAN, *THE POWER TO TAX: ANALYTICAL FOUNDATIONS OF A FISCAL CONSTITUTION* 33 (1980).

99. Those adhering to the view that competition distorts public choices by causing public officials to hold down taxes and other sources of costs to households and businesses, with the result that public goods are provided at suboptimal levels, include GEORGE F. BREAK, *INTERGOVERNMENTAL FISCAL RELATIONS IN THE UNITED STATES* 28 (1967), and John H. Cumberland, *Interregional Pollution Spillovers and Consistency of Environmental Policy*, in *REGIONAL ENVIRONMENTAL POLICY: THE ECONOMIC ISSUES* 255 (Horst Siebert et al. eds., 1979).

would select both an optimal tax rate on capital and local environmental standards despite competition for mobile capital.

The mechanics of Oates and Schwab's model are actually quite simple. Oates and Schwab presume that society at large consists of many jurisdictions, each of which is sufficiently large that all individuals both live and work in the same jurisdiction and none of the pollution generated by firms in one jurisdiction spills over into other jurisdictions.¹⁰⁰ The output of the jurisdiction's firms is a function of the jurisdiction's given stock of capital, labor, and allowable polluting waste emissions.¹⁰¹ Given a series of restrictive conditions, Oates and Schwab conclude that interjurisdictional competition will yield welfare-maximizing environmental standards.¹⁰² Society's overall stock of capital is fixed and perfectly mobile (i.e., transaction costs do not pose a long-term barrier to profit-maximizing relocations of capital in different jurisdictions). Consequently, firms will move to whatever jurisdiction provides the highest net returns to capital. (The net rate of return of capital in a given state equals the marginal product of capital in that state, minus the locality's tax upon capital, and plus any local subsidies.) As a result of capital moving, the net return will adjust until equilibrium is reached at which point the net return will be equal across all jurisdictions.¹⁰³ Note that, by changing their environmental standards or tax rates, localities can temporarily change their net rate of return to capital. However, the inflow of additional capital will eventually cause the locality's rate of return to capital to come back to the equilibrium rate of return. A key assumption of the Oates and Schwab model is that the national equilibrium rate of return to capital is a fixed value, determined by the market, that localities cannot influence.

In this context, local regulators set a jurisdiction-wide environmental emissions limit (allocated among the firms according to their productivity), and a tax on capital.¹⁰⁴ Imposing an emissions limit both raises social welfare by improving environmental quality, and

100. Cumberland, *supra* note 99, at 336.

101. Thus, the firms' production function can be written as: Output = F(L, K, E), where L = labor, K = capital, and E = waste emissions. The production of Q (product produced) exhibits constant returns to scale, so a doubling of inputs K (capital) and L (labor) results in a doubling of outputs Q and E (waste emissions). *Id.* at 336-37.

102. *Id.* at 336.

103. *Id.* at 336-37.

104. *Id.* at 336.

lowers it by chasing away capital, thus lowering wages.¹⁰⁵ Similarly, imposing a capital tax raises social welfare by increasing public revenues, but only at the cost of lowered wages (again, due to the lost capital). The problem of the regulator is thus to maximize social welfare by (1) choosing the emissions limit where the marginal private cost of stricter environmental standards (in terms of loss of capital and lowered wages) equals the marginal private benefit (in terms of higher environmental quality), and (2) setting the capital tax rate that balances the cost of the tax (in terms of lower wages resulting from lost capital) with its benefits (in terms of the additional public revenues).

In order to ensure that the regulator's choice of optimal standards and tax are in accord with what an individual would choose if confronted with the same choice, Oates and Schwab assume that residents' preferences (all residents are presumed to be identical in tastes and preferences¹⁰⁶) are translated into governmental policies according to the median-voter model.¹⁰⁷ Following this model, local officials are assumed to choose only policies that maximize the utility of the voter whose preferences represent the median of all voters on a particular issue.¹⁰⁸ Because Oates and Schwab assume all individuals within a given jurisdiction have identical utility functions and incomes,¹⁰⁹ application of the median-voter model means that public officials will choose policies that maximize the utility of a representative resident.

By equating marginal costs and benefits in their individual jurisdictions, the regulators in competing jurisdictions will of course choose environmental standards and capital tax rates that maximize the utility of their own residents. Under the conditions specified by Oates and Schwab, however, these same standards and tax rates will also be socially optimal for society at large. According to the model, the optimal tax rate in each jurisdiction will be that which just recoups

105. Wages are dependent on the marginal product of labor, which in turn is determined by the size of the capital stock. For example, increasing the amount of capital (e.g., investing in more office space, computers, or widget-making machines) increases the demand for labor (i.e., workers who can staff the offices and operate the computers or machines). Hence, if all other factors remain the same and if the labor supply is fixed, increasing capital will raise wages, and conversely, decreasing capital (or chasing it away to other jurisdictions) will lower wages.

106. *Id.* at 337-38.

107. *Id.* at 339.

108. DUNCAN BLACK, *THE THEORY OF COMMITTEES AND ELECTIONS* 18 (1958) ("The theorem states that the motion which will defeat any other put forward becomes determinate as soon as the position of the median optimum becomes determinate.").

109. Oates & Schwab, *supra* note 8, at 339.

the expense of public goods consumed by industry in that jurisdiction (e.g. roads, police and fire protection, etc.), while the environmental standard will be the one which equates the marginal benefit of the standard in that community (determined by the environmental quality preferences of the local residents) with its marginal cost (measured in terms of forgone consumption). These standards will in general not be equal, because the residents of different jurisdictions may have different relative preferences for material goods and environmental quality. Why should the standards chosen nonetheless be socially optimal for all jurisdictions jointly? Because in this equilibrium, there is no way to change the allocation of capital between jurisdictions to improve the well-being of some residents that does not come at the cost of making other residents worse-off. This is, of course, the definition of social optimality. Note that this stands in contrast to the equilibrium of the Prisoner's Dilemma model of the previous section (i.e., the lower-right payoff quadrant in Figure 1), where both states could be made better off by a move to the payoffs in the upper left quadrant.

Under these conditions, the Oates and Schwab model dictates that regulators in individual jurisdictions will choose both an efficient environmental standard and capital tax rate. The efficient environmental standard will be that standard which represents the point at which the marginal private cost of pollution equals the marginal private benefit from additional capital. Due to the median-voter model, there is no divergence between the point that maximizes private individual utility and the point that maximizes the utility of all of the jurisdiction's residents; whatever level of environmental quality maximizes individual utility will also maximize the utility of the community as a whole.¹¹⁰ As to a tax rate on capital, the regulator will choose the rate that simply recoups the expense of the public goods consumed by industry (e.g., roads, police and fire protection) and no more.¹¹¹

Thus, the Oates and Schwab model creates the conditions under which the private sector's alleged "invisible hand" can work in the public sector. In their model, the individual jurisdiction is best off at the same point that society is best off, and interstate competition leads to efficient local environmental standards. Hence, under the Oates and Schwab model, there is no "race-to-the-bottom" in state environmental standard-setting.

110. *Id.* at 342.

111. *Id.* at 337 n.6, 339 n.11.

C. A Key Assumption Distinguishing the Two Theoretical Models

Juxtaposed against one another in the current debate over the existence or nonexistence of a race-to-the-bottom in state environmental standard-setting are thus two very different models of interstate competition. According to the non-cooperative game-theoretic models relied upon by adherents of the race-to-the-bottom hypothesis, the market for firm location is imperfect; crippled by strategic interactions between the state participants, it causes states to establish suboptimal environmental standards. In contrast, under the neoclassical economic model held out by the revisionists, this same market is perfectly competitive and hence leads to efficient state environmental standards. Which of these two models best approximates interstate competition in the real world (or whether another model altogether would be more appropriate) is a question that can only be answered through theoretically informed appeals to evidence that would allow one to match one or another approach with the conditions of interstate competition in the real world.

What accounts for the different predictions of the two models? There are a number of superficial differences between the models, but one difference that is essential from the perspective of this Article is the number of states involved in the interaction: in the Prisoner's Dilemma, it is two, while in the Oates and Schwab model, the number is unspecified, but assumed to be large. The assumption of a "large" number of states is what allows the rate of return to capital in equilibrium to be treated in the Oates and Schwab model as a fixed value given by the market that individual states cannot influence. One way to think about the importance of this is to consider what happens when one state lowers its environmental standard, thereby attracting capital to itself and away from others. In the Oates and Schwab model, the number of other states from which this capital comes is so large, that only a negligibly small amount comes from any individual state. In other words, the "pain" of capital loss is spread so thin, that no state can notice it because no state's stock of capital can be affected by any other state's regulatory decisions. The efficient outcome of the Oates and Schwab model depends unavoidably on this assumption of a fixed equilibrium rate of return (i.e. large numbers of states). If the number of states were "small", the overall equilibrium rate of return would not be fixed by the market, but would depend on the particular configuration of state environmental standards, and efficient outcomes could no longer be guaranteed by the Oates and

Schwab model. Outcomes could not be easily predicted, and it would be necessary to apply game theory to the situation.

Thus to conclude that interstate competition results in efficient environmental standards upon the authority of Oates and Schwab's model, at least two sets of conditions must hold true in the real world: the number of participants in the market must be large (or their relative market power small), and several assumptions particular to the Oates and Schwab model must hold true. The number of market participants and their relative market power is relevant to the neoclassical versus game-theoretic distinction and will be discussed in detail directly below. The other assumption will be discussed later in Part IV.B.

(1) *The Perfect Competition Assumption*

The requirement that the number of participants be small (i.e. that the participants have small market power) is one of four standard conditions generally recognized as necessary for markets to generate efficient outcomes.¹¹² It is generally referred to as the competitiveness condition: no single market participant can have enough market power to affect the price of a good. The other three conditions of efficient markets are: first, the goods or services traded must be private goods, the most important requirement of which is that non-buyers must be excluded from enjoying the good;¹¹³ second, consumers must have accurate and complete information about the market prices and product quality; and third, all of the value of the good to potential consumers must be contained within the good's demand curve, and, similarly, all of the costs of producing the good must be reflected in the supply curve (in other words, there are no externalities).

In the context of the current interstate competition debate, the requirement that the market be competitive is critical. As noted, this condition is fulfilled when a market is composed of so many firms and consumers that none of them is able to have any effect upon price. Instead, price is determined by the total market supply and demand curves and taken as a given by market participants. For this reason, neoclassical economics uses the term "price-taker" to refer to the

112. For a list of the conditions for an efficient market see generally STEVENS, *supra* note 98, at 57-59; ROBERT S. PINDYCK & DANIEL L. RUBINFELD, *MICROECONOMICS* 587-88 (3d ed. 1995); HARVEY S. ROSEN, *PUBLIC FINANCE* 51-53 (4th ed. 1995).

113. Consumption of the goods must therefore be rival and excludable and the production of the good must be capable of being separated from the consumption of the good. See STEVENS, *supra* note 98, at 57.

competitive firm and the competitive consumer.¹¹⁴ Were a competitive firm to ignore the price-taking condition and offer its product at above-market price, no one would buy its product.

Oates and Schwab's model explicitly relies upon the assumption of perfectly competitive markets. Oates and Schwab assume that local environmental officials are "price-takers" in the market for industrial firms, stating, "just as perfectly competitive firms believe they have no influence on price and therefore behave as price-takers, these competitive communities take the rate of return on capital as a given."¹¹⁵ This is due to Oates and Schwab's assumption that the market consists of a great number of market participants (states as well as firms), none of which hold disproportionate market power. It follows that Oates and Schwab also assume that public officials are "price-takers" in relation to each other. According to their model, no public official has sufficient power in the market for industrial firms that she can influence the decisions of officials in other jurisdictions with respect to their actions in the same market.¹¹⁶

(2) *Monopoly and Oligopoly*

The classic case of a market imperfection due to an individual with excessive market power is that of monopoly. Unlike the participant in a perfectly competitive market who, as discussed above,

114. See, e.g., PINDYCK & RUBINFELD, *supra* note 112, at 11 ("A perfectly competitive market has many buyers and seller, so that no single buyer or seller has a significant impact on price."); *id.* at 241-42 ("Because each firm in a competitive industry sells only a small fraction of the entire industry sales, *how much output the firm decides to sell will have no effect on the market price of the product.* The market price is determined by the industry demand and supply curves. Therefore, the competitive firm is a price taker: it knows that its production decision will have no effect on the price of the product."); RICHARD H. LEFTWICH, *THE PRICE SYSTEM AND RESOURCE ALLOCATION* 26 (4th ed. 1970) (citing as a requirement of pure competition that "[e]ach buyer and each seller of the product involved must be so small in relation to the entire market for the product that he cannot influence the price of whatever it is he is buying or selling."); HAL R. VARIAN, *MICROECONOMIC ANALYSIS* 25 (3d. ed. 1992) (profit-maximizing firms exhibit "price-taking behavior" according to which they are "assumed to take prices as given, exogenous variables to the profit-maximizing problem"); ROSEN, *supra* note 112, at 51 ("The Fundamental Theorem [of welfare economics] holds only if all consumers and firms are price takers. If some individuals or firms are price makers (they have the power to affect prices), then the allocation of resources will generally be inefficient.").

115. Oates & Schwab, *supra* note 8, at 337. See also Working Paper, *supra* note 7, at 6 ("In the model, 'small' communities that behave as price-takers in a national capital market seek . . . to maximize the welfare of their residents subject to a collective budget constraint.").

116. Working Paper, *supra* note 7, at 14-15 ("The model is 'competitive' in spirit in the sense that they perceive their decisions to have no effects on certain parameters such as the rate of return to capital or the decisions of officials in other jurisdictions.").

behaves as a “price-taker,” a monopolist behaves as a “price-maker:” the price the monopolist charges is constrained only by the volume of product it wishes to sell.¹¹⁷ A monopolist’s price-making leads the market to produce inefficient outcomes. When supplied by a monopoly, goods are both more expensive and more scarce than they would be if the same goods were supplied by a competitive firm.¹¹⁸

An oligopoly will manifest inefficiencies similar to those manifested by a monopoly. However, because an oligopoly has more than one (but generally no more than a few) participants with excessive market power, it is distinguishable from a monopoly in several respects. First, quantity of output in an oligopoly is likely to be less different from competitive levels of output than in a monopoly because the market power of an oligopolist will be more diluted than that of a monopolist. Output in an oligopoly can span anywhere from competitive levels of output to the clearly suboptimal output levels of a monopoly.¹¹⁹ Thus, oligopolistic output can be efficient, but it is more likely to be inefficient.¹²⁰

Both industrial firms and states could manifest the characteristics of monopoly or oligopoly. As an example of the latter, a few states (oligopolists) could vie for a single new automobile manufacturing plant (a monopolist). To the extent that the stringency of environmental standards are part of the “price” paid by a state for newly sitting or relocating industries, one would expect that where industry is

117. VARIAN, *supra* note 114, at 233 (“A competitive firm is a *price-taker*; a monopoly is a *price-maker*.”); *id.* (“[A] monopolist has market power in the sense that the amount of output that it is able to sell responds continuously as a function of the price it charges.”); ROSEN, *supra* note 112, at 51.

118. PINDYCK & RUBINFELD, *supra* note 112, at 417 (unlike the perfectly competitive firm whose equilibrium price equals marginal cost, in a monopolistically competitive market the equilibrium price exceeds marginal cost); *id.* (“[T]he monopolistically competitive firm operates with *excess capacity*; its output is below that which minimizes average cost.”). See also VARIAN, *supra* note 114, at 235-36 (the monopolist produces where marginal revenue equals marginal cost; because, given certain conditions, the level of output at which price equals marginal cost is Pareto efficient, “it is clear that a monopoly must produce a level of output which is less than this Pareto efficient amount”).

119. According to the classic Cournot model of oligopolistic behavior, the oligopoly represents the case in between monopoly and perfect competition. VARIAN, *supra* note 114, at 290. In the Cournot model, if the portion of the total market output of an individual firm = 1, the equilibrium output will be the inefficiently low levels of output produced by a monopoly. As this portion approaches zero, such that each firm’s share of the market’s total output becomes negligible, the Cournot equilibrium approaches the competitive equilibrium. *Id.*

120. *Id.* at 291 (reiterating the in-between status of oligopolistic markets but making the general statement that an oligopolistic industry will produce an “inefficiently low level of output”).

monopolistic or oligopolistic, states will have weaker environmental standards and industrial firms will be under-supplied.¹²¹

The consequences of states being monopolistic or oligopolistic are somewhat different. Assuming, for example, that states are oligopolistic and firms are perfectly competitive, states will have excessive market power vis-à-vis industries. Assuming most states want high environmental quality, if it could be assumed that the market included a great many industry participants (or at least enough to preclude industry from being monopolists or oligopolists), this excessive market power on behalf of states might result in the state establishing inefficiently *stringent* environmental standards (as opposed to inefficiently lax standards).

(3) Conclusion

When competitive conditions are ideal, i.e., all market participants are "small," market interactions (and interstate competition in environmental standard-setting) will lead to outcomes that are both efficient and (theoretically) predictable. When one or the other side of the market consists of essentially a single actor holding monopoly power, market interactions, and hence competition, lead to outcomes that are suboptimal though still (theoretically) predictable. When either side of the market (or both) consists of actors that have disproportionate market power, it can generally be presumed that a suboptimal outcome favoring the stronger side will result; the precise allocation, however, is generally much more difficult to predict. Game theory was invented precisely to determine the resulting allocations that will occur in this more complex but less predictable situation.¹²²

In a game in the context of disproportionate market power, the inefficiencies are manifested in payoffs that yield suboptimal results

121. For example, in contrast to a competitive firm, whose sales drop to zero if it charges above the market price, the monopolist can sell his output at any price (though the total quantity that he can sell will be limited by the price at which it chooses to sell). VARIAN, *supra* note 114, at 233. Normally, a monopolist maximizes his profits when he sells the output quantity at which his marginal revenue equals his marginal costs. If a monopolist, such as an industrial firm siting a new plant, only *has* one unit to sell, he will sell at a price where marginal revenue far exceeds marginal cost. PINDYCK & RUBINFELD, *supra* note 112, at 322-23.

122. PINDYCK & RUBINFELD, *supra* note 112, at 420-21 ("In [perfectly competitive and monopolistic] markets, each firm could take price or market demand as given, and didn't have to worry much about its competitors. In an oligopolistic market, however, a firm sets price or output based partly on strategic considerations regarding the behavior of its competitors.").

for society overall but individual payoffs that reflect the benefits that can accrue to individual players who can capture market power. The Prisoner's Dilemma is just one (very simple) example of the type of game that might result, but given the complexities of the real world, many other, more complex games are imaginable. The point is that whatever the form of the particular game, to the extent that it arises from the concentration of market power, it is likely to lead to suboptimal outcomes—and what might more informally be referred to as a “race-to-the-bottom.”

Game theory will govern the results of interstate interactions for industry where the number of state participants is small. Game theory will also govern the results of the market as a whole where the number of industry and state participants are both small. Note that game theory *per se* does not necessarily always result in outcomes that are socially suboptimal. Game theory is simply a framework for analyzing how strategic interactions within the interstate market for industrial firms will be played out. However, the existence of strategic interactions in an otherwise competitive market is itself an indication of disproportionate market power and, hence, suboptimal outcomes and inefficient environmental standards.

III. The Empirical Evidence

In order to determine whether the revisionists' neoclassical economic model or the traditional game-theoretic approach best captures the essential dynamics of interstate competition in real life, it is necessary to test the assumptions of each model against data gleaned from the real world. This is not to say that a model must perfectly reflect the real world to have any validity; no model does or can, and yet models can still prove highly useful. The real test of a model's validity is its predictive ability.¹²³ The relevant empirical questions are many: Does industry hold disproportionate market power vis-à-vis states? Do states engage in strategic interactions in a bid for new industries? Is there evidence that states do, in fact, compete against each other in environmental standard-setting, and is there evidence that firms respond positively to this competition in terms of plant location decisions?

123. See DANIEL A. FARBER & PHILIP P. FRICKEY, *LAW AND PUBLIC CHOICE* 27-28 (1991) (stating that, while models often make simplifying assumptions that are at best approximations, “[t]he ultimate test of an economic model is its predictive ability”).

The following sections describe and discuss the empirical evidence available that corresponds to this list. The evidence includes an existing body of literature that uses statistical analysis to determine the importance of differences in environmental standards in firm location decisions, the author's own recent survey of state environmental regulators and other persons influential in the setting of state environmental standards, data on state bidding wars to attract new industry, financial inducements as incentives to attract industry, and data regarding the number of state and industry participants in the market for industrial sources.

Together, these sources of empirical data provide a basis upon which to test the accuracy of the neoclassical account of interstate competition and to test the race-to-the-bottom hypothesis more generally. Although the results of this theoretically informed appeal to evidence and empirical arguments are not definitive, I argue that the preponderance of the evidence points to the existence of significant economic inefficiencies, including a race-to-the-bottom. Not only do the data point to several failures in the market for new industrial plants, but they demonstrate that while differences in environmental standards are a statistically insignificant predictor of firm location, a substantial portion of states will nonetheless apparently relax their environmental standards out of concern over industry relocation and siting. Either phenomenon (market failures or standard relaxation to no effect) supports the conclusion that interstate competition is imperfect, and therefore environmental standards will be more lax and total social welfare will be less than would be the case were states to regulate as island jurisdictions.

A. Characteristics of the Interstate Market for Industrial Firms

(1) Competition Among Firms

While competition between states for industry is extremely intense, competition between firms for sites for new industrial plants is extremely limited, if it exists at all. Statistics show that the number of new plants siting at a given time in a given state are very few.¹²⁴ For example, during a five-year period—between 1987 and 1992—just 12,976 new plants located in the entire United States, an average of 52 plants per state per year. Some regions, such as the northeast and the

124. U.S. DEP'T OF COMMERCE, STATISTICAL ABSTRACT OF THE UNITED STATES 756-57 (1995). To derive the net change in manufacturing firms, the total number of manufacturing establishments in each state and region in 1987 were subtracted from the total number of manufacturing establishments in each state and region in 1992.

middle Atlantic states, actually recorded a loss of over a thousand plants each, demonstrating that more plants shut down during those five years than opened their doors.¹²⁵ Statistics on new plant openings in the United States overall and by region between 1982 and 1987 are about the same.¹²⁶ Interviews with state economic development agency officials suggest that the demand for new industries is so great and the number of available sites so numerous that it would be highly unusual to have more than one industrial entity competing for the same site.¹²⁷ This would seem to indicate that companies seeking sites for newly opening or relocating plants have little or no competition from other industries. Certainly this appears to be true with respect to new automobile manufacturers,¹²⁸ but appears to be true as well for many other industries, otherwise incentive packages that states offer to even small firms would be unnecessary.

A second characteristic worth mentioning is that demand for new or relocating plants is extremely high relative to supply. For instance, manufacturing employment in the United States between 1987 and 1992 dropped by 697,000 jobs.¹²⁹ This constituted an average drop of 13,667 manufacturing jobs per state (including the District of Columbia). The region faring the worst was the mid-Atlantic states (New York, New Jersey and Pennsylvania), losing an average of 144,000 manufacturing jobs per state, while the south central states fared the best, gaining an average of 23,000 industrial jobs per state. These

125. *Id.* The six northeastern states (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut) lost a total of 1,426 manufacturing plants between 1987 and 1992. This constitutes an average loss of 238 plants per state over the five-year time period or a loss of approximately 48 plants per state per year. The middle Atlantic states (New York, New Jersey, and Pennsylvania) lost a total of 3,894 manufacturing establishments during this same time period. This constitutes a loss, on average, of 1,298 plants per state within five years, or 260 plants per state per year.

126. *Id.* at 756.

127. Telephone Interview with Jim Kell, Research Associate, Division of Economic Development, Columbus, Ohio (Aug. 7, 1996); telephone Interview with Lynn Morford, Communications Manager, Illinois Department of Commerce (July 24, 1996).

128. New automobile plants appear to have no rivals when siting a new plant. New automobile plants are so rare and the competition for them so intense that each company is guaranteed to have the field all to itself. *See, e.g.,* E. S. Browning & Helene Cooper, *Ante Up: States' Bidding War over Mercedes Plant Made for Costly Chase*, WALL ST. J., Nov. 24, 1993, at A1 (reporting tri-state competition for Mercedes-Benz AG's first United States car plant); Richard Brandt, *Wherever GM Puts a Saturn, It's Going to Get a Sweet Deal*, BUS. WK., Apr. 1, 1985, at 36 (discussing multi-state competition for GM's new Saturn plant); Arun P. Elhance & Margaret Chapman, *States Should Ally to Lure Business*, CHI. TRIB., Oct. 6, 1990, at C17 (discussing state bidding wars for new car manufacturing plants).

129. U.S. DEP'T OF COMMERCE, *supra* note 124, at 756-57.

figures demonstrate that manufacturers were unlikely to experience much competition from other manufacturers in obtaining sites for the opening of new plants over a ten-year time period between 1982 and 1992, and that the demand for new plants was particularly intense.¹³⁰ As a result of this imbalance between demand and supply, industries are known to place additional demands upon states in order to agree to site a facility.¹³¹

Finally, there exists some evidence that could be interpreted to indicate that the usual number of states competing against each other for the location of all but the largest plants is small.¹³² The author's survey of persons influential in state environmental standard-setting found that states were most likely to be familiar with the environmental standards of neighboring states (an approximate average response of "fairly familiar"), less likely to be familiar with the standards of states within their geographic region (an average response between "not too familiar" and "fairly familiar"), and even less likely to know about the standards of states outside their geographic region (an average response of "not too familiar").¹³³ This could indicate that, to the extent states compete with other states in setting environmental stan-

130. These data do not show whether manufacturers experienced competition for new sites from non-manufacturing entities such as real estate developers. However, given the losses in industrial employment in many regions and only small gains in others, it appears unlikely that a state would not intervene to prevent the manufacturer from losing a prospective site to another competitor. See *infra* text accompanying notes 181-221 (describing arsenal of incentives used by state governments to attract and retain industrial development).

131. See Thomas J. Murray, *Going After Business*, BUS. MONTH, June 1988, at 48 (industry at the center of a state bidding war threatened to locate in another state unless a state raised the value of the incentive package they had offered).

132. Evidence that the number of states engaged in competition for a single plant is small is largely anecdotal, though some of it rests upon industry practice. With the exception of large automobile manufacturers, which may be attractive to many states, it is rare to hear of more than two to four states, or, for that matter, states from more than one region, competing for a single industrial plant. See, e.g., Murray, *supra* note 131, at 48 (four states offered bids for a new steel mill); *id.* at 51 (many battles for new industry are fought among states in the same region); *id.* at 49 (Oklahoma beat out other Plains states to obtain new tissue mill). That the number of states competing for new plants is few is consistent with the industry practice of keeping the list of sites they are considering secret until they have narrowed down the list of candidate states to just a few. Corporations do so to keep real estate prices low. See, e.g., Mark L. Goldstein, *Choosing the Right Site*, INDUSTRY WK., Apr. 15, 1985, at 57, col. 3 (manufacturer of electronic components settled on cities in five states prior to receiving state bids). It is not unusual to hear of many states and states from more than one region competing for a new automobile manufacturer, however.

133. See *infra* Table 5, Question 17A-C; Appendix, Table 6, Question 16A-C. The differences between these mean responses (i.e., whether respondents were more or less likely to be familiar with the standards of neighboring states, states within their same geographic region and states outside their same geographic region) were statistically significant. The

dards to attract business, they are typically competing against only a few other states. In sum, industrial firms looking to site new plants appear to have disproportionate market power (monopolistic or oligopolistic), and the small number of actors on both sides of the plant site market indicates that the interactions in this market are more likely to resemble a strategic game than a perfectly competitive neoclassical market.

(2) *Interstate "Bidding Wars"*

Interstate competition for new industrial plants is so intense that it has been likened to a second war between the states.¹³⁴ To entice new plants within their borders, or to prevent their existing plants from leaving, states offer firms lucrative packages consisting of a dizzying array of economic incentives.¹³⁵ While traditional economic incentives encompass subsidies, such as property tax abatements, low-interest loans, tax-exempt bonds to finance expansions and improvements, wage subsidies, special tax status, and grants of land and industrial parks, more recently, states are turning toward providing industries with customized services designed to help them improve

average responses of state environmental agency officials were similar to the average responses of all respondents combined. See *infra* Appendix, Table 7, Question 17A-C.

134. See e.g., Allen R. Myerson, *O Governor, Won't You Buy Me a Mercedes Plant?*, N.Y. TIMES, Sept. 1, 1996, § 3, at 1; Russell L. Hanson, *Bidding for Business: A Second War Between the States?*, 7 ECON. DEVEL. Q. 183, 183-84 (1993).

135. See NATIONAL ASS'N OF STATE DEVEL. AGENCIES, *DIRECTORY OF INCENTIVES FOR BUSINESS INVESTMENT AND DEVELOPMENT IN THE UNITED STATES: A STATE-BY-STATE GUIDE* [hereinafter *DIRECTORY*] (8th ed. 1996); 29TH ANNUAL REPORT: THE 50 LEGISLATIVE CLIMATES, *INDUS. DEV.*, Jan-Feb. 1995. See also John C. Gray and Dean A. Spina, *State and Local Industrial Location Incentives—A Well-Stocked Candy Store*, 5 J. CORP. L. 517 (1980) (describing the various types of incentives); Joshua P. Rubin, Note, *Take the Money and Stay: Industrial Location Incentives and Relational Contracting*, 70 N.Y.U. L. REV. 1277, 1300-05 (1995) (categorizing incentives as either "as-of-right" and thus available to all industries meeting specified criteria, or discretionary, and thus subject to bargaining between the state and industry); Mark Taylor, Note, *A Proposal to Prohibit Industrial Relocation Subsidies*, 72 TEX. L. REV. 669 (1994) (examining problems created by industrial relocation subsidies). State incentive programs for industry are now so numerous and diverse that a national organization of state officials publishes an annual directory that lists each program. The array of incentives offered by sites has led to the creation of a booming site consulting business where companies can hire a consultant to help them identify the most lucrative offer. Barbara Harrison, *Survey of North American Business Locations*, FIN. TIMES, OCT. 19, 1994, at III.

productivity and competitiveness.¹³⁶ Altogether, incentives given by localities to business are estimated at \$30 billion a year.¹³⁷

There are several notable aspects of this bidding process. First, states do not appear to discriminate on the basis of size, but rather compete to attract even small industries.¹³⁸ Second, the process of bidding results in the winning state paying more for the newly-siting or relocating plant than it would pay in the absence of competition. In other words, competition "bids up" the value of the incentive package necessary to obtain a plant.¹³⁹ Finally, many economists contend that, in offering huge incentives packages, states often lose more than they gain in compensating economic benefits. Mirroring this sentiment, several government officials have likened the interstate bidding war to

136. See, e.g., Timothy J. Bartik, *Jobs, Productivity, and Local Economic Development: What Implications Does Economic Research Have for the Role of Government?*, 47 NAT'L TAX J. 847, 848-49 (1994) (describing "new wave" services, which include providing companies with advice on technological innovation from university researchers, offering export assistance, and setting up industrial networks); Hanson, *supra* note 134, at 183-84 (arguing that "smokestack chasing" while still present, is being replaced by more systematic efforts to encourage the growth of indigenous industries).

137. Hanson, *supra* note 134, at 183. A single state's incentive package for one industry can constitute a tenth of the cost of industry to all states. See Myerson, *supra* note 134, § 3, at 1 (describing tax breaks and other subsidies offered by Alabama to win the state bidding war for a Mercedes plant totaling \$300 million, a cost to the state of \$200,000 per job).

138. Although the public is most familiar with the highly-publicized bidding wars for large automobile manufacturers, the variety of loan and incentive programs available for even small employers indicates that states are eager to attract smaller facilities as well. See, e.g., DIRECTORY, *supra* note 135 (listing numerous incentives offered in each state to new small businesses); Jeff Sturgeon, *Tax Dollars at Work: Incentives to Lure Businesses Come at a Price, but the Payoff May be in the Jobs They Create*, ROANOKE TIMES AND WORLD NEWS, June 30, 1996, at 1 ("Most every company [in the Roanoke, North Carolina, region] providing at least 25 new jobs gets something from the public trough."); Ron Bartlett, *Jobs, Economy at Heart of Legislative Concerns*, TAMPA TRIB., Mar. 2, 1996, at 1 (citing state lawmakers considering legislation offering tax refunds of \$500 per job to any business that creates over 10 jobs and offering all manufacturers tax exemptions for electricity). See also Telephone Interview with Ken Poole, Director of the National Association of State Economic Development Agencies (Aug. 10, 1996) (although receiving less publicity than automobile or semi-conductor plants, state and metropolitan area competition for small projects is particularly intense); Interview with Kell, *supra* note 127 (same).

139. See, e.g., Myerson, *supra* note 134, § 3, at 10, (stating that North and South Carolina found their bids for a new Mercedes plant matched or bettered by Alabama's); Richard Brandt, *Wherever GM Puts a Saturn, It's Going to Get a Sweet Deal*, BUS. WEEK, Apr. 1, 1985, at 36 (detailing how states augmented their incentive packages to obtain a coveted automobile-manufacturing plant as interstate competition intensified); Thomas M. Rohan, *Site Finders Dig Deeper; Great Golf Courses Don't Count Anymore*, 226 INDUS. WK., Aug. 19, 1985, at 20 (describing how South Carolina officials convinced a relocating lock-making plant to abandon its plans to locate in North Carolina by adding to the plant's incentive package).

interstate “cannibalism”¹⁴⁰ or a “zero-sum game,”¹⁴¹ and offered proposals for federal legislation that would eliminate competition through incentives by taxing subsidies as income.¹⁴²

B. Industry Location Studies

The prevailing impression is that the stringency of environmental standards is an important determinant of firm location. Indeed, common sense would suggest that when choosing a location, a profit-maximizing producer would take the cost of compliance with local environmental regulations into account together with other local cost factors. This common sense conclusion is reinforced by popular newspaper accounts and the rhetoric of disappointed political officials and business representatives who frequently cite environmental laws as the cause for a decision to open a plant in another location.¹⁴³

This common sense notion is largely at odds, however, with the empirical literature. Economists and political scientists who have conducted systematic studies of the impacts of state environmental regulation upon plant location decisions have nearly always concluded that, contrary to prevailing belief, the stringency of environmental standards is only a minor determinant of firm location.¹⁴⁴ This ap-

140. *Taking Stock of Environmental Problems: Hearings Before the Senate Comm. On Environment and Public Works*, 103d Cong., 1st Sess. 148 (1993) (testimony of Thomas C. Jorling, Commissioner, New York Department of Environmental Conservation) (attributing reference to “cannibalism” to Governor Cuomo).

141. Myerson, *supra* note 134, § 3, at 1 (quoting Robert B. Reich, United States Secretary of Labor, who went on to comment that, in the bidding war, “[r]esources are moved around; Peter is robbed to pay Paul”).

142. *Id.* (proposing that the federal government tax as income up to 100 percent of “any incentives or subsidies that a company receives to relocate”).

143. See, e.g., Timothy J. McNulty, *Republican Governors Resist Great Lakes Pollution Plan*, CHI. TRIB., Apr. 24, 1995, § 1, at 3 (reporting that resistance of Republican governors to the adoption of stricter pollution standards for discharges into the Great Lakes is based upon conviction that tougher pollution standards will cause industry to relocate elsewhere); William Trombley, *Bill to Ease Refinery Curbs Hit*, L.A. TIMES, Apr. 7, 1992, at A3, (reporting that several major oil companies are claiming they cannot follow through with \$5-9 billion investment in new and expanded facilities if they must comply with California’s strict environmental impact study procedures). See generally Adam B. Jaffe et al., *Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?*, 33 J. ECON. LIT. 132, 148 (1995) (“There appears to be widespread belief that environmental regulations have a significant effect on the siting of new plants in the United States.”).

144. Scholars have conducted numerous studies of the impacts of environmental regulations upon firm location. See, e.g., ROBERT W. CRANDALL, *MANUFACTURING ON THE MOVE* 55-58 (1993); ROGER W. SCHMENNER, *MAKING BUSINESS LOCATION DECISIONS* 39-41 (1982); STATE TAXATION POLICY 222 (Michael Barker ed., 1983); WILLIAM R. LOWRY, *THE DIMENSIONS OF FEDERALISM: STATE GOVERNMENTS AND POLLUTION CONTROL POL-*

pears to be true without much regard for the industry studied. Rather, the most important indicators of firm location are the percentage of unionized workers, proximity to markets and raw materials, access to transportation networks, quality of schools, and the costs of housing and energy.¹⁴⁵ Studies examining the impact of environmental regulations upon firm location employ three different methods: (1)

ICIES 12-15 (1992); Timothy J. Bartik, *The Effects of Environmental Regulation on Business Location in the United States*, 22 GROWTH AND CHANGE 22 (1988); Timothy J. Bartik, *Small Business Start-Ups in the United States: Estimates of the Effects of Characteristics of States*, 55 S. ECON. J. 1004, 1011 (1989); CHRISTOPHER J. DUERKSON, ENVIRONMENTAL REGULATION OF INDUSTRIAL PLANT SITING: HOW TO MAKE IT WORK BETTER (Conservation Foundation 1984); Virginia D. McConnell & Robert M. Schwab, *The Impact of Environmental Regulation on Industry Location Decisions: The Motor Vehicle Industry*, 66 LAND ECONOMICS 67 (1990); Joseph Friedman et al., *What Attracts Foreign Multinational Corporations? Evidence from Branch Plant Location in the United States*, 32 J. REGION SCI. 403, 410-14 (1992) (impact of state environmental policies upon the location of foreign multinationals); STEPHEN M. MEYER, ENVIRONMENTALISM AND ECONOMIC PROSPERITY: TESTING THE ENVIRONMENTAL IMPACT HYPOTHESIS (Massachusetts Institute of Technology, Project on Environmental Politics and Policy 1992); STEPHEN M. MEYER, ENVIRONMENTALISM AND ECONOMIC PROSPERITY: AN UPDATE (Massachusetts Institute of Technology, Project on Environmental Politics and Policy 1993); Paul H. Templet & Stephen Farber, *The Complementarity Between Environmental and Economic Risk: An Empirical Analysis*, 9 ECOLOGICAL ECON. 153 (1994); Arik Levinson, *Studies in the Economics of Local Environmental Regulation* 41-96 (1993) (unpublished Ph.D. dissertation, Columbia University); Michael Epping, *Tradition in Transition: The Emergence of New Categories in Plant Location*, 19 ARK. BUS. & ECON. REV. 16 (1986); Jack Lyne, *Service Taxes, International Site Selection and the "Green" Movement Dominate Executives' Political Focus*, SITE SELECTION, Oct. 1990, at 1134; Howard A. Stafford, *Environmental Protection and Industrial Location*, 75 ANN. ASS'N. AMER. GEOGRAPHERS 227 (1985); Bob Hall, *Gold and Green*, S. EXPOSURE, Fall 1994, at 4. For an informative overview of several of the most important of these studies, see Jaffe et al., *supra* note 143, at 148-50. Many studies have been done on the effect of domestic environmental regulations upon industry's choice to locate or relocate a plant in a foreign country. Like the results of the domestic location studies discussed in this article (which examine whether differences in state environmental regulations affect firm location) studies of the effects of domestic environmental regulation upon the international location of industrial firms generally conclude that, while pollution-intensive industries have migrated abroad, it is not clear that they have done so because of increasingly strict environmental regulations. These studies are summarized in Jaffe et al., *supra* note 143, at 142-48, and Stewart, *supra* note 3, at 2065-66.

145. See, e.g., John P. Blair & Roger Premus, *Major Factors in Industrial Location: A Review*, 1 ECON. DEV. Q. 72 (1987) (reviewing determinants of firm location); ROGER J. VAUGHAN, STATE TAXATION AND ECONOMIC DEVELOPMENT 19-30 (1979); Timothy J. Bartik, *Business Location Decisions in the United States: Estimates of the Effects of Unionization, Taxes, and Other Characteristics of States*, 3 J. BUS. & ECON. STAT. 14, 19 (1985) (showing that differences in unionization across states have a large and statistically significant effect upon industrial location in the United States); Friedman et al., *supra* note 144, at 414-15 ("[F]our factors [are] important in determining the location choice of [foreign multinational plants] in the United States . . . market size, manufacturing wage rate, transportation infrastructure, and state promotional activities designed to attract foreign investment.").

surveys of industry executives who were personally involved in choosing a plant location; (2) "aggregate studies," or studies comparing, within localities, aggregate measures of economic activity (e.g., growth rate of employment) with aggregate measures of environmental regulatory stringency (e.g., the state's spending on environmental program administration, the number of environmental laws adopted); and (3) "establishment-level studies," or studies correlating the sites chosen for new plants (or overall number of industrial plants) with various measures of both environmental stringency and economic indicators.

(1) *Surveys of Manufacturing Plant Executives*

The results of surveys of executives who participated in plant location decisions can be found in Table 1.¹⁴⁶ Most of these surveys conclude that environmental regulations play a minor role in plant location decisions, though in a few, the executives claimed that environmental regulations did have some influence upon their location choice.¹⁴⁷ It is difficult to compare surveys reaching opposing conclusions, given that the surveys differ in both scope and methodology. For example, some asked the respondents to rank a preselected list of factors for their importance to firm location decisions, while others asked open-ended questions about the factors that influence plant location.¹⁴⁸ Of the two conclusions, the nature of the expected bias would tend to predict that industry executives would state that environmental regulation is important to firm location, as such a conclusion would work in industry's favor. Industry officials may *say* that it was because of onerous environmental regulations in other locales, but it is difficult to determine whether this is the *real* reason or the reason industry officials would like the public to believe.¹⁴⁹ For these reasons, of the three types of location studies, surveys of executive officials would seem to be the most susceptible to bias towards the importance of environmental standards. Even so, the majority of such

146. See Epping, *supra* note 144, at 23-24; Lyne, *supra* note 144; Stafford, *supra* note 144, at 230-37; STATE TAXATION POLICY, *supra* note 144, at 245-59.

147. Compare STATE TAXATION POLICY, *supra* note 144, at 222 (finding little evidence that environmental factors influenced the industry's choice of location) with Lyne, *supra* note 144, at 1134-35 (finding environmental regulations did influence industry location choice).

148. See Levinson, *supra* note 144, at 43, for a similar critique of the survey-based studies.

149. This is in contrast to any bias that might exist in the responses given by environmental agency regulators to the author's survey, which would tend to work against revealing the influence of industry relocation upon the relaxation of environmental standards.

studies find that environmental standards are a minor factor in proportion to other location determinants.

Table 1: Impact of Differences in Environmental Regulations Upon Plant Location: Surveys of Manufacturing Plant Executives

STUDY	DATA	RESULTS
Barker (1983)	Survey of executives of corporations which made manufacturing investments in NY, MA, MT, KS, DE, NM, CO, RI, WV, ME, and ND in 1979.	New firms: 11.1% stated that air quality regulations were a "moderate negative influence" and 73.3% stated that they were an "insignificant influence" upon location choice. Expansions of existing firms: 14.3% stated that air quality regulations were a "moderate negative influence" and 71.4% stated they were an "insignificant influence" upon location choice.
Epping (1986)	Survey of executives of manufacturers that located facilities during 1957-77.	"Favorable pollution laws" were ranked between 43rd and 47th out of a total of 84 location factors.
Fortune Magazine Market Research (1981)	1981 survey of executives at 500 of the 1,000 largest U.S. industrial corporations who reported locating a new facility during the past 10 years or planned to do so in the next 10 years.	When scale score answers were weighted and compared, executives as a whole ranked "state and/or local posture on environmental controls" 10th out of 26 given factors.
Site Selection Magazine (1990)	1990 Site Selection magazine survey of corporate real estate executives.	42% of executives listed "state clean air legislation" among the three factors affecting location choice. Executives were asked to pick three factors out of a list of 12.
Schmenner (1982)	New Fortune 500 plants built between 1972-78.	Environmental regulations were not listed among the top 6 location factors mentioned.
Stafford (1985)	Oral and written survey of largest U.S. corporations, each of which recently sited a new manufacturing branch plant (total of 162 plant siting decisions).	Environmental regulations were ranked 5th out of 10 factors in national-scale location searches, 9th out of 10 factors in regional scale searches, and 6th out of 10 in local scale searches.

(2) *Aggregate Studies*

Researchers have also attempted to determine the relative importance of environmental regulatory stringency upon firm location

through the use of aggregate studies, a summary of which is included in Table 2.¹⁵⁰ By demonstrating that there is no correlation between stringent state environmental regulation and economic prosperity, aggregate studies generally support the conclusions of the surveys of executive officials—that environmental regulations are not a significant determinant of firm location. It is important to note that aggregate studies do not specifically target the effect of environmental regulatory stringency upon firm location, however. Instead, these studies focus on the impact of environmental regulatory stringency upon a location's overall economic prosperity, of which the number of new plant or branch plant openings may be one economic indicator among several.

150. Duerkson, *supra* note 144 at 62-71, 218-229; Meyer, *supra* note 144 at 8-41; Templet & Farber, *supra* note 144 at 154-60; Hall, *supra* note 144.

Table 2: Impact of Differences in Environmental Regulations Upon Plant Location Decisions: Studies Using Aggregate Data

STUDY	DATA	RESULTS
Duerkson (1984)	Compared the stringency of state environmental programs to increases in state industrial employment between 1970-76 and 1976-80.	No statistically significant difference in competitive shift among states with high and low environmental index scores between 1970-76. States experiencing gains in industrial employment between 1976-80 had higher (more stringent) environmental index scores.
Meyer (1992)	Correlated all 50 states' performance between 1982-89 according to 5 economic indicators: gross state product growth, non-farm employment growth, construction employment growth, manufacturing labor productivity, and overall labor productivity, with the state's ranking according to Duerkson's 23 environmental factors.	Strong environmental programs are positively correlated with gross state product, total (non-farm) employment growth, and overall labor productivity. There is no difference between strong and weak environmental regimes in terms of manufacturing labor productivity.
Meyer (1993) (Update of 1992 Study)	Updated 1992 study and incorporated the more recent indicator of state environmental performance from a 1991 study.	Positive correlation between state economic indicators and strong environmental programs observed in 1992 study was not changed.
Crandall (1993)	Compares cost of environmental compliance for manufacturing firms during 1977-91 by state to levels of manufacturing employment.	Compliance costs did not have a measurable effect upon the regional distribution of manufacturing employment. New plant startups and plant closures are not affected by control costs, though both expansions and contractions are affected.
Hall (1994)	Ranks all 50 states according to 250 environmental indicators and compares each state's environmental ranking with a list of economic indicators.	Nine states ranked among the top twelve states both in terms of environmental stringency and economic strength and, conversely, twelve other states ranked as the nation's lowest in terms of environmental stringency and economic strength.
Templet & Farber (1994)	Constructed an "E/J" ratio (emissions to jobs) for all 50 states using statewide emissions data from the U.S. EPA Toxic Release Inventory database and U.S. Census data on employment, income and energy use, and compared each state's E/J ratio to the stringency of its environmental programs.	Economic and environmental risks are complementary. Higher state E/J ratios are positively associated with less stringent state environmental programs and vice-versa.

For example, an early aggregate study conducted for the Conservation Foundation by Christopher Duerkson correlated data on changes in state industrial employment during the 1970s with data on the strength of each state's environmental programs and concluded that environmental stringency had a negligible influence upon industry employment levels.¹⁵¹ One problem with aggregate measurement, illustrated by the Duerkson study, is that such studies do not distinguish between employment shifts attributable to industrial growth versus nonindustrial growth, or between different changes within industrial growth, such as plant start-ups, shutdowns, and plant expansions and contractions. That environmental regulations have little impact upon levels of industrial employment does not necessarily mean that they are insignificant in determining the location of new industrial firms, however. Changes in net industrial employment levels reflect employment changes resulting from closures of old plants, contractions and expansions of existing plants, and the births of new plants, rather than just those changes in employment resulting from the opening of new plants.¹⁵² Consequently, two states could have the same levels of industrial employment, and yet have very different success rates in attracting new industrial firms. A state that attracted no new firms and yet also did not lose any would have the

151. Duerkson, *supra* note 144, at 63-68. Duerkson's study tested whether there was a "competitive shift" in employment toward states with relatively lax environmental standards between the years 1970 and 1976 and between 1976 and 1980. A competitive shift was defined as the difference between the actual change in employment in a state and the change that *would* have occurred had industry grown or declined at the national average rate. The stringency of state environmental programs was rated by attributing to each state a number based upon a weighted sum of measures such as per capita level of spending on environmental program administration, the comprehensiveness of the state's environmental impact regulations, the extent of state regulations protecting critical wildlife habitat, and the environmental voting record of the state's congressional delegation. *Id.* at 78 n.55. Considering manufacturing as a whole, the study determined that states having a positive competitive shift between 1970 and 1976 had an environmental index value that was slightly lower (meaning their laws were less stringent) than those experiencing a loss in employment, but that the difference was not statistically significant. Interestingly, for pollution-intensive industries as a whole, the difference was even slighter. The environmental index was updated in 1983 to include 23 factors and has been widely used since then to rank state environmental programs. However, the difference with respect to primary metals industry was statistically significant. *Id.* at 63. Between 1976 and 1980, the direction of the competitive shift for states overall was the reverse: States experiencing gains in industrial employment had *higher* environmental index scores than states suffering losses in employment. The differences between gainer and loser states in pollution-intensive industries remained the same, however. Overall, this statistical evidence seems to indicate that while weak environmental programs alone are insufficient to attract industries to states, environmental stringency, alone, is insufficient to deter industries from states. *See id.* at 68.

152. *See* Levinson, *supra* note 144, at 45.

same level of industrial employment as a state that attracted several new firms but lost as many jobs as it gained through the closure of one large industrial employer.

The design of two more recent aggregate studies, one conducted by Dr. Stephen Meyer and the other by Robert Crandall,¹⁵³ address this weakness in the Conservation Foundation study.¹⁵⁴ Meyer uses the Foundation's data on the stringency of state environmental pro-

153. See MEYER, ENVIRONMENTAL IMPACT HYPOTHESIS, *supra* note 144, at 8-22.

154. Although other aggregate studies correlate more recent state economic and environmental data by state, they contribute little to an understanding of whether relaxed environmental policies attract industrial facilities because they fail to control for preexisting economic conditions and thus cannot tell us whether it is the preexisting economic conditions or the state's environmental policies that account for the observed differences in state economic prosperity. See Hall, *supra* note 144; Templet & Farber, *supra* note 144. For instance, in the Hall study, all 50 states are ranked according to 250 environmental indicators, including such indicators as the number of high-risk, potentially cancer-causing facilities, population in non-attainment areas, number of non-compliant public sewage-treatment systems, total radioactive waste, gasoline use per capita, Toxic Release Inventory releases, number of Superfund sites, cancer death rates, and pesticide use per capita. Hall compared the ranking of each state on two lists, the first consisting of 20 environmental indicators (e.g., toxic emissions, pesticide use, energy consumption, and spending for natural resource protection), and the second consisting of economic indicators (e.g., annual pay, job opportunities, business start-ups, and workplace injury rates). Although finding that 9 states ranked among the top 12 states on both the economic and environmental scales (Hawaii, Vermont, New Hampshire, Minnesota, Wisconsin, Colorado, Oregon, Massachusetts, and Maryland) and, conversely, that 12 other states were among the worst 14 states on both lists (Louisiana, West Virginia, Alabama, Mississippi, Texas, Tennessee, South Carolina, Kentucky, Oklahoma, Indiana, Arkansas, and Ohio), Hall does not indicate whether the poor environmental conditions are responsible for the poor economic conditions or whether conditions would in fact be worse if the states had adopted more environmentally protective environmental policies. This is also true of Templet & Farber's study which demonstrated the complementarity between economic and environmental risks. See Templet & Farber, *supra* note 144. Templet & Farber found that a state's relative environmental risk, measured by the state's ratio of total polluting emissions to jobs in the manufacturing sector, was positively correlated with rates of unemployment, poor environmental quality, and weak environmental regulatory policies. *Id.* at 155-160. Although the Templet & Farber study observed a correlation between poor economic and environmental conditions, the study was not designed to determine either the direction of the causation nor whether a state is better or worse off as a result of high levels of environmental risks. *Id.* at 160-61 ("What we observe is, in fact, poorer welfare conditions where environmentally risky activities are more intense. However, the direction of causation cannot be determined from the data presented in this study. It is a legitimate question whether poor welfare conditions create an atmosphere of tolerance toward risky activity, either in policies toward the types of industries encouraged or in policies of environmental regulation; or whether risky activities can further deteriorate welfare conditions by eroding tax bases, restricting the development of a skilled and educated work force, negatively influencing government, or externalizing costs. Probably, the relation goes both ways in the form of a vicious cycle Whether a state is better off with a particular risky activity than without it is also a legitimate question. This study does not tell us how much better or worse a particular state would be with and without a particular activity.").

grams but examines several different economic indicators (as opposed to examining only net changes in industrial employment levels)¹⁵⁵ to conclude, like Duerkson, that variations in environmental regulatory stringency has little bearing upon state economic prosperity. One economic parameter used by Meyer does have a direct bearing upon industrial migration: construction employment growth. Construction employment growth should be a good indicator of the attractiveness of a state to new plants because it reflects future business plans. As Meyer explains, "industries planning to migrate three or five years in the future need facilities to move to."¹⁵⁶ Consequently, if it is true that industry will flee toward states with less stringent environmental standards, Meyer should have observed a slowdown in construction employment as environmental regulations increase or tighten and an increase in such employment as environmental regulations are relaxed. In fact, Meyer's data show just the opposite. Meyer found that there was a strong positive correlation between construction employ-

155. Data for the economic indicators were collected for the 50 states during the period 1982-89, a time period representing a time of the greatest divergences in environmental policies and a period of substantial national economic growth. MEYER, ENVIRONMENTAL IMPACT HYPOTHESIS, *supra* note 144, at 9. Because Meyer used Duerkson's environmental data, however, his data for his environmental indicators came from the late 1970s and early 1980s. Here Meyer's preferences for a data set and the data set he used are at odds. According to Meyer, the period from 1982-89 represents the height of the new federalism, during which the Reagan Administration cut federal funding to the states, reduced federal enforcement efforts, and generally encouraged states to act in areas such as the environment in which the federal government had previously been supreme. Meyer states that this period is thus an optimal time period to study the environmental indicators because it would be the time of the greatest divergences in state environmental policies, with some states choosing to take up the environmental mantle thrown down by the federal government and others choosing to let environmental regulation suffer by failing to make up for the losses in federal involvement. Nevertheless, Meyer ends up using a data set reflecting the environmental policies of the 1970s and early 1980s, the era preceding that of Reagan's new federalism. Meyer justifies the discrepancy between the time periods used for the environmental versus the economic indicators as having the advantage of exhibiting the "enduring medium term" (as opposed to "one-shot") effects of environmental policies upon state economies. *Id.* at 10. There is obvious merit to having a lag between the time period for viewing the environmental and economic indicators. A lag time helps assure that the economic indicators take into consideration the enduring effects of an earlier era's environmental policies. Nevertheless, incorporating a lag time into a comparison using 1980s economic data meant that Meyer was not able to use data from the 1980s as well, the time period Meyer convincingly argues is the best time to view the economic effects of environmental policies given the divergences between state environmental policies borne out of Reagan's new federalism. It is more likely that the discrepancies between the time periods of Meyer's economic and environmental data sets are attributable more to the lack of availability of an environmental-indicator data set during the 1980s than to the advantages of a lag-time-period indicator data set.

156. *Id.* at 4.

ment and strength of environmental programs. Average construction employment growth among environmentally strong states was about 53% for the period 1982-89, while the environmentally weak states showed an average decline of approximately 1.4%.¹⁵⁷

The lack of a negative impact of environmental regulations upon construction employment turns out to be Meyer's strongest evidence for his conclusion that the "environmental impact hypothesis" (the thesis that all else being equal, states with weak environmental policies should exhibit greater economic vitality than states with strong environmental policies)¹⁵⁸ is false. Meyer's study actually finds that strong environmental programs are *positively* correlated with gross state product, total (non-farm) employment growth, and overall labor productivity, and that there is no difference between strong and weak environmental regimes in terms of manufacturing labor productivity.¹⁵⁹ The strength of Meyer's study is the care with which he refutes possible alternative explanations for his results. For example, Meyer refutes two compelling alternative explanations for the apparent positive correlation between environmentalism and economic growth: (1) the possible overshadowing effect of the big state economies of California, New York, and Texas, and (2) greater per capita wealth of the

157. One problem with Meyer's data, however, is that it is not clear whether the increases in construction employment he notes in states with strong environmental programs reflects an increase in the employment of construction workers by polluting industries or only an increase in overall construction employment, including construction of houses, roads, and polluting and nonpolluting industries. Meyer states only that his construction employment data "were obtained from the U.S. Labor Department's *Employment and Earnings* publication." *Id.* at 9. Thus, Meyer's data might merely reflect a residential building boom in states with stringent environmental standards and a drop in residential building in states with lax environmental standards. Even residential construction employment should, however, reflect increases in the location of firms because they would reflect the rising number of workers. Even increases in residentially related construction employment should reflect an increase in industry because it likely includes the housing demand of new industrial workers. (It is possible, though unlikely, that the increases in residential housing demand would be attributable to the demand for vacation homes or the homes of workers in nonpolluting industries only.)

158. *Id.* at 8. Meyer does this by constructing a growth difference index for each state that calculated the difference in growth rate for each of the study's five economic indicators between the periods of 1973-80 and 1982-89. Meyer found that, whereas the economic performance of environmentally strong states improved during the 1980s vis-à-vis their performance during the 1970s, the economic performance of environmentally weak states declined. *Id.* at 25, Tables III & IV.

159. *Id.* at 19. Meyer found the following correlations between environmental rank and economic indicators: growth in gross state product +0.35; growth in non-farm employment +0.23; growth in construction employment +0.54; growth in manufacturing labor productivity +0.007; growth in overall labor productivity +0.33. *Id.* at 12, Table II.

residents of strong environment states.¹⁶⁰ However, Meyer achieved substantially similar results even after he controlled for large state economies and for wealthy residents.¹⁶¹ While Meyer himself is not entirely convinced of the accuracy of the *positive* correlation he observes between strong environmental programs and economic prosperity,¹⁶² by failing to find any negative association between the two, his results appear to strongly refute the argument that weak environmental policies are advantageous to the overall economy.

Crandall used census data on manufacturers' environmental compliance costs to determine the approximate effect of environmental policy upon levels of manufacturing employment by geographical location and between plant start-ups, expansions, contractions, and closures.¹⁶³ Surprisingly, Crandall found that compliance costs for manufacturers between 1977-91 did not have a measurable effect upon the regional distribution of manufacturing employment. According to Crandall, the high compliance costs for industries in the dirtier and older northeastern states is compensated by the more stringent standards generally applicable to new industries in the cleaner

160. Similarly, one might predict, consistent with the "income effect," that wealthy states will spend more on the environment than poor states, and thus the greater economic prosperity Meyer observes in some states is really attributable to wealth rather than better environmental policies.

161. Meyer dispels the possibility that the association he finds between environmentalism and economic growth is attributable to the strong economies of the states with strong environmental programs by demonstrating that he would still find a positive correlation between strong environmental policies and total employment and construction employment (but not with overall economic growth) even if he limited the data set to the twenty-five states with gross state products under \$40 billion. MEYER, ENVIRONMENTAL IMPACT HYPOTHESIS, *supra* note 144, at 38. However, when Meyer restricted the data set to the 41 states with gross state products under \$80 billion (as opposed to the twenty-five states with gross state products under \$40 billion), environmentalism was positively associated with all five of the study's economic indicators. *Id.* In an update to his 1992 study, Meyer demonstrated that when he controlled for wealth, the positive association between environmental rank and economic indicators remained. MEYER, ENVIRONMENTALISM AND ECONOMIC PROSPERITY: AN UPDATE, *supra* note 144, at 6.

162. The positive correlation between environmentalism and economic prosperity may be attributable to a third factor that is associated with both environmentalism and economic growth, such as a tendency by the state to invest in education, health, transportation, communications, or other factors that stimulate economic growth. MEYER, ENVIRONMENTAL IMPACT HYPOTHESIS, *supra* note 144, at 42. On the other hand, there are perfectly plausible explanations for the positive association. For example, highly skilled and well-educated workers may be attracted to regions that offer a better quality of life. This would mean that new industries and high-technology firms might well migrate to environmentally strong states. *Id.*

163. CRANDALL, *supra* note 144, at 56-58.

and less heavily industrialized states of the South and West.¹⁶⁴ More interestingly, Crandall found that environmental compliance costs slow both plant expansions and plant closures. While environmental compliance costs slow plant expansion, the proportionately higher cost of environmental controls for new plants will tend to prevent companies from closing, it being preferable to continue the operation of an old plant than to shut it down and build a new plant.¹⁶⁵

(3) *Studies Using Establishment-Level Microeconomic Data*

The most sophisticated studies of the effects of environmental regulation on business location in the United States, the results of which are found in Table 3, use establishment-level microeconomic data, or specific data on the firm location.¹⁶⁶ In contrast to studies relying on aggregate data, studies using microdata usually distinguish between different types of business location decisions, such as the opening of new plants, the opening of branch plants, the closing of plants, or the expansion or contraction of existing plants. These studies thus give a more accurate picture of the impact of environmental regulation on specific forms of industrial location decisions. The focus of such studies is the conditional probability, given that a plant will be opened, that a corporation will choose a particular site for its location. This conditional probability is modeled in each of the microeconomic data studies using a conditional logic model.¹⁶⁷ The basic idea of such

164. *Id.* at 56-57. New plants are subject to more stringent requirements under each of the major federal pollution statutes. The rationale frequently given for this different treatment is that new plants are better able to absorb the costs because it is less expensive to build controls into design of a plant as opposed to retrofitting an old plant with pollution-control equipment. However, environmental grandfather provisions also protect an existing industry from competition from a new industry. See Heidi G. Robertson, *If Your Grandfather Could Pollute, So Can You: Environmental "Grandfather Clauses" and Their Role in Environmental Inequity*, 45 CATH. U. L. R. 131, 168-69 (1995).

165. Indeed, fear that this is the case is responsible for much criticism about the tougher standards for new plants and remains one of the strongest arguments for the EPA's bubble policy. Keeping older plants on line will tend to keep pollution levels higher since older plants will tend to be larger polluters than newer plants using more modern equipment.

166. See Bartik, *Small Business Start-ups*, *supra* note 144; Bartik, *The Effects of Environmental Regulation*, *supra* note 144; Levinson, *supra* note 144; McConnell & Schwab, *supra* note 144; Friedman, *supra* note 144.

167. See Bartik, *The Effects of Environmental Regulation*, *supra* note 144, at 27. Bartik's 1988 study used variables that would reflect the stringency of environmental regulations according to two different measures. The first resulted in two variables, one for air and one for water pollution, which was based upon the state's spending upon air and water pollution control divided by state manufacturing employment. These variables thus reflected the probability with which a polluter in the state would face inspections as well as

a model is to determine which of all the available sites will yield the maximum profit, and hence will carry the highest probability that it will be chosen as the actual location of a plant. The significance of environmental regulations for the probability of a plant siting at a particular location is determined by comparing the stringency in the environmental regulations of the sites chosen with that of the sites not chosen, after adjusting for the other factors.

the level of the state's public concern for environmental quality. Two other environmental variables were based upon the costs for particular industries of complying with air and water pollution regulation in the state, as compared with the national average. Non-environmental, location-specific variables included the total land area of the state, the percent of the labor force that is unionized, the corporate and property tax rates, the number of existing manufacturing facilities, the wage rate, the educational level of the population, construction costs, and energy prices. See Bartik, *Small Business Start-ups*, *supra* note 144, at 30.

Table 3: Impact of Differences in Environmental Regulations Upon Plant Location Decisions: Studies Using Microeconomic Establishment-Level Data

STUDY	DATA	RESULTS
Bartik (1988)	Used updated Dunn & Bradstreet data on the location of new branch plants and a comprehensive group of environmental and other industry-cost variables, varied by specific state, to determine whether state environmental regulations were a significant determinant of the actual location of new Fortune 500 branch plants during the 1970s.	Current variations in state environmental regulations have no statistically significant effect upon business location.
Bartik (1989)	Location of small business start-ups for 19 manufacturing industries was compared with the strictness of state environmental controls, as measured by Duerkson's 1983 study.	Differences in stringency of environmental standards had a very small but statistically significant impact upon small manufacturing plant starts-ups.
McConnell & Schwab (1990)	Examined a variety of county characteristics on the locations of 50 new branch plants in the motor vehicle industry during 1973-82 using a conditional logic model.	Regional differences in environmental regulations had no significant effect upon the choice of location of new motor vehicle branch plants between 1973-82.
Levinson (1993)	Census of Manufacturers data on number of new branch plants between 1982-87.	No evidence that variations in environmental stringency affects plant location choice in general, although there is some evidence that variations affect the location choice of the largest multiplant companies in pollution-intensive industries.
Friedman, Gerlowski, & Silberman (1992)	Compared siting of 884 new foreign manufacturing branch plants between 1977 and 1988 with stringency of state environmental programs measured by state pollution abatement capital expenditures divided by state gross product originating in manufacturing industries.	While negative, the stringency of state pollution regulations did not exert a statistically significant effect upon location of new foreign branch plants between 1977-88.

The microeconomic studies uniformly find that variations in environmental regulations do not affect industry location decisions in any significant manner. In an early microeconomic study, Virginia McConnell and Robert Schwab examined the impact of local air pollution regulations controlling facility emission of volatile organic compounds (VOCs) upon the locations chosen for opening 50 branch

automobile plants between 1973 and 1982. McConnell and Schwab found that whether a particular county was in attainment with the ambient ozone standard¹⁶⁸ was irrelevant to where the branch plants were opened.¹⁶⁹ There was *some* evidence, however, that firms were deterred from opening branch plants at the most polluted cities in the country, cities where the ambient ozone levels were severely out of attainment.¹⁷⁰ The significance of the results of the McConnell & Schwab study are somewhat reduced by the fact that the motor vehicle industry, according to the authors' own admission, has traditionally kept associated plants in contiguous locations.¹⁷¹ Prior studies conclude that agglomeration and transport economies were extremely important to the automobile industry's origins in the Detroit area. One scholar criticizes McConnell and Schwab's results as being closer to an anecdote than a general conclusion.¹⁷²

A more recent study of much broader scope conducted by Timothy S. Bartik examined the effects of state environmental regulations upon the location of new manufacturing branch plants owned by Fortune 500 companies between 1972-78. Bartik examined branch plants because he was more likely to detect even a small effect of differences in state regulation upon branch plant openings than upon relocations of existing plants.¹⁷³ According to Bartik, his results "do not show any statistically significant effect of current variations in

168. Ozone is one of six air pollutants for which Congress has directed the EPA to establish national ambient air quality standards (NAAQs). See Clean Air Act, 42 U.S.C. § 7409 (1994). Initially, the EPA's ozone NAAQ was .08 ppm, not to be exceeded more than once per year. In 1979, the EPA raised the standard to .12 ppm. States are in "attainment" when the level of the pollutant is lower than the applicable NAAQ and in "nonattainment" when the levels of the pollutant exceed the NAAQ.

169. McConnell & Schwab, *supra* note 144, at 79.

170. *Id.* These cities were out of attainment in both 1977 and 1982. The severity of the nonattainment problem of these cities is recognized when it is remembered that in 1979, EPA raised the ozone NAAQ from .08 ppm to .12 ppm. McConnell and Schwab's study thus concludes that, because of environmental regulations, branch plants of the automobile industry were deterred from locating in just three U.S. cities, each of which was severely out of attainment with the ozone NAAQ: Los Angeles, Milwaukee, and Houston. *Id.* at 79 n.28.

171. *Id.* at 70 (discussing industry's origins in Detroit).

172. Levinson, *supra* note 144, at 46 (remarking that McConnell & Schwab's finding that environmental regulation was a statistically significant factor for only three cities that were extremely far out of compliance with the Clean Air Act "closer in spirit to an anecdote than a general conclusion: a particular industry, with a particular pollution problem, appears to be deterred from three specific cities").

173. Unlike existing plants, branch plants lack investments that deter mobility. Furthermore, the environmental laws applied to new plants are generally more stringent standards than those that apply to existing plants. Bartik, *The Effects of Environmental Regulation*, *supra* note 144, at 23.

state environmental regulations upon business location" at conventional levels of significance.¹⁷⁴ Bartik was able to rule out the existence of all negative effects upon industry location attributable to environmental regulatory stringency with the exception of small effects. By small, Bartik means effects so small that were a state to tighten its standard for particulate reduction (the most sensitive of the environmental parameters tested) sufficient to raise its rankings from the national average to the top one-third in state environmental stringency, it might possibly lose as much as 3.3% of the total number of new plants that would have located in its state absent such a shift. By comparison, the same size change in the percentage of a state's labor force that is unionized, would produce a statistically significant 30-40% drop in the number of new firm sitings.¹⁷⁵ Moreover, Bartik was unable to detect any effect upon highly polluting industries, though he performed additional statistical tests designed specifically to capture such an effect.¹⁷⁶

A subsequent study using more recent data largely confirmed Bartik's results. Using data from the Census of Manufacturers on the opening of new branch plants between 1982 and 1987¹⁷⁷ and the 1991 "Green Index," ranking states for their environmental stringency,¹⁷⁸ Arik Levinson found "no evidence that variations in regulatory stringency across states affect plant location choice in general."¹⁷⁹ Levinson did find some evidence that such variations affected the location decisions of the "largest multiplant companies in pollution-intensive industries."¹⁸⁰

174. *Id.* Standard errors on the coefficients for environmental variables were roughly the same size as the coefficients themselves, indicating no significance at the 99, 95 or even 90 percent confidence intervals. *Id.* at 32 (Table 1).

175. *Id.* at 32-33.

176. *Id.* at 33 (failing to detect a negative effect upon branch company location resulting from environmental regulation even after conducting an additional statistical test weighing the coefficients of highly polluting industries).

177. Prior studies had used data from Dunn & Bradstreet, while Levinson used data from the Census of Manufacturers. *See* Levinson, *supra* note 144, at 48.

178. Bartik's data, as well as the other studies, were based upon data on state environmental regulations during the 1970s. Yet, the 1980s witnessed a tremendous increase in state involvement in environmental policy-making, as states passed environmental legislation that would qualify them to run federal environmental programs. This state activity is likely to have increased the variation in environmental regulations and hence the sensitivity of business location decisions to state environmental regulations. *Id.* at 46-47.

179. *Id.* at 65.

180. *Id.* Levinson attributes this to two factors: "that multi-plant firms have economies of scale in location searches" and that branch plants are "geographically footloose" in that they are less likely to be tied to any specific region than plants opened by single entrepreneurs. *Id.* at 63.

In summary, the general consensus conclusion of the large number of studies on the determinants of firm location is that variations in the stringency of environmental standards, if it affects firm location at all, is at most a minor factor. This indicates that to the extent that state regulators relax environmental standards in order to encourage the location of new firms or to discourage the relocation of existing ones, such changes will lead to suboptimally low environmental standards; social welfare losses attributable to lower standards are not compensated by economic benefits.

C. Survey of Players in State Environmental Policy-Making on the Role of Interstate Competition

(1) Survey Design and Purpose

In order to determine, empirically, whether states seek to relax their environmental standards in order to attract or retain industry, the author conducted a survey of five separate groups of respondents who either were responsible for or influential in state environmental standard-setting: state environmental regulators, state legislators, state economic development agency officials, state chamber of commerce officials, and directors and staff members of state citizen environmental organizations.¹⁸¹ The survey asked each group of respondents to fill out a questionnaire containing five sets of substantive questions relevant to the race-to-the-bottom hypothesis.¹⁸²

181. State environmental regulators actually include three separate subgroups: directors of state water pollution administrators, state air pollution administrators, and administrators of state environmental agencies. Table 4 in the Appendix shows the numbers of individuals from each group surveyed as well each group's response rate.

182. Using the questionnaire for the state environmental regulators as an example, the following sketches the nature of the different sets of questions. The respondent was asked in the first set of questions how he or she rated the importance in industry location decisions, of the stringency of environmental standards and other frequently mentioned factors. The second set of questions asked respondents whether government officials in their state were concerned about the possibility that industry currently located in the state might relocate elsewhere or that firms would choose other states in which to site new plants and, if so, whether this concern had ever played a role in the state's environmental actions, decisions, or policies. Ten questions within this set asked the respondent whether concern over industry relocation had ever played a role in the state taking particular actions such as not adopting, or adopting a less stringent, environmental standard, reducing the steps employed in the state's typical permit review process, or not enforcing or assessing lighter civil or criminal penalties in the enforcement of an environmental violation. The third set asked respondents the degree of their familiarity with other state's environmental standards, the source of that familiarity, and how likely the respondent was to know whether another state's standard was more or less stringent than his or her own state's standards. In the fourth set, respondents were asked questions regarding the relationship of their state's standards to the standards of other states. For instance, they were asked whether they

A new study was deemed necessary because of the paucity of research on this topic. While many on both sides of the debate over whether a race-to-the-bottom exists assume that states relax their standards in response to interstate competition, systematic searches through the legal literature failed to uncover a single study whose purpose was to confirm this fact. A survey was chosen as the format for obtaining evidence relevant to the race-to-the-bottom hypothesis for several reasons. For example, as just discussed, there exist numerous studies of the importance of environmental standards to industry location, nearly all of which conclude that they are relatively unimportant. It could be argued from these studies that the race-to-the-bottom does not exist because if industry is not influenced by environmental standards, states obviously cannot compete through their use. This argument assumes, however, that states understand and believe that environmental standards are not important to firm location. If the evidence indicates that states do not understand or believe that environmental standards are unimportant to firm location and hence continue to use them to compete for firms, just the opposite could be argued: that a race-to-the-bottom exists (because more lax environmental quality is not made up for by the economic benefits of new firms).¹⁸³

believed it most important for their state's standards to be more or less stringent than, or of about the same stringency as, the standards of other states and whether their state had ever revised their state standards to copy the standards of another state after discovering that the other state's standards were more or less stringent than their own. In the final substantive section of the survey, respondents were asked whether their state had recently enacted any of a list of popular regulatory reform measures and whether concern over industry relocation and siting, or the adoption of a similar measure by another state, had played a role in the state's adoption of the measure.

The survey was designed to both determine the actual role of concern over industry relocation and siting in state environmental agency's actual actions and policies, and to determine the effect of this concern upon the lobbying of groups influential in state environmental agency decisionmaking. Thus, the survey asked state environmental regulators what their agency *did* or *they themselves believed*; state citizen environmental groups, who were placed in the role of double-checking the responses of the regulators, were asked what *they believed state regulators did and believed*; and state legislators, state economic development agencies, and state chamber of commerce officials were asked what role concern over industry relocation had played, if any, in *prompting them to lobby for or against* or to *support or oppose* certain types of environmental legislation or environmental regulations. To ensure that the respondents held a common body of experience and knowledge, a final set of questions in the survey asked the respondent questions about the breadth and nature of his or her own background and experience in state environmental matters.

183. See LOWRY, *supra* note 144, at 13 ("Even if it is true that few industries base relocation decisions on differentiated policies, that does not mean that states do not compete through such policies.").

A survey is one way to determine the importance, attributed by state regulators, of environmental standards upon firm location. If, despite the conclusions of firm location studies, regulatory officials nevertheless believe that the stringency of environmental standards is important to industry, and consequently relax them under a belief that this is necessary in order to retain or attract industry, a race-to-the-bottom may exist. Evidence that states relax their standards in response to an industry relocation threat, when coupled with data on the significance of environmental standards to firm location decisions, provides compelling *prima facie* evidence of suboptimal outcomes. Further, a survey can reveal similarities in state interactions with actors in a game, thus providing evidence of the applicability of game theory to interstate competition.

The principle liability of survey data is, of course, bias. There are two types of survey bias: bias in the selection of respondents and bias in the actual responses of those respondents.¹⁸⁴ Although pains were taken to exclude bias from the present survey's results,¹⁸⁵ biased responses cannot be ruled out. However, to the extent that bias was present in the respondents' answers, it is quite plausible that it worked against the respondents owning up to their state governments relaxing environmental standards out of concern over industry relocation and siting. Such revelations might be viewed as "caving in" to industry, an appearance that environmental regulators would presumably want to

184. Charles H. Backstrom & Gerald Hursh-Cesar, *SURVEY RESEARCH* 66-76, 122-24 (2d ed. 1981).

185. The survey contained several design features intended to minimize the influence of bias. First, respondents were assured of the confidentiality of their responses. For instance, respondents were informed that the survey was being concluded as an anonymous survey. Each questionnaire was affixed with a unique study number that was correlated with the personal names of the respondents only to determine which questionnaires had been returned and who needed a reminder letter or phone call. Respondents were assured that neither the personal names nor the names of individual states would be used to interpret or explain the survey results. Finally, the respondents were assured that, once all completed questionnaires were received, the list of names to whom the survey was sent would be destroyed. See Appendix (directions to survey respondents). Second, to avoid pointing respondents in any particular direction in their responses, respondents were offered alternative explanations for state behavior. For example, as noted above, respondents were asked both if they believed states were engaged in a race-to-the-bottom and if they believed states were engaged in a race-to-the-top; whether they copied other state's more stringent standards and whether they copied other state's less stringent standards. Third, similar sensitive questions were rephrased and repeated in different parts of the questionnaire so as to provide a basis for double-checking a respondent's earlier response for bias. (Note, however, that the response rate to some questions was low; for example, 24% of legislators in Table 5, and a low response rate raises questions of validity.)

avoid. Thus, response bias, if it exists, would tend to result in underreporting of standard-relaxation.

Bias in responses among the groups surveyed may be predicted to be strongest with respect to the political agency appointees, and weakest with respect to career officials, and indeed, the survey results could be interpreted to confirm this (although other explanations could also explain the occasional observed differences between the responses of career and political appointees).¹⁸⁶ A counter-bias, a tendency to overemphasize the influence of the industry relocation threat upon standard-relaxation, may account for the responses of the other groups besides the environmental regulators. State legislators, for example, may have been elected because they promised to be conciliatory toward industry. Such bias may also creep into the responses of the constituency groups surveyed, such as the state chamber of commerce officials and citizen environmental organizations, both of whom might stand to gain from revealing instances in which regulatory officials have been solicitous of industry.¹⁸⁷

(2) *Summary of Survey Results*

The interstate competition survey revealed that many states are concerned about industry relocation and siting, that such concern does at times influence their environmentally related actions, policies and standards, and that a substantial minority of states have relaxed their standards in response to this concern at some point in the past. The following summary is drawn from the analysis of the survey results found in Tables 4-6 in the Appendix.

Focusing upon the responses of environmental agency officials—the largest and most important group surveyed—several conclusions can be made.¹⁸⁸ First, the possibility that industry might relocate or

186. See *infra* text accompanying notes 202-04.

187. Chambers of Commerce and state economic development agencies have a business constituency and would therefore be expected to emphasize their successes in cutting back environmental regulations. Citizen environmental groups may have motives to embellish the extent to which regulators are intent upon dismantling environmental laws so as to create a sense of urgency and importance to their work. When interpreting the responses of citizen groups, however, this incentive for bias must be balanced against their potentially broader perspective. While a state environmental regulator may only know his or her department's policies with respect to the narrow scope of issues he or she is assigned to, a citizen group may be familiar with the actions of that entire agency as well as the activities of other state agencies with environmental responsibilities.

188. The data related to state environmental regulators are drawn from 80 mailed questionnaires sent to regulators between April and July, 1996. The author has subsequently received additional questionnaires from additional state environmental regulators.

site a new plant elsewhere is something of a concern to the environmental regulators in many states, and affects environmental policy-making in some manner in most states. Indeed, 57 out of 65 regulators (88%) who responded to the question (out of a total of 80 regulators surveyed) stated that concern over industry relocation and siting affects environmental decisionmaking in their state.¹⁸⁹ Also supporting this conclusion are data showing that environmental regulators as a group rank environmental stringency last among five possible factors influencing industry location decisions, but over half (59%, or 47 out of 80 respondents)¹⁹⁰ believed that this factor was a fairly or a very important determinant of industry location.

For a substantial minority of regulators, this concern over industry relocation and siting has played a role in the state somehow relaxing or choosing not to adopt, implement, or enforce its environmental health or safety standards. Of the given range of reactions to industrial siting or relocation, environmental regulators reported that a state was most likely to reduce the number of steps in its typical permit review process (25 out of 54, or 46% of those who answered the question);¹⁹¹ adopt a less stringent environmental standard (18 out of 52, or 35% of those who answered the question);¹⁹² delay the adoption of an environmental standard (19 out of 54, or 35% of those who answered the question);¹⁹³ levy a smaller civil penalty or a lighter criminal penalty for an environmental violation (16 out of 51, or 31% of those who answered the question);¹⁹⁴ or oppose the adoption of a standard (16 out of 53, or 30% of those who answered the question).¹⁹⁵

These same state environmental regulators were less likely to report that concern over industry relocation and siting had played a role in decisions relating to monitoring, permit-issuance, or whether or not the state abandoned an ongoing enforcement action. Thus, fewer regulators cited industry location concerns as a factor in their state allowing a permittee to reduce the frequency or comprehensiveness of

While these later-received questionnaires are not incorporated in the data set discussed in this Article, they reinforce the conclusions discussed herein. The author plans to publish the results of all questionnaires received from state environmental regulators, together with a more detailed analysis of the survey as a whole, at a later date.

189. Appendix, tbl. 5 at Question 4.

190. *Id.* at Question 1(A).

191. *Id.* at Question 10.

192. *Id.* at Question 7.

193. *Id.* at Question 6.

194. *Id.* at Question 14.

195. *Id.* at Question 5.

environmental monitoring (6 out of 52, or 12% of those who answered the question);¹⁹⁶ granting a pending permit (9 out of 54, or 17% of those who answered the question);¹⁹⁷ or dropping an enforcement action altogether (9 out of 54, or 17% of those who answered the question).¹⁹⁸

Some environmental regulators (10 out of 80 total) stated that concern over industry siting and relocation had played "no role" in their state's environmental standard-setting, permitting, and enforcement actions.¹⁹⁹ When asked to explain why they believed that concern over industrial development did not influence environmental decisions, regulators were most apt to cite the existence of minimum federal environmental standards which reduced the state's discretion to use more lax standards to attract industry.²⁰⁰ For this group of regulators, the state's desire to attract nonpolluting industries and the importance of environmental quality to the state's residents over and above the economic benefits of industry were secondary explanations for the immunity of environmental decisions to the state's desire to attract industry.²⁰¹

The types of agency actions most likely to be attributed, at least in part, to concern over industry relocation or siting differed across the subgroups of environmental regulators. As a general matter, a lower level official in a state's air pollution control division was more likely to claim that concern over industry siting or relocation negatively affected the vigor of the state's environmental efforts than the administrator or secretary of the entire state agency (or even a member of the administrator's or secretary's staff, since many of the secretaries and administrators had staff members fill out the survey questionnaires). This was especially true with respect to standard-setting and certain actions relating to the permitting process. Thus, for example, as opposed to 14% (2 out of 14) of state agency administrators or secretaries answering the particular question, 43% (10 out of 23) of state air program officials answering the question stated that concern over industry siting and relocation had played a role in their state not adopting an environmental standard and in their agency asking for less information from an environmental permittee.²⁰² Simi-

196. *Id.* at Question 9.

197. *Id.* at Question 12.

198. *Id.* at Question 13.

199. *Id.* at Question 4.

200. *Id.* at Question 16(C).

201. *Id.* at Question 16(A), 16(B).

202. Appendix, tbl. 6 at Questions 5, 8.

larly, as opposed to 21% (3 of 14) of those agency administrators or secretaries who answered the question, 43% (10 of 23) of the air programs office officials who responded to the question stated that this concern had played a role in their state delaying the adoption of an environmental standard.²⁰³ Only with respect to reductions in the number of steps involved in the typical permit review process did the percentage of agency administrators and staff members answering the question match the percentage of air pollution control officials who stated that their state had made such a reduction out of concern over industry relocation and siting (46% air program officials answering the question as opposed to 43% of agency secretaries or administrators answering the question).²⁰⁴ While the distinction may be attributable to bias, it could also be due to the different perspectives of the offices held by these two groups of individuals. Agency administrators are much less likely to get involved in the substantive standards in an agency permit, though they may well be involved in the administrative permit review process by virtue of their positions at the head of an agency.

The responses of agency regulators did not greatly differ across geographic regions, however. With the exception of the responses of regulators in northeastern and mid-Atlantic states, the answers given by state environmental regulators were fairly uniform. Regulators in the northeast and mid-Atlantic states were more likely to report that their state had relaxed an environmental standard than regulators in other regions of the country;²⁰⁵ however, because of the small number of regulators from northeastern and mid-Atlantic states included in the survey (8 in total), it is difficult to generalize on the basis of the survey results alone.

Interestingly (and not wholly surprisingly), citizen environmental organizations as a group were more likely to report that concern over

203. *Id.* at Question 6.

204. *Id.* at Question 10.

205. *See, e.g.*, Appendix, tbl. 7, at Questions 5-15, 23, 23(A), 24, 24(A). For example, 83% of northeastern-mid-Atlantic regulators reported that concern over industry siting and relocation had contributed to their state reducing steps in the typical permit review process; 75% said that this concern had contributed to their state levying a smaller civil or a lighter criminal penalty for an environmental violation. *Id.* at Questions 10, 14. However, these percentages represent the responses of only five and three regulators, respectively. Similarly, 57% of northeastern/mid-Atlantic regulators claimed that their state had revised a standard upon learning of another state's less stringent standard, and only 14% stated that the state had mimicked another state's more stringent standard. *Id.* at Questions 23, 24. Again, however, these percentages represented the responses of only a few regulators—four and one regulator respectively.

industry siting and relocation influenced state environmental decision-making than were state environmental regulators. Thus, nearly all organization members responding to the particular question reported that this concern contributed to discouraging their state from adopting environmental standards (17 out of 19, or 90% of the members answering the question),²⁰⁶ encouraging their state to adopt less stringent standards (17 out of 18, or 94% of the members responding to the particular question),²⁰⁷ encouraging their state to allow industries to discharge larger amounts of pollutants (13 out of 14, or 93% of those responding to the particular question),²⁰⁸ and leading their state to grant otherwise questionable environmental permits (14 out of 15, or 93% of the members answering the particular question).²⁰⁹ Environmentalists were in least agreement on some of the actions that also witnessed less agreement among the environmental regulators. Approximately three-quarters of environmental group members believed that concern over industry siting and location influenced the monitoring frequency required of industry by their state regulators (11 out of 15, or 73% of the group members answering this particular question),²¹⁰ and a similar percentage thought that this concern contributed to their state dropping ongoing environmental enforcement cases (8 out of 11, or 73% of the members answering this particular question).²¹¹ The differences between citizen groups and environmental regulators could be attributable to a biased assessment of state officials' priorities, or, alternatively, to the broader perspective possessed by citizen groups who oversee the workings of not just a single division within an agency or even a single agency, but all aspects of state government that impinge upon the environment.

Another conclusion supported by the data is that states strive to mimic the standards of other states—activity that is at least consistent with the hypothesis that states act strategically when establishing environmental standards. On average, environmental regulators agreed “strongly” with the proposition that it was important that their state’s standards be of about the same stringency as the standards of neighboring states.²¹² Regulators rated uniformity more important than their state’s standards being either less stringent or more stringent

206. Appendix, tbl. 5 at Question 5.

207. *Id.* at Question 7.

208. *Id.* at Question 11.

209. *Id.* at Question 12.

210. *Id.* at Question 9.

211. *Id.* at Question 13.

212. *Id.* at Question 20(C).

than the standards of other states (though they slightly preferred that their standards be less stringent rather than more stringent).²¹³ Environmental regulators reported that they were generally likely to know the standards of neighboring states, which would make such uniformity possible.²¹⁴

While the responses of the environmental regulators indicate that states may act strategically, it is unclear whether this strategic interaction prompts states to establish more or less stringent standards than they would otherwise establish were they islands. The importance of uniformity to the regulators could indicate that states duplicate each other's standards regardless of whether they are lax or stringent. The regulators' responses to other survey questions also failed to establish a clear trend upward or downward; on average, regulators "disagreed somewhat" with *both* the proposition that competition for industry leads states to race to relax their environmental standards in order to attract industry or to prevent industry from moving to another state *and* that states race to enact tougher environmental standards.²¹⁵ On the other hand, that strategic state standard-setting leads to a race to laxity cannot be ruled out. Although regulators disavow such a race, this disavowal is somewhat undercut by their responses to other survey questions, namely (1) the admission, by a sizable number of regulators, that the existence of federal minimum standards is a "fairly major reason" for why states do not relax their standards to attract industry;²¹⁶ and (2) the greater number of regulators who claimed their state had relaxed a standard so as to be uniform with another state (18 out of 67, or 27% of the regulators responding to the particular question)²¹⁷ than the number of regulators who claimed their state had tightened a standard so as to be uniform with another state (14 out of 27, or 21% of the regulators responding to that particular ques-

213. *Id.* at Questions 20(A), 20(B), 20(C).

214. *Id.* at Questions 17(A), 17(B), 17(C). States were less likely to be familiar with the standards of states that were merely within their same geographic region and even less likely to be familiar with the standards of states outside their same geographic region.

215. *Id.* at Questions 21, 22.

216. *Id.* at Question 21(A)(i). On average, those regulators who rejected the race-to-the-bottom thesis rated the existence of federal minimum standards as the best explanation for the lack of such a race. These regulators also rated the importance of environmental quality to residents as somewhat more than a "minor reason" for the lack of a race, and rated the state's knowledge that environmental standards are relatively unimportant in industry location decisions as only a "minor reason." *Id.* at Questions 21(A)(iii), 21(A)(ii).

217. *Id.* at Question 23, 23(A).

tion).²¹⁸ Furthermore, on average members of environmental organizations reported that state environmental regulators believed it was just as important to have standards that were less stringent than neighboring states as to have uniform standards and that either option was preferable, in the eyes of the regulators, to their state having more stringent standards.²¹⁹

The distinction between states following each other in setting more stringent or less stringent standards (or both) is not as important as it might seem. As discussed more thoroughly below in Part V.A., to the extent that states act strategically in setting environmental standards, the market for industrial plants cannot be presumed to be efficient and thus, according to the definition employed by the revisionists, it is plausible to presume that states are engaged in a welfare-reducing "race-to-the-bottom." Thus, the presence of strategic interactions responds to the fundamental question of whether a race-to-the-bottom exists, while the issue of whether interstate competition pushes states to adopt more or less stringent standards only elaborates upon the nature of the race-to-the-bottom. Because the race-to-the-bottom is simply a race to inefficiency, that race can occur both when states adopt standards that are too stringent as well as when states adopt standards that are too lax.

The survey results also demonstrate that concern over industry relocation and siting causes state legislators and business groups to exert substantial pressure upon state environmental regulators to relax the strictures of state environmental programs. Large percentages (often over 50% of those answering the particular question) of state legislators, state economic development agency officials, and state chambers of commerce officials reported that this concern had prompted them to introduce or sponsor measures to relax the state's environmental standards or to not adopt or to delay the adoption of an environmental regulation.²²⁰ Also, while economic development and chamber of commerce officials, like environmental agency regulators, disagreed that a race-to-the-bottom existed, their other responses

218. *Id.* at Question 24.

219. *Id.* at Questions 20(A), 20(B), 20(C) (on average, citizen environmental group members stated they "agree somewhat" with the proposition that state environmental regulators believe that it is important that their state standards be less stringent than those of neighboring states and also "agree somewhat" with the proposition that regulators believe it to be important that they have standards that are less stringent than those of neighboring states, but disagreed with the proposition that state regulators believed that it was important that their state have more stringent standards than neighboring states).

220. *Id.* at Questions 5-14.

seemed to support the existence of such a race. For instance, these two groups were over six times more likely to report that their state had revised its standards upon learning of another state's less stringent standard than they were to report a revision in response to another state's more stringent standard.²²¹

Thus, survey data demonstrate that state regulators and others influential in state environmental standard-setting and permitting believe that the stringency of environmental standards is an important factor in firm location decisions. The data furthermore demonstrate that for a substantial minority of states, concern over industry siting and relocation has contributed to the state relaxing, not adopting, vigorously implementing, or enforcing environmental standards. Hence, survey data indicate that state regulators are either not aware of or do not believe the results of firm location studies demonstrating the unimportance of environmental standards to firm location, or are under political pressure, regardless of their awareness or belief, and that many states relax their environmental standards without being assured of compensating economic benefits.

D. Recent Developments in State Environmental Law

Recent developments in state environmental law support the results of the author's survey, demonstrating that interstate competition for industry prompts states to reduce the stringency of their environmental programs and that states often seek to copy the environmental laws or regulations of other states. Two developments are discussed here: the outbreak of state laws forbidding state environmental agencies from promulgating standards more stringent than the minimum standards promulgated by the federal government, and the spread of state legislation protecting the fruits of corporate environmental compliance audits from discovery or use by government enforcement authorities.

(1) "No More Stringent Than" State Legislation

As discussed in an earlier section, most federal environmental statutes direct EPA to promulgate minimum standards, but authorize states implementing the federal program to enact standards more stringent than these federal minimums if they wish.²²² While many

221. *Id.* Compare responses of economic development agency and Chambers of Commerce officials to Questions 23, 23(A) with the responses of these same officials to Question 24, 24(A).

222. See *supra* text accompanying note 56.

states have enacted more stringent standards, an opposite trend has also taken place: a large number of state legislatures have passed laws preventing their state agencies from promulgating standards more stringent than the federal minimums.²²³ In essence, states enacting such laws have turned the "federal minimums" into "federal maximums."

The trend toward "federal minimum/state maximum" laws is consistent with the existence of the race-to-the-bottom, though other inferences are possible. In the states enacting such legislation, it is clear that the federal standards are the most stringent standards that the state would possibly consider enacting and most likely constitute standards more stringent than the state's preferred standards. It is certainly plausible that such artificial dampening of state environmental standards is attributable to a concern, by state legislatures, that more stringent standards will place their state at a competitive disadvantage in the quest for new businesses vis-à-vis other states.²²⁴ The results of the author's survey, showing that state legislators were more likely to be concerned about industry relocation and siting than environmental agency regulators and that this difference appears to be statistically significant,²²⁵ supports this interpretation.

On the other hand, other inferences are also possible. For example, it could be that the federal standards are "too stringent," i.e., the welfare benefits that would accrue from less stringent standards are greater than the welfare losses that accrue from lower environmental standards. Consequently, in preventing their state's standards from outdoing the stringency of the federal standards, states are simply attempting to minimize the welfare losses that would accrue from more stringent standards.

223. As of 1995, a total of nineteen states had enacted at least one statute limiting the authority of a state agency to promulgate rules more stringent than that required by federal environmental laws. See Jerome M. Organ, *Limitations on State Agency Authority to Adopt Environmental Standards More Stringent than Federal Standards: Policy Considerations and Interpretive Problems*, 54 MD. L. REV. 1373, 1376 n.13 (1995) (citing such state laws). Although most of these laws are media- or source-specific (e.g., restricting enactment of more stringent hazardous pollutant standards than the federal standards), the laws in several states generally prohibit their state environmental agencies from enacting any regulation more stringent than the federal laws or regulations. *Id.* at 1377. See also James M. McElfish, Jr., *Minimal Stringency: Abdication of State Innovation*, 25 E.L.R. 10003 (1995) (discussing recent sweep of "no more stringent than" state laws).

224. See Organ, *supra* note 223, at 1388-89.

225. See *infra* Appendix, tbl. 6, Question 3.

(2) *State Audit Privilege and Immunity Legislation*

A second development supporting the author's survey results is the recent rash of state acts affording the fruits of corporate environmental self-audits protection from discovery by government enforcement officials. State audit legislation generally provides that voluntary internal corporate environmental audits are privileged from disclosure to government officials through discovery, or that the self-disclosure of corporate noncompliance with environmental laws is immune from civil and criminal penalties, or some combination of both privilege and immunity legislation.²²⁶ As of this writing, sixteen states had passed some form of corporate audit legislation just within the past three years, and audit privilege and immunity bills are currently pending in twenty-three others.²²⁷

The similarities among audit privilege bills and the alacrity with which such legislation has spread among the states demonstrates the degree to which states are aware of environmental initiatives in other states and copy such initiatives for adoption in their own state. The audit privilege example also demonstrates that industry can be responsible for spreading environmental legislation. According to some accounts, certain corporations have had a significant role in causing audit privilege and immunity legislation to spread from state to state.²²⁸ These industries, many of which have had less than stellar environmental report cards, are reportedly the driving force behind national business lobbying groups who are pushing state representa-

226. See generally, Mia Anna Mazza, *The New Evidentiary Privilege for Environmental Audit Reports: Making the Worst of a Bad Situation*, 23 *ECOLOGY L.Q.* 79 (1996) (discussing the privilege, its effects, and alternative methods employed to protect environmental audit reports).

227. States that have enacted some form of corporate audit procedures include: Arkansas (ARK. CODE ANN. § 8-1-301 (Michie 1995)), Colorado (COLO. REV. STAT. ANN. § 13-25-126.5 (West 1995)), Idaho (IDAHO CODE § 9-802 (1996)), Illinois (ILL. REV. STAT. ch. 415, para. 5/52.2 (1996)), Indiana (IND. CODE ANN. § 13-28-4-1 (West 1994)), Kansas (KAN. STAT. ANN. § 60-3333 (1995)), Kentucky (KY. REV. STAT. ANN. § 224.01-040 (Baldwin 1996)), Michigan (MICH. COMP. LAWS ANN. § 324.14802 (West 1996)), Mississippi (MISS. CODE ANN. § 49-2-71 (1995)), New Hampshire (N.H. REV. STAT. ANN. § 147-E:1 (1996)), South Carolina (S.C. CODE ANN. § 48-57-10 (Law Co-op. 1996)), South Dakota (S.D. CODIFIED LAWS ANN. § 1-40 (1996)), Texas (TEX. REV. CIV. STAT. ANN. art. 4447cc (West 1996)), Utah (UTAH CODE ANN. § 19-7-103 (1996)), Virginia (VA. CODE ANN. § 10.1-1198 (1995)), Wyoming (WYO. STAT. § 35-11-1105 (1995)).

228. CHRISTOPHER BEDFORD, *DIRTY SECRETS: THE CORPORATION'S CAMPAIGN FOR AN ENVIRONMENTAL AUDIT PRIVILEGE* (Environmental Action Foundation Feb. 1996) (alleging that industries who have recently been subject to greater public scrutiny of their environmental records are behind the wave of state audit privilege bills).

tives to introduce and pass corporate self-audit privilege and immunity bills.²²⁹

It is not so clear, however, whether the spread of state audit privilege and immunity laws constitutes a downward shift in environmental quality or an upward shift. Proponents of such bills argue that audit legislation encourages companies to monitor and correct their environmental compliance because any noncompliance that is discovered will not be revealed to authorities or used as the basis for penalties.²³⁰ From this it might be argued that the widespread adoption of such legislation constitutes an upward shift because it will lead to a cleaner environment.

On the other hand, critics argue that audit privilege legislation simply saves polluters from adverse publicity and exonerates them from responsibility for their illegal acts.²³¹ From its recent actions, it is clear that the Clinton Administration views audit privilege legislation as a threat to state environmental programs. The EPA recently withheld delegation of the Clean Air Act's permitting program from one state due to the state's enactment of an audit privilege statute.²³² In an effort to head off the further multiplication of such state laws, the Clinton Administration promulgated its own audit privilege policy affording certain immunities to companies who discover, report, and correct environmental noncompliance pursuant to a self-audit.²³³ This

229. *Id.*

230. See, e.g., Jim Moore and Nancy Newkirk, *Not Quite a Giant Step*, 12 ENVTL. L. FORUM 16, 16-17 (1995); John H. Cushman, Jr., *Many States Give Polluting Firms New Protections*, N.Y. TIMES, Apr. 7, 1996, at A1.

231. Craig N. Johnston, *An Essay on Environmental Audit Privileges: The Right Problem, the Wrong Solution*, 25 ENVTL. L. 335, 337-43 (1995) (arguing that the creation of privileges "is not the way to go" because they increase costs of environmental enforcement, enforcement-related investigations, and would shield some violators from criminal enforcement).

232. 61 Fed. Reg. 30,570, 30,572 (1996) (to be codified at 40 C.F.R. pt. 70) (proposed June 17, 1996) (reproposing to deny delegation of Clean Air Act operating permits program to Idaho based upon Idaho's enactment of a statute providing that any person who voluntarily discloses an environmental audit report identifying circumstances that may constitute an environmental violation shall be immune from civil or criminal penalties associated with the violation).

233. Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations, 60 Fed. Reg. 66,706, 66,711 (1995). The EPA policy provides that the EPA will waive gravity-based (noneconomic benefit) penalties and will recommend against criminal prosecution where a violation is discovered through a voluntary environmental audit, corrected, and measures put in place to prevent recurrence. The EPA policy also states that the EPA will reduce gravity-based penalties by 75% even for violations that are voluntarily discovered, corrected, and remedied, even if they were not found through a formal policy. Finally, the EPA promised that it would adhere to its long-standing practice of refraining from routine requests for environmental audit reports. *Id.*

would indicate that the adoption of audit legislation signals a downward shift because it will lead to a more polluted environment.

IV. Lessons from the Empirical Evidence

A. Significance of Empirical Evidence to the Theoretical Debate

The record of empirical evidence is less than ideal in that it does not conclusively answer many of the unresolved issues relevant to the race-to-the-bottom debate. Nevertheless, the empirical record is sufficient to sketch a broad outline of conclusions. As a general matter, the empirical evidence indicates that the conditions of interstate competition for industry in the real world differ from the conditions necessary to yield efficient environmental standards. These conditions are sufficient to predict suboptimal standards, whether the assumed theoretical framework for interstate competition is competitive neoclassical economics (as argued by the revisionists) or game theory (as traditionally argued). This is because the evidence appears to show both that the interstate market for industrial firms is not perfectly competitive and that it contains the imperfection—small numbers of states and firms—that triggers the applicability of non-cooperative game theory. Because of these differences between the conditions necessary for perfect competition and those existing in the real world market for new industry, there is little basis for asserting, as the revisionists do, that interstate competition can be presumed to lead to efficient state environmental standards. The following sections apply the empirical evidence detailed above to the conditions outlined in Part III that either trigger market failures or otherwise undermine the conditions necessary for perfect competition.

(1) *The Empirical Data Provide Prima Facie Evidence that States Engage in a "Race-to-the-Bottom"*

Studies on the importance of various site-specific characteristics upon firm location demonstrate that variation in the stringency of state environmental standards has, if anything, only a minor influence upon firm location decisions. Were states both aware of this information and rational economic actors, it could safely be assumed that there is no race-to-the-bottom; no rational economic actor supplied with such information could expect that relaxing environmental standards would occasion much, if any, improvement in a state's economic health. Indeed, the most obvious conclusion to be drawn from studies on firm location is that relaxing state standards will lower social welfare by lowering environmental quality without substituting in its

place greater economic benefits. According to the responses received in the author's survey, however, a substantial minority of officials influential in the state environmental standard-setting process concede that their state has relaxed its standards and permit procedures in order to attract or retain industrial firms.²³⁴ Thus, when combined, data from statistical modeling studies on the actual importance of environmental stringency upon firm location decisions and survey data from state environmental regulators on the influence of concern over industry location upon environmental standard-setting seem to provide prima facie evidence that states are indeed engaged in a race-to-the-bottom. Because industry is unlikely to respond much to differences in environmental standards, the states relaxing their standards will end up with lower social welfare; the welfare losses experienced by states that relax their environmental standards are unlikely to be offset by compensating economic gains.

It is legitimate to wonder why many state regulators act in such an apparently economically irrational manner as to relax environmental standards, not only without any assurance of social welfare gains, but in the face of evidence indicating that such reductions will result in social welfare losses. It could be that state regulators are simply not aware of the evidence demonstrating the unimportance of environmental standards to firm location. Some evidence supporting this explanation is revealed by the author's survey in which a majority of the state environmental regulators responding (59%) stated that environmental standards were either a "fairly" or "very" important factor in determining firm location.²³⁵ Indeed, if regulators are not familiar with the empirical studies on firm location, it would be difficult for a regulator to tell, solely on the basis of the regulator's own experience, whether the siting of new plants (or the failure of existing plants to leave) is attributable to the state's lax standards or whether the plant locations would have occurred even with more stringent standards. On the other hand, regulators were not uninformed when it came to the *relative* importance of environmental standards vis-à-vis other factors. As a group, state regulators ranked the stringency of environmental standards last in importance to four other given factors (proximity to transportation, skill and unionization of the workforce, proximity to natural resources, and the availability of economic incentives), a ranking that is consistent with the findings of most industry location studies.

234. Appendix, tbl. 5 at Questions 5-15.

235. *Id.* at Questions 5-14.

More likely, environmental regulators relax environmental standards to attract industry because they are responding to different incentives. Rather, like any group of government officials, they are subject to politically rational, but not always economically rational, political pressures to accommodate industry with the use of less stringent environmental standards. Indeed the groups one might expect to exert political pressure upon state environmental regulators to weaken regulations both placed greater importance upon environmental stringency in firm location and responded more favorably to the idea that states should use relaxation of environmental standards to attract industry. For example, 86-87% of state legislators, economic development agency officials, and members of state chambers of commerce responded that environmental standards were a "fairly" or "very important" factor in firm location.²³⁶ Each of these three groups ranked the stringency of environmental standards relatively highly—second or third out of the five factors.²³⁷ Additionally, these groups responded with surprising frequency that concern over industry location or relocation had played a role in prompting them to pressure their state government (or, in the case of legislators, introducing or sponsoring legislation) to relax their state's environmental standards.²³⁸ These data indicate that regardless of what environmental regulators themselves may believe about the efficacy of less stringent environmental standards in attracting industry, they are subject to pressure from others, some being quite powerful, who do believe (or at least profess to believe), that stringency is important and are more favorably inclined to relax standards in order to attract industry.

Studies of economic development incentives may provide an additional clue as to the real explanation for why some states engage in an all but fruitless effort to relax their standards to attract industry. This same, seemingly counterintuitive behavior, is manifest in state officials' use of financial incentives to attract industry. In much the same way they have discredited the view that differences in environmental standards affect industry location, social scientists have questioned the effectiveness of business incentive programs. Most scholars agree that relative to other factors (such as proximity to an appropriately skilled labor force, transportation, and raw materials), business

236. *Id.*

237. *Id.*

238. *Id.* For example, 56% of the legislators, 65% of the economic development agency officials, and 82% of the chamber of commerce officials who answered the question responded that concern over industry location or relocation had prompted them to discourage their state from adopting an environmental standard. *Id.* at Question 5.

incentives are not a significant determinant of firm location.²³⁹ Nevertheless, business incentives are still a cornerstone of most state development policies. In an attempt to resolve this apparent contradiction, some scholars have concluded that financial incentives continue to be used both because they allow officials to claim credit for successful business locations and provide a symbolic measure of respect for business important to signaling a hospitable business climate.²⁴⁰ This could also be the case with respect to lax environmental standards.

(2) *The Excessive Market Power Held by Industries and States Implies that Interstate Competition Is Inefficient*

As discussed above in Part III, if the companies supplying industrial firms, or the states demanding such firms, possess excessive market power, this constitutes a market failure, and state policies resulting from such a market will likely be inefficient.

Data on plant sitings indicate that the number of plants and states in a given market are very few. For example, the evidence shows that relatively few new plant sitings occur at any given time in any given state, and that the value of the jobs created by a plant that does site is increasing due to dwindling employment in manufacturing industry as

239. See, e.g., ROGER WILSON, *STATE BUSINESS INCENTIVES AND ECONOMIC GROWTH: ARE THEY EFFECTIVE? A REVIEW OF THE LITERATURE* 22 (Wash., D.C. Council of State Governments 1989); MICHAEL KIESCHNICK, *TAXES AND GROWTH: BUSINESS INCENTIVES AND ECONOMIC DEVELOPMENT* (Wash., D.C. Council of State Planning Agencies, 1981); Roger J. Vaughan, *State Taxation and Economic Development* (Wash., D.C. Council of State Planning Agencies, 1979); Oliver A. Houck, *This Side of Heresy: Conditioning Louisiana's Ten-Year Industrial Tax Exemption upon Compliance with Environmental Laws*, 61 *TULANE L. REV.* 289, 299-308, 346 (1986) (presenting data showing that Louisiana's ten-year exemption for new or expanding manufacturers from state, parish, and municipal property taxes has had little, if any, effect in attracting new industry; the exemption has gone mostly to expansions of existing industries, which the author claims did not need the inducement to stay).

240. See DeLysa Burnier, *Becoming Competitive: How Policymakers View Incentive-Based Development Policy*, 6 *ECON. DEVEL. Q.* 14, 22 (1992) (On basis of study of Ohio's business tax abatement policies, Burnier concludes that "[i]ncentives similar to the enterprise zone are important for their symbolic content. They give practitioners the opportunity to appear active and engaged, and they give elected officials the chance to claim credit and reassure community members that jobs are being created. Finally, incentives are 'important as a symbolic measure of the esteem that business interests command in the community'"); Lee Axelrad, *What Motivates California's Global Promotion Efforts?*, 6 *BERKELEY PLANNING J.* 161, 170 (1991) ("FDI [Foreign Direct Investment, or foreign ownership of productive assets in the United States] promotional activities are increasing despite the fact that access to markets is vastly more important than state promotions. This increase seems to follow from the perceived need, on the part of governments, to demonstrate to potential investors and other constituents that the bureaucracy is doing everything it possibly can to attract new investment.").

a whole. Since virtually all plants are thus welcomed by a state, plants appear to choose locations in the virtual absence of competition from other industries. With respect to states, the evidence suggests that the power of states is usually relatively weaker than the near monopoly position held by a firm attempting to site a large plant.

This evidence indicates that industry participants in the market for industrial plants are likely to be monopolistic, or, at best, oligopolistic, and that states are likely to be oligopolists. Whether monopolists or oligopolists, companies clearly have excessive power in the market for new industry. In the absence of distorting market failures on the state side of the market, the excessive market power of industry will cause industry to under supply new firms and "overcharge" for the firms it provides. Because the stringency of environmental standards is frequently considered part of the industry purchase "price," firms would appear to possess the power to demand that environmental standards be relaxed on their account.

Indeed, this is what the evidence seems to show. Industry appears to exert considerable influence over states when choosing a location for a new or relocating plant. For instance, according to the results of the author's survey, for a substantial minority of states, concern over industry relocation and siting was a factor in their decision to relax existing environmental standards or adopt less stringent standards in the first place.²⁴¹ The influence of industry in state adoption of corporate audit privilege and immunity laws is also an example of the industry's excessive market power.

Being few in number, states would also appear to possess an excess of market power. In the absence of monopolistic or oligopolistic behavior on the part of industry, this power would work to the advantage of states vis-à-vis industry, providing states with the power to keep the purchase price of industrial firms low without sacrificing firm locations. Thus, were the oligopolistic behavior of states the only imperfection in the market for new firms, it is possible that state environmental standards might be suboptimally stringent. As it is, while their oligopolistic status may improve their bargaining power with industry over what it would be were the number of states in a given market plentiful, industry still pretty clearly holds the upper hand (or states believe that it does). Were this not the case, no state would invest, as many now do, in lower environmental standards and financial incentives in an effort to attract industrial firms. Thus, while both industry

241. Appendix, tbl. 5 at Questions 5-14.

and states possess excessive market power, industry seems to possess more market power than states.

(3) *As Compared to Competitive Neoclassical Models, Game Theory Is a More Appropriate Model of State Interactions*

The small number of states involved in any one instance in a competition for an industrial plant has the further repercussion that in their interactions with one another, states will act strategically. As a consequence, game theory is likely to supply a more appropriate conceptual framework than competitive neoclassical economics in understanding the interactions of the state market participants. While the empirical evidence is not sufficient to indicate the type of game being played, plausible scenarios are available which would predict that states will establish suboptimal environmental standards. The important point, however, is that because of the applicability of game theory, state environmental standard-setting cannot be presumed (as indicated by the revisionists) to result in efficient environmental standards.

A prerequisite for strategic interactions is the ability to influence the actions of others. The evidence demonstrates that states influence the "price" at which other states "pay" for the location of industrial plants. For instance, nearly one-third of all environmental regulators claimed that their state had altered a standard when another state had a less stringent requirement for a similar standard, and somewhat fewer state regulators claimed that their state had done the same thing when confronted by another state's more stringent standard.²⁴² The responses of state environmental groups indicate that the frequency of such mimicry may in fact be much greater.²⁴³ In addition, on average, environmental regulators "agreed somewhat" with the statement that it was important that their environmental standards be of the same stringency as the standards of other states. Finally, accounts of state "bidding wars" for industry indicate that the size of the location incentives offered by one state can affect the size of the incentives offered by another state.²⁴⁴ Oates has himself recognized that bidding wars "suggest[] the potential of a game-theoretic approach to understanding at least certain facets of [interstate] competition."²⁴⁵

242. *Id.* at Questions 23, 24.

243. *See* Appendix, tbl. 4.

244. *See supra* text accompanying notes 136-239.

245. Oates, *Working Paper, supra* note 7, at 27-28.

While the above constitutes direct evidence of strategic behavior, indirect evidence might be found in the practice of many states of relaxing their environmental standards in response, at least in part, to concern over industry relocation and siting. To the extent that such concern is a factor *because* other states are offering industries more appealing incentive packages, this practice is indicative of the influence exerted by states over one another. Additional indirect evidence that states are capable of influencing the price at which other states purchase industrial plants is found in the recent developments in state environmental law discussed in Part III.A.4 (state enactment of "no more stringent than" laws and corporate self-audit privilege and immunity legislation).

The applicability of game theory opens the door to the possibility that the interstate market for industrial firms will yield suboptimal environmental standards, a possibility that Oates himself clearly recognizes.²⁴⁶ Where players are engaged in a non-cooperative game, there exists the possibility that one strategy yields, or might be perceived to yield, higher payoffs to the individual than a competing strategy that yields higher payoffs to society overall. Suboptimal environmental standards are possible in a non-cooperative game, regardless of whether states rate the highest individual payoffs to accrue from lax or stringent standards. Thus, for instance, states might perceive the payoffs from standards to be structured such that it receives the highest payoffs from winning the location of an industrial firm, even if it must relax its environmental standards (and/or offer lucrative financial incentives) to do so. If one state perceives the payoffs to be so structured, it is likely that several states likewise perceive it to be so structured, with the result that several states in the same market increase the value of the incentives they offer to industry (in the form of more relaxed standards and/or greater financial incentives). The ultimate result, of course, is precisely the type of result predicted by Prisoner's Dilemma-like games: a reduction in total social welfare.

Alternatively, states could perceive the payoffs to be highest when they enact stringent environmental standards. Meyer's study of

246. *Id.* at 14-15 (noting that his and Schwab's model relied on assumption of "smallness"—that local officials have no power to influence upon the rate of return of capital or the decisions of officials in other localities, but that the presence of strategic interactions may result in outcomes that are not Pareto-efficient) (citing Jack Mintz and Henry Tulken, *Commodity Tax Competition Between Member States of a Federation: Equilibrium and Efficiency*, 29 J. PUB. ECON. 133 (1986) (presenting a model in which strategic interactions between two jurisdictions imposing a tax on a private good yields an inefficient Nash equilibrium)).

the relationship between employment and economic growth and the stringency of state environmental programs noted an association between state economic growth and strong state environmental programs. This is consistent with the possibility (though it does not dictate) that individual state payoffs for environmental stringency are higher than the payoffs for environmental laxity.²⁴⁷ If state officials believe in the reality of such a scenario, they might be encouraged to make their standards more stringent so as to achieve the larger individual state payoffs predicted in Meyer's study. Indeed, one-fifth of the state environmental regulators surveyed claimed that their state changed its standards in response to another state's *more stringent* environmental standards. Where states race to make their standards more stringent, the result may still be suboptimal environmental standards. The difference is that the standards established are suboptimally stringent, as opposed to suboptimally lax. Either way, this game-theoretic interaction leads to a "race-to-the-bottom."

Both of the scenarios in which states establish suboptimal environmental standards assume that the game being played by states in setting standards follows the basic outline of the Prisoner's Dilemma. While plausible, the empirical evidence is simply too incomplete at this time to determine whether the game engaged in by states is a Prisoner's Dilemma or instead, some other game. Interestingly, data obtained from the author's survey do *not* in fact support the argument that states are engaged in a Prisoner's Dilemma. If states were engaged in a Prisoner's Dilemma, one would expect (assuming the regulators answered honestly and depending upon whether they perceived stringent or lax standards to result in the highest social payoffs) that the states would rank as most important that either their state's standards be less stringent than the standards of other states or that their standards be more stringent than the standards of other states. Instead, states ranked as most important that their standards be of the *same* stringency as those of other states.²⁴⁸ This would seem to indicate that states mimic each other's standards, both when they are more and when they are less stringent than their own, behavior that is not consistent with the classic Prisoner's Dilemma.

The exact type of game being played in state standard-setting is an interesting question, and one on which I hope future research may shed some light. Nevertheless, the lack of a clear answer on this side issue does not detract from the fundamental point that, whatever

247. See MEYER, ENVIRONMENTAL IMPACT HYPOTHESIS, *supra* note 144.

248. Appendix, tbl. 4 at Question 20(C).

game is being played, the very applicability of game theory (and hence games that, like the Prisoner's Dilemma, result in suboptimal standards) means that state environmental standards cannot be presumed to be efficient.

(4) *Conclusion*

The empirical evidence provides several bases for concluding that interstate competition in environmental standard-setting will be suboptimal (i.e., that states will "race-to-the-bottom"). First, results-oriented data consisting of industry location studies and survey data indicate that states which relax their environmental standards in part to attract or retain industry are probably not achieving adequate compensating economic benefits for the welfare losses that they sustain in lower environmental quality. Second, both states and industry (and industry more so than states) possess excessive power in the market for industrial firms. The presence of excessive market power is a classic market failure leading to inefficiency. If it is true (as the evidence seems to indicate) that industry possesses greater market power than do states, the inefficiency resulting from both states and industry possessing excessive market power is that state environmental standards will probably be suboptimally lax (as opposed to suboptimally stringent). Finally, states' use of lax environmental standards and economic benefits as incentives to attract or retain industry is characterized by strategic interactions among the states. The resulting potential applicability of game theory to state environmental standard-setting makes it plausible that states are engaged in a game, such as the classic Prisoner's Dilemma, that would result in suboptimal environmental standards. Although available evidence is insufficient to determine what game it is that states are "playing" (indeed, available evidence does not conclusively support the proposition that the game is the Prisoner's Dilemma), the potential applicability of game theory means that it cannot be presumed that state environmental standards will be optimal.

B. Implications of Empirical Data for the Efficiency of the Oates and Schwab Neoclassical Economic Model

(1) *Specific Preconditions for Efficiency under the Oates and Schwab Neoclassical Economic Model*

As discussed above, the particular neoclassical economic model relied upon by the revisionists for their claim that interstate competition yields efficient environmental standards is a model developed by

economists Wallace Oates and Robert Schwab.²⁴⁹ In addition to the general prerequisites for efficiency detailed in Part III.C., the Oates and Schwab model relies upon a set of highly restrictive conditions. While these conditions apply only to their particular model, the testing of their empirical validity is nonetheless important given that the Oates and Schwab model is the primary model upon which the revisionists rely for their argument that interstate competition yields efficient state environmental standards. Among these are the assumptions that (1) the society is classless, consisting solely of wage-earners at local industrial plants; (2) the jurisdiction employs head taxes to pay for local consumption goods rather than taxes on capital; (3) government officials, consistent with the median-voter model, act only in the best interests of their constituents as a whole; and (4) the production function of all industries exhibits constant returns to scale. A later paper written by Oates recognizes the restrictive nature of many of these very assumptions.²⁵⁰

First, the Oates and Schwab model assumes that all residents work as wage-earners in the local industrial plants.²⁵¹ Each resident, it must be remembered, also lives within the same jurisdiction as the plant for which she works and thus is personally exposed to the ill effects of the plant's polluting emissions.²⁵² Given this context, the

249. See Oates & Schwab, *supra* note 8 and text accompanying notes 98-111.

250. Oates & Schwab, *supra* note 8 (describing how their model would produce inefficient standards if particular conditions did not hold true); Oates, *Working Paper*, *supra* note 7, at 14-17 (conceding that his and Schwab's model is "admittedly restrictive in some important ways," that the framework necessary for the workings of the invisible hand to result in efficient outcomes when jurisdictions compete against each other "takes some strong assumptions" and that "[c]ertain realistic amendments to the model can easily introduce allocative distortions").

251. Oates & Schwab, *supra* note 8, at 336.

252. *Id.* The Oates & Schwab model appears to assume that pollutants are dispersed in such a way that their concentration is uniform throughout a single jurisdiction. This is at odds with generally held assumptions elsewhere. With the exception of the tall-stacks phenomenon, it is generally assumed that the concentration of the pollutants are greatest nearest the plant and taper off the farther the distance from the plant. In addition to dispersion, the risk of exposure to plant emissions will be unevenly distributed throughout the population of a jurisdiction because of the placement of the plant within the given jurisdiction. Many recent studies demonstrate that noxious facilities such as hazardous waste treatment storage and disposal facilities tend to be located in neighborhoods disproportionately populated by the poor and by racial minorities. See, e.g., UNITED CHURCH OF CHRIST, COMMISSION ON RACIAL JUSTICE, TOXIC WASTES AND RACE IN THE UNITED STATES: A NATIONAL REPORT ON THE RACIAL AND SOCIO-ECONOMIC CHARACTERISTICS OF COMMUNITIES WITH HAZARDOUS WASTE SITES 13-14 (1987) (noting that the percentage of minorities living in zip code areas in the United States containing one operating hazardous waste facility is approximately double that living in zip code areas without such facilities—24% to 12%). Although many of the studies demonstrating that noxious facili-

assumption that all residents work for the jurisdiction's firms is critical to the authors' conclusion that the environmental standards established by each jurisdiction are socially optimal because it collapses, into each person, the alleged trade-offs between economic and environmental benefits. Thus, each individual pays, in terms of health and quality of life, for the wage hikes that accrue from lowered environmental quality standards, and vice versa. Because each resident stands to both gain and lose from any relaxing of the jurisdiction's environmental standards, those standards preferred by the individual resident represent socially-optimal standards.

The efficiency prediction of Oates and Schwab's model is undermined, however, by the self-evident fact that workers obtain their income from different sources and accordingly support different policies designed to maximize their opportunities to enhance their income given their particular occupation. According to the model, a jurisdiction populated by both wage-earners in the local industrial plants and non-wage earners who obtain their incomes from other sources will establish suboptimal environmental standards, regardless of whether the wage-earners or the non-wage earners are in the majority.²⁵³ When the workers are in the majority, the model predicts that the locality's environmental standards will be higher than optimal because workers will choose to attract industry entirely through subsidies (paid for by all residents, wage-earners, and non-wage-earners alike, but from which only wage-earners benefit through the higher wages resulting from increased capital) rather than through lowered environmental standards.²⁵⁴ In contrast, where the non-wage-earners are in the majority, the model predicts that standards will be lower than optimal because non-wage-earners desire a positive tax on capital (from which they benefit) and hence will be forced to lower environmental

ties are disproportionately located in poor, minority areas are national in scope, a few specifically examine whether such facilities are disproportionately located in poor, minority neighborhoods within a single state or local jurisdiction. See e.g., Douglas L. Anderton et al, *Environmental Equity: The Demographics of Dumping*, 31 *DEMOGRAPHY* 229, 236-39 (1994) (finding that the percentage of minorities living within a 2.5 mile radius of an operating hazardous waste facility is double the percentage living in the census tracts outside this radius but still within the standard metropolitan statistical area (SMSA); percentage of minorities living within the census tract in which a hazardous waste facility is located is not significantly different, however, than the percentage of minorities living in all other census tracts within the SMSA).

253. Oates & Schwab, *supra* note 8, at 349 ("If the jurisdictions are divided between workers and non-wage-earners, not only will there be a divergence of desired policies within each community, but the median-voter outcome will not, in either case, be an economically efficient one.").

254. *Id.* at 347.

standards to retain industry that would otherwise leave the jurisdiction because of the higher tax rate.²⁵⁵

A second assumption of the Oates and Schwab model is that jurisdictions will finance local public goods for residents (e.g., police and fire protection, street-cleaning, and garbage pick-up) through head taxes, as opposed to taxes on capital.²⁵⁶ Should a locality tax capital, or tax capital to cover the costs of general public services beyond those necessary to pay for the public benefits to capital itself, the Oates and Schwab model, consistent with the general conclusions of the public finance literature, predicts that public goods (including environmental standards) will be established at suboptimally low levels.²⁵⁷ Thus, the applicability of the "efficiency" predictions of the model to the real world would be weakened by data showing that localities, for whatever reason, raise revenues through corporate or other taxes upon corporate earnings.

This second assumption is followed by a third: government officials make decisions which reflect the preferences of the median voter (the "median-voter" model).²⁵⁸ Thus, the model's applicability is vulnerable if it can be shown that political decision-making can distort

255. *Id.* at 348.

256. *Id.* at 342-43.

257. *Id.* at 343. See also Oates, *Working Paper, supra* note 7, at 16 (arguing that taxes on capital will tend to underprovide for local public goods). The prediction that localities will underprovide public goods is based on the assumption that, in order to have the least effect upon capital, localities will raise the tax rate only to the point at which the cost of the public good equals the benefits for their individual locality. Because public goods that leave one community go to other communities where they are still of benefit, the locality's choice of a tax rate on capital will result in the underprovision of public goods because it will fail to take into account the beneficial externalities one locality's public goods create for other communities. The environment is, of course, a public good that would be underprovided. For a discussion of the theory that "distorting taxes," or taxes upon capital, will lead to the underprovision of public goods, see George R. Zodrow & Peter Mieszkowski, *Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods*, 19 J. URB. ECON. 356 (1986); John D. Wilson, *Optimal Property Taxation in the Presence of Interregional Capital Mobility*, 17 J. URB. ECON. 73 (1985); John D. Wilson, *A Theory of Interregional Tax Competition*, 19 J. URB. ECON. 296 (1986); Remy Prud'homme, *Merits and Demerits of Fiscal Competition*, in PUBLIC FINANCE WITH SEVERAL LEVELS OF GOVERNMENT 281 (Peggy Musgrave ed., 1991); David E. Wildasin, *Interstate Tax Competition: Comment*, 39 NAT'L TAX J. 353 (1986); David E. Wildasin, *Interjurisdictional Capital Mobility: Fiscal Externality and a Corrective Subsidy*, 25 J. URB. ECON. 193 (1989); David E. Wildasin, *Nash Equilibria in Models of Fiscal Competition*, 35 J. PUB. ECON. 229 (1988).

258. Oates & Schwab, *supra* note 8, at 339-340. Because of their reliance upon the median-voter model, Oates and Schwab could assume that the preferences of the individual resident (each of whom is identical in the model) for environmental quality would be perfectly reflected in the jurisdiction's environmental standards. For a more detailed explanation of the median-voter mode, see ROSEN, *supra* note 112, at 125.

voter preferences. Finally, the Oates and Schwab model assumes that the production functions of all firms exhibit constant returns to scale.²⁵⁹ This means that local environmental standard-setting may not yield optimal standards if local industries are found to exhibit increasing returns to scale.

(2) *The Interstate Market for Industry Fails to Comply with Specific Preconditions for Efficiency Under the Oates and Schwab Model*

An examination of empirical evidence reveals that the underlying assumptions of the Oates and Schwab model just discussed are unlikely to hold true in the real world. Due to the importance of these assumptions to the model's conclusions that interstate competition yields efficient environmental standards, the failure to validate the assumptions with real world data means that the model cannot predict that interstate competition in the real world will yield efficient environmental standards.

As discussed above, the assumption that society consists of a single class of workers employed by the local industrial plants is integral to the model's efficiency predictions. Yet it is self-evident that society is not composed of a single class of workers employed in local industries. According to 1994 labor force statistics, while approximately 24 million workers were employed in various polluting industries (mining, manufacturing, and construction), approximately 49 million worked in non-polluting industry occupations (public administration, and business and repair, personal, entertainment and recreation, and professional, services).²⁶⁰ Because the "classless society" assumption of Oates and Schwab's model plainly does not hold in the real world, neither does its prediction that states will produce efficient environmental standards.

Oates and Schwab recognized the fragility of the assumption that society is classless in their 1988 publication introducing their model.²⁶¹

259. Oates & Schwab, *supra* note 8, at 336 ("We posit further than [sic] the production function exhibits constant returns to scale and possesses all of the nice curvature properties of a standard neo-classical production function.").

260. U.S. BUREAU OF THE CENSUS, *supra* note 124, at 416 (Table No. 653 "Employment, by Industry: 1970 to 1994"). To break down the nonpolluting industrial labor force a bit, in 1992, the United States labor force consisted of approximately 2 million writers, artists, entertainers, and athletes, 1 million social and religious workers, 5 million teachers, 2 million doctors and nurses, 680,000 maids, and, last (but not about to let themselves be forgotten), 821,000 lawyers. *Id.* at 411-13 (Table No. 649 "Employed Civilians, by Occupation, Sex, Race, and Hispanic Origin: 1983 and 1994").

261. Oates & Schwab, *supra* note 8, at 347.

When the authors varied their model only slightly to encompass a community which contains two types of persons: wage-earners in polluting firms and non-wage earners who earned income from other sources (presumably doctors, lawyers, teachers, and employees in other professions and service industries), they found that the environmental standards established when either group was in the majority was not socially optimal.²⁶²

Another critical assumption of the Oates and Schwab model—highlighted by the authors as questionable—is the assumption that jurisdictions will finance local fire, police, and other public services through the advent of head taxes as opposed to taxes on capital.²⁶³ As Oates and Schwab recognized, however, communities may be forced to tax capital due to constitutional limitations upon their authority to raise taxes through an alternative mechanism.²⁶⁴ Thus, the Oates and Schwab model compels the conclusion that communities that impose a positive tax rate on capital will engage in a race-to-the-bottom.²⁶⁵

Oates and Schwab's use of the median-voter model is also integral to their predictions of efficiency. Application of competing models of the outcome of majority rule yield very different results, however. For example, when Oates and Schwab assume that local bu-

262. *Id.* at 349. Oates and Schwab found that, where workers constitute a majority, a community will want to subsidize capital, as opposed to setting a zero tax rate on capital. This is because workers reap all of the benefits of the increases in wage income resulting from additional capital, but do not bear the full cost of a subsidy since part of the cost of the subsidy will fall upon the non-wage-earners. *Id.* at 347. In contrast, where non-workers are in the majority, the community will want to tax capital because they gain all of the benefits from such a tax and are generally unaffected by the impact of such a tax on wages. Because the result in either case is different than a zero tax on capital, neither is socially optimal. *Id.* at 349. Oates and Schwab also theorize that workers and non-workers will have different preferences as to environmental quality. *Id.* at 351.

263. *Id.* at 342-43.

264. *Id.* at 342. See also Oates, *Working Paper*, *supra* note 7.

265. Although Professor Revesz concedes that this real world condition may cause states to lower their environmental standards to suboptimally low levels, he refuses to consider this a race-to-the-bottom because, in setting the too-high rate of tax on capital that triggers the race, states are failing to "act in an economically rational manner." Revesz, *supra* note 1, at 1243. It is not clear, however, what rationality should have to do with whether states are engaged in a race-to-the-bottom. According to the definition of such a race given by Revesz in his article, a race-to-the-bottom occurs whenever interstate competition causes states to establish suboptimal environmental standards. *Id.* at 1219. It would not seem to make a difference whether this was because of rational or irrational state policies. In addition, it is not necessarily irrational to raise revenue through a tax on capital when states have no other legal option (due to a state constitutional or statutory bar upon other forms of revenue raising); in such a case the state's action could be viewed as a rational response to a bad situation.

reaucrats act first and foremost to maximize their agency's budget,²⁶⁶ the model predicts that localities would establish *inefficiently low* environmental standards.²⁶⁷ Yet a third alternative is presented by public choice, according to which the voting behavior of elected politicians reflects the preferences of powerful interest groups who support politicians who allow them to "rent-seek" against other, less powerful interest groups.²⁶⁸ While neither the median-voter, nor the Niskanen model, nor the public choice model appears to reflect the outcome of majority rule in real life,²⁶⁹ the existence of plausible alternatives to

266. See WILLIAM A. NISKANEN, JR., *BUREAUCRACY AND REPRESENTATIVE GOVERNMENT* 37 (1971). The Niskanen model is based on the proposition that a bureaucrat's salary, reputation, power, and the capacity to award patronage increases as the budget of the bureaucrat's agency increases.

267. Oates and Schwab, *supra* note 8, at 344-46. This follows from the assumption that, because the Niskanen bureaucrat increases her salary, power, etc., with additional public revenues, she will seek to increase the tax base by enticing more capital into the jurisdiction by relaxing environmental standards. The fiscal effect of this strategy is excessive local pollution. See also Oates, *supra* note 7, at 15-16.

268. See, e.g., Frank H. Easterbrook, *Foreword: The Court and the Economic System*, 98 HARV. L. REV. 4, 15-17 (1984); Richard Epstein, *Toward a Revitalization of the Contract Clause*, 51 U. CHI. L. REV. 703, 713-17 (1984); Jonathan R. Macey, *Promoting Public-Regarding Legislation Through Statutory Interpretation: An Interest Group Model*, 86 COLUM. L. REV. 223 (1986).

269. In addition to assuming that voter preferences are single-peaked (i.e., ranked along a single spectrum), the median-voter model assumes that all substantive policy matters are decided through direct democracy. However, in our political system referenda are a fairly unusual way of deciding issues, most issues being decided by elected representatives. Although one scholar argues that vote-maximizing elected representatives will, in fact, adopt the preferences of the median-voter, ANTHONY DOWNS, *AN ECONOMIC THEORY OF DEMOCRACY* 73-74 (1957), this result assumes, unrealistically, that neither ideology, personality, nor notions of leadership or charisma will sway a politician from vote-maximizing behavior. ROSEN, *supra* note 112, at 133-34. The Niskanen model might be verified by comparing the costs and outputs of a government agency to those of a private firm producing the same product. If those costs were the same, this would be persuasive evidence that the Niskanen model was invalid. In real life, it is extremely difficult to conduct such a test because many goods are either not made by private firms or their quantity or quality is hard to measure. Consequently, "the widespread suspicion that a bureaucrat's main concern is empire building is hard to confirm or deny." *Id.* at 137. Finally, although some argue strenuously that public choice accurately reflects the voting behavior of politicians, others find the empirical basis of public choice theory weak. Compare Geoffrey P. Miller, *Public Choice at the Dawn of the Special Interest State: The Story of Butter and Margarine*, 77 CAL. L. REV. 83, 128-30 (1989) (using public choice theory to illustrate history of "margarine wars") with FARBER & FRICKEY, *supra* note 123, at 27-33 (reviewing the literature attempting to test, empirically, public choice theory and concluding that "the supporting evidence is quite thin"). For commentary on the unrealistic nature of public choice theory from a long-time state legislator, see Abner J. Mikva, *Foreword to the Symposium on the Theory of Public Choice*, 74 VA. L. REV. 167, 167-69 (1988) (commenting that not even five terms in the Illinois state legislature had prepared him for the political villainy depicted by public choice scholarship).

the median-voter model compels us to look skeptically upon other models, such as Oates and Schwab's, whose outcomes rely upon its validity.

Finally, the Oates and Schwab model assumes that the production function of all firms exhibits constant returns to scale.²⁷⁰ However, in a model of interjurisdictional competition developed by James Markusen, Edward Morey, and Nancy Olewiler, in which interjurisdictional competition for mobile capital results in suboptimally low environmental standards,²⁷¹ the production function exhibits increasing returns to scale.²⁷² As it turns out, the inefficient environmental standards established by jurisdictions in the Markusen, Morey, and Olewiler model are attributable to the assumption that firms exhibit increasing returns to scale.²⁷³ Industry studies show that many large industries experience increasing returns to scale.²⁷⁴ Thus, because the assumption of constant returns to scale may very well be unrealistic, so also may be the results of the Oates and Schwab model, which rely upon this assumption.

In sum, Oates and Schwab's neoclassical economic model—the model relied upon by the revisionists to support their claim that states engaged in interstate competition for industry will establish efficient environmental standards—rests upon numerous restrictive assumptions that empirical data demonstrate are unlikely to hold true in the

270. Oates & Schwab, *supra* note 8, at 336 (“We posit further than [sic] the production function exhibits constant returns to scale and possesses all of the nice curvature properties of a standard neo-classical production function.”).

271. James R. Markusen et al., *Competition in Regional Environmental Policies when Plant Locations are Endogenous*, 56 J. PUB. ECON. 55, 67, 70, 73 (1995) (Tables 1, 2, and 3) (demonstrating that the combined welfare of two regions establishing environmental standards while engaged in interstate competition for mobile industry is lower at each of three possible noncooperative equilibrium than at nonstrategic tax rates).

272. *Id.* at 58.

273. Levinson, *supra* note 144, at 23-25. In the Oates and Schwab model, where returns to scale are assumed to be constant, the only economic rents earned are the marginal product of labor earned by every laborer; consistent with the assumption of perfect competition, the manufacturer makes no profit. In contrast, in the Markusen, Morey, and Olewiler model, the manufacturer earns profits from production as a result of the firms increasing returns to scale. However, because the local residents only capture the rents by taxing the firm, jurisdictions will compete over this tax, and thereby bid it down below its proper level. In doing so, jurisdictions will relax their environmental standards to suboptimally low levels since the tax also serves in the model to reduce pollution by raising the marginal cost of production. *Id.*

274. See, e.g., Kavuri Suryaprakasa Rao et al., 27 IIE TRANSACTIONS 435 (Aug. 1995) (continuous production processes such as chemical, petroleum, petrochemicals and fertilizers); Kathleen Morris, *Arrow Electronics: Consider Those Economies of Scale*, 161 FIN. WORLD 18 (Mar. 31, 1992) (electronic parts); *Bulletin Boards Represent Key Element in Post-636 Era*, 76 PIPE LINE INDUS. 21 (May 1993) (gas distribution industry).

real world. While no model can duplicate the conditions of the real world exactly, the degree to which these assumptions depart from reality render the model's predictions of efficient state environmental standards highly questionable.

V. Solutions to the Race-to-the-Bottom: Are Federal Minimum Standards the Answer?

The above sections demonstrate that the race-to-the-bottom hypothesis is strongly supported by a broad range of empirical evidence, and that there is good reason to believe that absent federal standards, both environmental quality and overall social welfare would be lower than it is today. The question remains, however, whether the adoption of minimum federal environmental standards—the standards adopted so far—is the *best* approach to preventing a race-to-the-bottom. Admittedly, these types of standards have numerous drawbacks. Indeed, dissatisfaction with the *methods* for redressing the race-to-the-bottom may have fueled the recent questioning of the race-to-the-bottom hypothesis itself. The following section discusses the debate over the remedies to the race-to-the-bottom. It concludes that the minimum and uniform technological standards approach has much to recommend it. Nevertheless, in order to maximize opportunities for state experimentation and leadership in environmental standard-setting, the federal government should experiment with mechanisms to counter the “race-to-the-bottom” by ratifying environmentally progressive multi-state agreements.

A. Existing Remedies for the Race-to-the-Bottom

While it is generally accepted (at least until recently) that the remedy to the race-to-the-bottom is federal intervention, the appropriateness of the particular form that the federal regulation has taken has sparked vigorous criticism.²⁷⁵ Scholars make three principal arguments against the minimum environmental quality and uniform technology standards prevalent in environmental laws: they are economically inefficient; they can trigger a welfare-reducing “race-to-the-top”; and they undermine federalism. Uniform technology standards are said to be inefficient because they ignore differences in

275. See *supra* text accompanying notes 55-70 (discussing how federal minimum environmental quality standards and uniform technology standards have traditionally constituted the federal response to the race-to-the-bottom).

abatement costs between and among different industrial sources.²⁷⁶ Critics cite studies showing that abatement costs could be reduced by up to ninety percent if abatement burdens were allocated in a nonuniform manner that reduced society's overall costs.²⁷⁷

The federalism critique argues that any scheme of federal regulation short of wholesale nationalization of all regulatory function is inadequate to stem the race-to-the-bottom, and wholesale nationalization is, of course, anathema to federalism.²⁷⁸ Less than wholesale federalization is asserted to be inadequate to stop interstate competition because, if prevented from competing in one realm, states will simply shift to competing in another. Consequently, although federal minimum and uniform standards might prevent states from competing over environmental standards, it will simply cause states to compete over minimum wage laws, fair labor standards, or product liability laws.²⁷⁹ Thus, argue critics, the only certain way to halt the race-to-the-bottom is to nationalize all areas that might provide grist for interstate competition.²⁸⁰

A further problem with setting environmental standards at the federal level is that it provides an opportunity for states to "rent-seek" against other states through Congress. For example, Peter Pashigian found that northern-urban constituencies—living in dirty-air areas—voted for adoption of a policy preventing clean air areas from allowing their air to deteriorate, while southern, rural and western constituencies—living primarily in clean air areas—voted against them.²⁸¹

276. See, e.g., James E. Krier, *On the Topology of Uniform Environmental Standards in a Federal System—And Why It Matters*, 54 MD. L. REV. 1226, 1228-30 (1995); James E. Krier, *The Irrational National Air Quality Standards: Macro-and-Micro-Mistakes*, 22 UCLA L. REV. 323, 324-30 (1974); Richard B. Stewart, *Environmental Regulation and International Competitiveness*, 102 YALE L. J. 2039, 2088 (1993); WILLIAM J. BAUMOL & WALLACE E. OATES, *THE THEORY OF ENVIRONMENTAL POLICY* 284-96 (1988); MENNELL & STEWART, *supra* note 9.

277. See, e.g., Robert W. Hahn & Gordon L. Hester, *Marketable Permits: Lessons For Theory and Practice*, 16 ECOLOGY L.Q. 361, 363 (1989), citing T. TIETENBERG, *EMISSIONS TRADING: AN EXERCISE IN REFORMING POLLUTION POLICY* 15 (1985).

278. See Revesz, *supra* note 1, at 1244-47.

279. *Id.* at 1246.

280. *Id.*

281. B. Peter Pashigian, *Environmental Regulation: Whose Self-Interests Are Being Protected?*, 23 ECON. INQUIRY 551 (1985). Pashigian examined the geography of the districts of members of Congress who voted for and against incorporating the EPA's "prevention of significant deterioration" ("PSD") policy into the 1977 amendments to the Clean Air Act. The PSD policy, which was adopted into the Act, prevents regions which have cleaner air quality than the federal minimum standards from allowing their air quality to significantly deteriorate below their "cleaner than federal minimum" standards. 42 U.S.C. §§ 7470-7492 (1994).

Pashigian explains this voting phenomenon according to the "self-interest" hypothesis. Specifically, he argues that the PSD policy was developed to "attenuate the locational competition between developed and less developed regions and between urban and rural areas."²⁸²

There are some reasons to doubt these claims, or at least their more extreme form. Uniform standards are of great benefit to industry, especially industries producing polluting products. Not only do they eliminate competition, but they free industries whose products have a national market from having to comply with fifty different standards as opposed to a single national standard.²⁸³ Market-based solutions, though economically efficient under ideal circumstances and zero transaction costs, are in practice often expensive to develop, administer, and enforce. Finally, it is not at all clear that redressing the race-to-the-bottom with federal minimum standards presents quite the "slippery slope" away from the values of federalism that some have claimed. As John Dwyer reminds us, the federal government *needs* the states, that is, it needs state bureaucracies to carry out federal laws and needs state politicians for their political support of environmental legislation.²⁸⁴ Because, as a practical matter, the federal government needs state assistance, we can be sure that state concerns and preferences will continue to be reflected in federal environmental laws and administrative regulations. Furthermore, where the federal government does impose minimum environmental standards to prevent a race-to-the-bottom, states are usually allowed to impose more stringent standards above these federal minimums. Thus, "federalization" has not meant the wholesale nationalization of state environmental law.

B. Suggested Revisions to the Existing Approach: The Northeastern Ozone Transport Commission as a Model of Multistate Environmental Decision-Making

Given the evidence suggesting that state environmental standard-setting is indeed a race-to-the-bottom, the existing approach to preventing the race should not be abandoned—certainly not without an adequate replacement. Granted, there is no assurance that the federal environmental regulators will develop "efficient" environmental standards any more so than their state counterparts. Nevertheless, even if inefficient, the federal standards have, at least historically,

282. Pashigian, *supra* note 281, at 553

283. See *supra* text accompanying notes 43-46.

284. Dwyer, *supra* note 35, at 1216.

been more stringent than the standards the states would establish in the absence of federal intervention. Given the huge gaps in our ability to determine the "costs" and "benefits" of environmental protection, it may be more prudent to err on the side of over-protection rather than under-protection.²⁸⁵ Moreover, other compelling reasons exist for federal environmental protection aside from efficiency. The need to guarantee human rights to environmental quality, for example,²⁸⁶ might demand levels of protection over and above those sufficient to meet the demands of "efficiency" and hence the greater stringency of the federal standards may be independently justifiable.

In any case, the location studies discussed in Part IV.2. suggest that even if Professors Revesz, Oates, and Schwab are correct in *principle*, there is very little to be lost in *practice* in terms of economic benefits from preventing interstate competition. These studies find that variations in environmental standards have at most a minor effect upon the location of new industrial firms (and possibly no effect at all). Consequently, even the potential efficiency gains to be had by allowing competition are likewise small (and possibly nonexistent). Thus, the bar upon standards-based competition imposed by federal minimum environmental regulations is causing, at most, a minor reduction in the efficiency of environmental standards (and possibly no reduction at all). That is, the competition-stifling aspect of federal standards can be having at most a small effect upon the overall efficiency of a state's economy. This does not preclude the possibility that other (non-competition related) aspects of federal standards may be the source of significant inefficiencies, however. If the revisionists are right, the efficiency gains from adopting these recommendations at most will be small; but if they are wrong, the losses from mistakenly adopting their recommendations could be huge, given the large political pressures on state regulators. Indeed, by requiring states to have more stringent environmental standards, it is possible (though far

285. This is the point of the "precautionary principle" which avers that activities should be subject to regulation before harm is demonstrated and thus shifts the burden of proving the "harmlessness" of a challenged activity to the persons or entities who wish to engage in the activity. See Bernard A. Weintraub, *Science, International Environmental Regulation, and the Precautionary Principle: Setting Standards and Defining Terms*, 1 N.Y.U. ENVTL. L. J. 173, 204-09 (1992). The precautionary principle has been incorporated into several major international environmental conventions, including the 1985 Vienna Convention, the 1987 Montreal Protocol, the 1992 Biodiversity Convention, the 1992 Climate Change Convention, and the 1992 Rio Declaration. See Philippe Sands, *The "Greening" of International Law: Emerging Principles and Rules*, 1 IND. J. GLOBAL LEGAL STUD. 293, 297-302 (1994).

286. See *supra* text accompanying notes 30-55.

from certain) that federal environmental regulators may be doing states a *favor*. According to Stephen Meyer's study, a prosperous state economy is positively associated with more stringent state environmental laws; this finding is consistent with a causal connection between more stringent state environmental programs and economic prosperity, though it does not prove such a causal connection.

Rather than throwing the baby out with the bath water (or jeopardizing environmental protection for the possibly elusive goal of economic efficiency), Congress and federal regulators could experiment with less drastic revisions to the existing standard-setting approaches for preventing a race-to-the-bottom. Any standard-setting scheme for preventing such a race should meet the following criteria: the scheme should enhance the relative power of states vis-à-vis industry; it should provide for a uniform floor of environmental standards among states likely to engage in interstate competition for industrial firms, and it should provide an opportunity for a superauthority to impose mandates upon (or at least enforce agreements among) states where necessary to prevent states from "defecting" by adopting suboptimal standards. In addition, in order to overcome a frequent criticism of existing approaches—that they fail to provide for geographic and other variations—a revised standard-setting approach could provide for setting uniform environmental standards on an issue- or media-specific basis within specific geographic regions.

Thus, a possible addition to the existing regulatory approaches for preventing a race-to-the-bottom is the creation of regional bodies responsible for developing uniform, media-specific standards applicable in all states in a specific region and which may be enforced, where appropriate, by the federal government. The following describes a recent environmental standard-setting initiative that appears to be an example of such an approach: the multi-state northeastern Ozone Transport Commission (OTC). The OTC could constitute a standard-setting model for other multi-state regions with particular environmental problems.

Congress created the Ozone Transport Region (OTR) in the 1990 Amendments to the Clean Air Act after recognizing that the natural transport of ozone precursors throughout the northeastern corridor rendered the ozone attainment strategies of the affected eleven states (plus the District of Columbia) interdependent.²⁸⁷ Pursuant to the

287. Clean Air Act § 184, 42 U.S.C. § 75110 (1994). The eleven states are: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York,

Act, the EPA Administrator convened the OTC, which by law must consist of the governor of each OTR state, air pollution control officials representing each state, the EPA Administrator, and the EPA Regional Administrators of each EPA region included within the OTR.²⁸⁸ Upon a majority vote of the non-federal members of the Commission, the OTC can petition the EPA to require states within the OTR to adopt those additional control measures deemed necessary by the Commission to bring all or part of a region into attainment with the Clean Air Act.²⁸⁹ Thus, the OTC is in effect a regional air pollution government—an environmental authority between the states and EPA—which, upon majority rule and the approval of EPA, can override the decisions of a single state and require it to adopt more stringent standards.

In its brief history, the OTC has already proven itself a progressive environmental problem-solver and an effective model of intra- and inter-governmental cooperation. The OTC gained national attention when, in 1994, it voted 9 to 4 to petition the EPA to impose California's stringent vehicle emission standards upon all states in the OTR, including the District of Columbia.²⁹⁰ Due to the particular history of auto-emission standards under the Clean Air Act, the auto-emission standards in effect in any state will be the EPA-promulgated federal standards unless the state adopts California's standards. Although the precise outcome of the petition is still unresolved, it has already had the effect of provoking an unprecedented counterproposal by the auto-industry: in return for the OTC dropping its adoption of the California standards, and specifically, the zero-emission (electric) vehicle sales mandate, they will support the EPA's promulgation of more stringent federal auto-emission standards applicable in all states other than those that have adopted the California stan-

Pennsylvania, Rhode Island, and Vermont. *See also* 59 Fed. Reg. 48,664, 48,665 (1994) (to be codified at 40 C.F.R. pt. 85) (proposed Sept. 22, 1994).

288. 42 U.S.C. § 7506a(b)(1) (1994). While Congress created the OTR, Congress authorized the EPA Administrator to establish an interstate transport region on the Administrator's own motion whenever the Administrator "has reason to believe that the interstate transport of air pollutants from one or more States contributes significantly to a violation of a national ambient air quality standard in one or more other States." 42 U.S.C. §7506a(a) (1994).

289. 42 U.S.C. § 7511c(c)(1) (1994).

290. *See* 59 Fed. Reg. 48,664, 48,667 (1994) (to be codified at 40 C.F.R. pt. 85) (proposed Sept. 22, 1994). New Hampshire, Virginia, Delaware, and New Jersey voted against the recommendation.

dards.²⁹¹ More recently, the OTC signed an agreement with northeastern utilities imposing upon that industry some of the most stringent air pollution regulations applicable to electrical utilities anywhere in the nation.²⁹²

The OTC represents a model that could be used to supplement the existing approaches for preventing the race-to-the-bottom. The OTC appears to match the criteria for a standard-setting scheme designed to prevent a race-to-the-bottom. First, the OTC provides for the enhancement of the power of state environmental policy-makers vis-à-vis important polluting industries. Were all of the twelve OTC states to adopt California's auto-emission standards, the auto industry would be required to make a major, and to its mind, premature, investment in electric cars. Thus, the industry was prompted to offer its support for more stringent federal auto-emission standards that omitted the zero emission sales mandate. Without the threat of being required to service such a large zero-emission vehicle market, it is unclear whether the auto industry would have made this offer.

Second, by using majority rule to decide which environmental policies will be applicable to the OTR, the OTC's decision-making structure reduces the opportunities for strategic state interactions that could lead to states "defecting" by adopting standards that they believe might benefit their state individually, though only at the cost of reducing the welfare of all states within the region as a whole. For example, were a single OTR state allowed the opportunity not to adopt the California auto-emission standards, that state might believe that not adopting such standards would bestow an advantage over other northeastern states in attracting and retaining transportation-related industries, such as trucking firms or retail distributing firms. One state's defection may lead to other states defecting, with the re-

291. After first proposing to grant the OTC's petition to have the California standards apply to all states in the OTR, 59 Fed. Reg. 48,644 (1994) (to be codified at 40 C.F.R. pt. 85) (proposed Sept. 22, 1994), the EPA reversed course and proposed the auto industry's plan that would require low emission vehicles in all states except those that have adopted the California standards (so far, this includes all states besides California). 60 Fed. Reg. 52734 (1995) (to be codified at 40 C.F.R. pts. 51, 85, 86) (proposed Oct. 10, 1995).

292. See *Massachusetts: State, Energy Producers Agree on Plan to Reduce Nitrogen Oxide by More than 15 Percent*, ENV'T. REP. CURRENT DEVEL. IN THE STATES (Aug. 2, 1996). The nitrogen oxides initiative demonstrates something of the inadequacies of the regional approach when the industry being regulated is producing a nationally distributed product. Due to recent moves to deregulate utilities, midwestern utilities are free to sell electricity to northeastern power-users. As a result, OTC officials are now worried that production increases by midwestern utilities not subject to the nitrogen oxide reductions mandated by the OTC-industry agreement could easily wipe out the nitrogen oxide reductions achieved by the northeastern industries subject to the agreement. *Id.*

sult that the Northeast remains saddled with its severe ozone problem. In addition, the provision allowing the EPA to mandate the OTC policies that have received majority support reinforces this safeguard against state defections.²⁹³

In summary, although our current framework of federal laws designed to prevent the race-to-the-bottom arguably has numerous drawbacks relative to a platonic ideal, the possible losses resulting from wholesale abandonment of the current framework are likely to be far larger than any putative benefits from such draconian reform. Consequently, federal regulators should experiment with less drastic reforms of the current legal structure. One reform, explored above, is to supplement the current model with region-based, problem-specific, state or local regulatory decision-making similar to the OTC. The OTC model could be used to address other regional environmental problems, such as the extremely serious pollution problems of the Mississippi Gulf Coast region (to name just one example).

Conclusion

The two sides of the current debate over the existence of a welfare-reducing race-to-the-bottom in state environmental standard-setting are rooted in two long-standing theoretical traditions: game theory and neoclassical economics. According to prior applications of these two approaches to questions of interstate competition for mobile capital, the game-theoretic approach predicts that state environmental regulations will result in suboptimal standards, while the competitive neoclassical model predicts optimal standards. My goals in this Article have been (1) to identify the key assumptions between the two theories that account for their different outcomes; (2) to present empirical evidence that can be used to evaluate which approach—game theory or neoclassical economics—is most likely to describe the real environmental standard-setting behavior of states competing for industrial firms; and (3) to draw conclusions from this attempt to match theoretical approaches to real world conditions about whether states engaged in interstate competition for industry are also engaged in a race-to-the-bottom (i.e., promulgating inefficient environmental standards).

293. Such a provision is necessary since states, as sovereign entities, have no mechanism for imposing their will upon each other short of engaging in civil war or obtaining a majority of votes for their policy in both houses of Congress.

Drawing from industry location studies, my own survey of persons influential in state environmental policy-making, and various sources of data on the characteristics of the state and industry participants in the market for new industrial firms, I ultimately conclude in this article that the preponderance of the evidence indicates that states engaged in interstate competition for industry are also engaged in a race-to-the-bottom in environmental standard-setting, and that the general direction of the race is toward more lax standards. This ultimate conclusion is based upon two prior conclusions: first, that non-cooperative game theory (which generally predicts that the outcomes of competition will be suboptimal), as opposed to neoclassical economics, better describes the dynamics of environmental standard-setting of states engaged in interstate competition for mobile industry; and second, that, even if one relies upon the neoclassical economic framework, empirical evidence indicates that the real world conditions of interstate competition fail to reflect the assumptions underlying the framework's predictions of efficiency.

Thus, even before weighing all the evidence in detail, there is little plausible ground for asserting (as the revisionists do) that interstate competition is presumptively beneficial. Indeed, it appears the presumption should run in the opposite direction.

Assuming a welfare-reducing race-to-the-bottom does in fact exist, the question becomes whether the dominant approaches to federal environmental regulation—minimum environmental quality standards and uniform technology standards—are the most appropriate approaches to preventing a race-to-the-bottom. Available evidence indicates that the losses that would accrue from the wholesale abandonment of these approaches would likely far outweigh the benefits. This does not mean, however, that all proposals for enhancing the efficiency of environmental regulation ought to be rejected. One of the lessons of game theory is that binding agreements are effective in preventing parties from engaging in destructive competition. Thus a promising modification of our current approach to environmental protection consists of implementing minimum environmental quality and technology standards on a regional basis through interstate enforcement mechanisms akin to binding agreements. Indeed, something similar to this approach was used by Congress when establishing the Ozone Transport Commission. I recommend that future proposals for regulatory reform take their cue from this successful example.

The findings of this Article point to the need for additional research on both the empirical and theoretical fronts. On the empirical

front, further research elucidating in greater detail the actual dynamics of interstate competition for industrial firms is needed. For example, although this Article has presented evidence to support the claim that the number of states which compete for a given industry is small (and hence, that game-theoretic approaches will be more appropriate than perfectly competitive neoclassical models), additional research on this question would help clarify how "small" this is relative to the level needed to approximate competitive conditions.

This question leads directly to research needs on the theoretical front. A better theoretical understanding of the kinds of environmental standard-setting "games" in which states are actually engaged is critical. As discussed in Part IV.A.(3), my survey of state environmental regulators suggests that states do in fact engage in strategic interactions (and thus, that they are likely involved in some kind of sub-optimal standard-setting "game"), but it does not appear to support the argument that the game conforms to the classic Prisoner's Dilemma. The exact type of game being played thus remains an interesting but open question.

In sum, what is needed on the research front, is, on the one hand, more theoretically-informed appeals to evidence, and, on the other, more empirically-informed appeals to theory. Only when theoretical understandings are able to pass the difficult test of consistency with empirical realities are they likely to generate good law and good policy.

**Appendix 1: Interstate Competition Survey Results
Table 4: Profile of Survey Respondents**

	All Groups	Env't Agency (Air, Water and Secretaries of Env't Agencies)			Citizen Env't Groups	Legislators	Econ. Devel	Chamb. Comm.
		All Env't Regulators	Air only	Water only				
Number of Persons Sent a Questionnaire	445	150	50	51	49	149	48	45
Number of Questionnaires Received	203	80	30	24	26	36	32	31
Percent Response rate	46%	53%	60%	47%	53%	24%	64%	65%
Number of states represented	51 ³	44	30	24	26	31	30	31
Number of regions represented (5 total) ⁴	5	5	5	5	5	5	5	5
—Number in Northeast-Mid-Atlantic ⁵	26	8	4	2	2	4	6	5
—Number in Midwest ⁶	52	20	8	5	7	11	6	9
—Number in South Atlantic ⁷	35	14	6	3	5	5	5	4
—Number in South Central ⁸	32	11	2	6	3	4	7	6
—Number in West ⁹	58	27	10	8	9	11	8	7

1. The data used to construct the Tables in this Appendix were derived from the analysis of the survey results completed by Robin M. Wagner, Ph.D., M.S.

2. This subgroup of environmental regulators includes secretaries of state environmental agencies as well as members of the Secretary's staff.

3. The questionnaire was sent to respondents in all fifty states and the District of Columbia.

4. The five geographic regions consisted of the Mid-Atlantic/Northeast; the Midwest; the Southern Atlantic; the South Central; and the Western states.

5. States in the Northeast-Mid-Atlantic region consist of New York, New Jersey, Pennsylvania, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

6. States in the Midwest region consist of Ohio, Indiana, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, and Nebraska.

7. States in the South Atlantic region consist of Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida.

8. States in the South Central region consist of Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

9. States in the West consist of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii.

Table 5: Comparison of Responses by Group Surveyed

Description of Questionnaire Question:	All Groups	Env'tl Agency Regulators	Citizen Env'tl Groups	Legislators	Economic Development	Chamber of Commerce	Statistical Test	Probability	Signif. Diff's Btwn Groups?
Number of Persons Sent a Questionnaire	445	150	53	149	48	45			
Number of Questionnaires Received	203	80	24	36	32	31			
Percent Response Rate	46%	53%	45%	24%	64%	65%			
Number of States Represented in Data ¹⁰	51	44	24	31	30	31			
Number of Geographic Regions (5 total) ¹¹	5	5	5	5	5				
How important do you believe industry considers the following factors when determining the location of an industrial plant? Stringency of env'tl stnds (mean) ¹²	1.9	1.6	1.5	2.2	2.0	2.4	Kruskal-W.	0.009	Yes
—Percent claiming stringency of env'tl stnds very or fairly imp. to indus. location	70%	59%	38%	86%	88%	87%			
—Rank out of 5 given factors (Number of responses)	4th (203)	5th (80)	5th (24)	3rd (36)	3rd (32)	2nd ¹³ (31)			
Proximity to transportation (mean) (Number of responses)	2.7 (203)	2.7 (80)	2.6 (24)	2.8 (36)	2.6 (32)	2.5 (31)	Kruskal-W.	0.038	
Nature of labor force (e.g., age, skill, union membership) (mean) (Number of responses)	2.7 (203)	2.7 (80)	2.8 (24)	2.7 (36)	2.8 (32)	2.6 (31)	Kruskal-W.	0.599	No

10. The questionnaire was sent to respondents in all fifty states and the District of Columbia.

11. The five geographic regions consisted of: the Mid-Atlantic/Northeast; the Midwest; the Southern Atlantic; the South Central; and the Western states. For a listing of the individual states included within each of these regions as well as a breakdown of the survey results by region, see Appendix, tbl. 4.

12. The mean constitutes the average of the following responses and their values: "not a factor" = 0; "not too important a factor" = 1; "fairly important a factor" = 2; "very important a factor" = 3.

13. State Chamber of Commerce officials ranked both stringency of environmental standards and proximity to transportation facilities second in importance in determining the location of industrial plants.

Tax incentives/subsidies (mean) (Number of responses)	2.1 (203)	2.3 (80)	2.0 (24)	2.1 (36)	1.8 (32)	2.4 (31)	Kruskal- W.	0.011	Yes
Prox. to natural resources (mean) (Number of responses)	1.8 (203)	1.9 (80)	2.0 (24)	1.9 (36)	1.4 (32)	1.6 (31)	Kruskal- W.	0.008	Yes
2. How important do you believe industry considers the following envt'l factors when determining the location of an industrial plant? (mean) ⁴ A. Time/expense in obtaining permits (Number of responses)	2.2 (201)	2.2 (78)	1.9 (24)	2.2 (36)	2.5 (32)	2.6 (31)	Kruskal- W.	0.001	Yes
B. State officials flexibility and willingness to help industry (Number of responses)	2.1 (201)	2.2 (78)	2.0 (24)	2.1 (36)	2.1 (32)	2.3 (31)	Kruskal- W.	0.275	No
C. Stringency of written envt'l stnds (Number of responses)	2.0 (201)	1.7 (78)	1.8 (24)	2.1 (36)	2.2 (32)	2.5 (31)	Kruskal- W.	0.000	Yes
3. How concerned are government officials in your state over industrial plant relocation or initial siting? (mean) ⁵ (Number of responses)	1.4 (203)	1.3 (80)	1.7 (24)	1.3 (36)	1.5 (32)	1.6 (31)	Kruskal- W.	0.003	Yes
4. Percent claiming concern over poten. impacts on indus. has played a role in their or their agency's actions, decisions, or policies. (Number of responses)	86% (144 of 168)	88% (57 of 65)	100% (23 of 23)	62% (18 of 29)	89% (23 of 26)	92% (23 of 25)	Fisher's	0.002	Yes

14. The mean constitutes the average of the following responses and their values: "not a factor" = 0; "not too important a factor" = 1; "fairly important a factor" = 2; "very important a factor" = 3.

15. The mean constituted the average of the following responses and their values, as recoded: "no concern" = 0; "minor concern" = 1; "major concern" = 2.

Percent claiming concern over industry relocation and siting has played a role in their agency/ an agency within their state/ themselves/ their organization/ []: ¹⁶													
5. [discouraging/ opposing adoption of envt'l stnd] (Number of responses)	56% (72 of 129)	30% (16 of 53)	90% (17 of 19)	56% (10 of 18)	65% (11 of 17)	82% (18 of 22)	Chi-square	0.000	Yes				
6. [delay/advocate delay of envt'l stnd] (Number responding)	53% (65 of 123)	35% (19 of 54)	80% (12 of 15)	81% (13 of 16)	47% (8 of 17)	65% (13 of 20)	Chi-square	0.001	Yes				
7. [adopting/advocate adoption of a less stringent envt'l stnd] (Number of responses)	52% (66 of 126)	35% (18 of 52)	94% (17 of 18)	53% (9 of 17)	53% (10 of 19)	60% (12 of 20)	Chi-square	0.001	Yes				
8. [reducing/ advocating reduction in amount of info demanded in typical envt'l permit] (Number of responses)	42% (53 of 126)	30% (16 of 54)	86% (12 of 14)	47% (7 of 15)	36% (8 of 22)	48% (10 of 21)	Chi-square	0.005	Yes				
9. [allowing /advocating allowing envt'l permittee to perform less monet.] (Number of responses)	29% (35 of 121)	12% (6 of 52)	73% (11 of 15)	27% (4 of 15)	18% (3 of 17)	50% (11 of 22)	Chi-square	0.000	Yes				
10. [reducing/advocate reducing steps in permit review process] (Number of responses)	59% (73 of 124)	46% (25 of 54)	75% (9 of 12)	60% (9 of 15)	71% (15 of 21)	68% (15 of 22)	Chi-square	0.137	No				

16. This statement should precede the different end-phrase in the brackets for each of Questions 5-14. Note that although all questionnaires distributed within a group of respondents were identical, and the subject matter of all questions was identical across groups, the questionnaire questions were worded slightly differently, depending upon which group was involved. For questions 5-14 in Table 1, all environmental regulators were asked whether concern over industry relocation or siting had ever played a role in their agency doing the particular action shown in brackets. Consistent with the "watchdog" role in which they were placed for purposes of this survey, citizen environmental groups were asked whether they were aware of any instance in which concern over industry relocation or siting had played a role in their state agency doing the action shown in brackets. State legislators were asked whether concern over industry relocation or siting had ever prompted them to sponsor or support the measures shown in brackets. Finally, State economic development agency and State Chamber of Commerce officials were asked whether concern over industry relocation or siting had ever caused them to lobby, petition, or urge their state government to adopt or carry out the measures shown in brackets. These differences in perspectives are indicated by the different phrases separated by slashes in the brackets in each of Questions 5-15. See Interstate Competition Questionnaire Comparison Document (July 1996) (on file with author).

11. [allowing/ advocating allowing larger permitted discharges] (Number of responses)	31% (38 of 121)	26% (14 of 53)	93% (13 of 14)	13% (2 of 16)	32% (6 of 19)	16% (3 of 19)	Chi-square	0.000	Yes
12. [granting/advocating granting of envt'l permit] (Number of responses)	27% (33 of 124)	17% (9 of 54)	93% (14 of 15)	12% (2 of 17)	42% (8 of 19)	0% (0 of 19)	Chi-square	0.000	Yes
13. [dropping/advocating dropping envt'l enforcement action] (Number of responses)	24% (29 of 119)	17% (9 of 54)	73% (8 of 11)	20% (3 of 15)	42% (8 of 19)	5% (1 of 20)	Chi-square	0.000	Yes
14. [levy/advocating levying smaller or lighter civil or criminal penalty for envt'l violation] (Number of responses)	36% (43 of 121)	31% (16 of 51)	86% (12 of 14)	20% (3 of 15)	50% (9 of 18)	13% (3 of 23)	Chi-square	0.000	Yes
15. [doing something other than that described in Ques. 5-14] (Number of responses)	57% (63 of 111)	48% (24 of 50)	83% (10 of 12)	50% (7 of 14)	59% (10 of 17)	67% (12 of 18)	Chi-square	0.197	No
16. For those claiming "no role" in response to #4, how well do following explain this? (mean ^a) A. envt'l qual. more imp. than industry (Number of responses)	1.4 (27)	1.4 (10)	— (0)	1.3 (10)	1.5 (2)	1.4 (5)	Kruskal-W.	0.996	No
B. Want to attract non-polluting indus. (Number of responses)	1.4 (27)	1.4 (10)	— (0)	1.8 (10)	1.5 (2)	0.8 (5)	Kruskal-W.	0.445	No
C. Fed. stnds reduced discretion to use more lax stnds to attract industry (Number of responses)	1.5 (27)	1.5 (10)	— (0)	1.5 (10)	1.0 (2)	1.6 (5)	Kruskal-W.	0.927	No
D. Availability of indus. inducements other than lax envt'l stnds (Number of responses)	1.5 (27)	1.1 (10)	— (0)	1.4 (10)	1.3 (2)	2.8 (5)	Kruskal-W.	0.047	Yes
17. Familiarity with (mean ^b);									

17. The mean constitutes the average of the following responses and their values: "not a reason" = 0; "a minor reason" = 1; "a fairly important reason" = 2; "a very important reason" = 3.

18. The mean constitutes the average of the following responses and their values: "not at all familiar" = 0; "not too familiar" = 1; "fairly familiar" = 2; "very familiar" = 3.

A. Neighboring states (Number of responses)	1.7 (198)	1.8 (79)	1.8 (22)	1.5 (35)	1.8 (31)	1.7 (31)	Kruskal- W.	0.204	No
B. States in same geo. region (Number of responses)	1.5 (199)	1.6 (79)	1.4 (23)	1.3 (35)	1.5 (31)	1.5 (31)	Kruskal- W.	0.549	No
C. States outside geo. region (Number of responses)	1.0 (199)	1.1 (79)	0.7 (23)	1.0 (35)	1.0 (31)	1.0 (31)	Kruskal- W.	0.178	No
18. Likelihood of knowing about (mean ¹⁹) A. Other state's envt'l qual. Stnds (Number of responses)	1.7 (178)	1.8 (70)	1.6 (22)	1.5 (30)	1.6 (27)	1.6 (29)	Kruskal- W.	0.153	No
B. Other state's permitting requirements (Number of responses)	1.5 (178)	1.6 (70)	1.2 (22)	1.2 (30)	1.8 (27)	1.4 (29)	Kruskal- W.	0.006	Yes
C. Whether other state's envt'l stnds more strin- gent than yours (Number of responses)	1.9 (178)	2.0 (70)	1.8 (22)	1.9 (30)	2.1 (27)	1.9 (29)	Kruskal- W.	0.570	No
D. Whether other state's envt'l stnds less strin- gent than yours (Number of responses)	1.9 (177)	2.0 (70)	1.9 (21)	1.9 (30)	2.0 (27)	1.9 (29)	Kruskal- W.	0.561	No
E. Whether other state's envt'l stnds more strin- gent than federal stnds. (Number of responses)	1.8 (177)	1.8 (70)	1.5 (21)	1.8 (30)	1.9 (27)	1.7 (29)		0.419	No
19. Source of info. about other state's envt'l programs (mean ²⁰): A. Industry representatives (Number of responses)	1.4 (178)	1.1 (69)	2.0 (20)	1.2 (31)	1.4 (28)	1.8 (30)	Kruskal- W.	0.000	Yes

19. The mean constitutes the average of the following responses and their values: "will not know this" = 0; "unlikely to know this" = 1; "fairly likely to know this" = 2; "pretty sure to know this" = 3.

20. The mean constitutes the average of the following responses and their values: "not our information source" = 0; "a minor information source" = 1; "a major information source" = 2.

B. Federal agencies (Number of responses)	1.2 (179)	1.3 (70)	1.4 (20)	1.4 (31)	1.0 (28)	1.0 (30)	Kruskal- W.	0.016	Yes
C. Nat'l orgs. of state officials (Number of responses)	1.4 (178)	1.7 (70)	1.3 (19)	1.5 (31)	0.9 (28)	0.9 (30)	Kruskal- W.	0.000	Yes
D. Business organizations (Number of responses)	1.2 (177)	0.9 (69)	1.7 (20)	1.1 (30)	1.3 (28)	1.7 (30)	Kruskal- W.	0.000	Yes
E. Research by agency in state (Number of responses)	1.3 (178)	1.2 (70)	1.4 (20)	1.7 (30)	1.5 (28)	1.1 (30)	Kruskal- W.	0.005	Yes
F. Citizen groups (Number of responses)	0.7 (174)	0.6 (68)	1.2 (20)	1.6 (30)	0.5 (27)	0.2 (30)	Kruskal- W.	0.000	Yes
G. Other source (Number of responses)	1.7 (43)	1.6 (24)	2.0 (2)	1.6 (9)	2.0 (3)	2.0 (5)	Kruskal- W.	0.482	No
20. Agreement with following description of relationship of own state's envt'l stands with envt'l stands of neighboring states (mean ²):									
Important to be less stringent (Number of responses)	1.7 (196)	1.2 (76)	3.0 (22)	1.6 (36)	1.5 (31)	2.0 (31)	Kruskal- W.	0.000	Yes
A. Important to be more stringent (Number of responses)	1.8 (196)	1.9 (77)	1.5 (22)	2.0 (35)	1.7 (31)	1.5 (31)	Kruskal- W.	0.002	Yes
C. Important to be of about same stringency (Number of responses)	2.9 (197)	2.9 (76)	3.0 (24)	2.7 (35)	2.8 (31)	3.3 (31)	Kruskal- W.	0.110	No
21. Agree that competition for industry leads states to race to relax envt'l stnds to attract or retain industry (mean ²) (Number of responses)	2.1 (200)	2.0 (77)	3.0 (24)	2.5 (36)	1.6 (32)	1.6 (31)	Kruskal- W.	0.000	Yes

21. The mean constitute the average of the following responses and their values: "disagree strongly" = 1; "disagree somewhat" = 2; "agree somewhat" = 3; "agree strongly" = 4.

22. *Id.*

A. Competition for industry does not lead states to race to relax env'tl stnds because: (mean ²³): i. Existence of federal env'tl stnds elim. States' ability compete through lax env'tl stnds (Number of responses)	2.1 (136)	2.3 (54)	1.7 (6)	1.9 (18)	1.9 (31)	2.0 (27)	Kruskal-W.	0.040	Yes
ii. States know env'tl stnds not imp. to industry location (Number of responses)	1.0 (136)	1.2 (54)	1.0 (6)	1.1 (18)	0.7 (31)	0.6 (27)	Kruskal-W.	0.005	Yes
iii. States recognize imp. of env'tl qual. to state residents (Number of responses)	1.7 (136)	1.9 (54)	1.3 (6)	1.8 (18)	1.7 (31)	1.3 (27)	Kruskal-W.	0.072	No
22. Agree states race to enact tougher stnds to achieve high env'tl qual. (mean ²⁴) (Number of responses)	2.2 (194)	2.1 (73)	1.7 (24)	2.3 (36)	2.4 (31)	2.4 (30)	Kruskal-W.	0.011	Yes
23. Percent claiming state revised stnd upon learning of another state's similar less stringent stnd (Number of responses)	35% (59 of 168)	27% (18 of 67)	90% (17 of 19)	28% (8 of 29)	23% (6 of 26)	37% (10 of 27)	Chi-square	0.000	Yes
A. And state revised stnd to match other state's less stringent stnd (Number of responses)	62% (36 of 58)	56% (10 of 18)	69% (11 of 16)	100% (8 of 8)	17% (1 of 6)	60% (6 of 10)	*	*	*
24. Percent claiming state revised stnd upon learning of another state's similar more stringent stnd (Number of responses)	18% (31 of 172)	21% (14 of 67)	27% (6 of 22)	31% (10 of 32)	4% (1 of 25)	0% (0 of 26)	Fisher's	0.002	No
A. State revised stnd. to match other state's more stringent stnd. (Number of responses)	61% (19 of 31)	50% (7 of 14)	67% (4 of 6)	80% (8 of 10)	0% (0 of 1)	— (0 of 0)	*	*	*

23. The mean constituted the average of the following responses and their values: "not a reason" = 0; "minor reason" = 1; "fairly major reason" = 2; "major reason" = 3.
24. The mean constitute the average of the following responses and their values: "disagree strongly" = 1; "disagree somewhat" = 2; "agree somewhat" = 3; "agree strongly" = 4.

Table 6: Responses of State Environmental Regulators

Description of Questionnaire Question:	All Envi- Regulators	Water only	Air only	Sec. Office only ²⁵	Statistical Test	Probability	Significant Dif Btwn Groups?
Number of Questionnaires Received	80	24	30	26			
1. How important do you believe industry considers the following factors when determining the location of an industrial plant?	1.6 59%	1.6 60%	1.7 58%	1.6 54%	Kruskal- W.	0.840	No
A. Stringency of envtl stnds (mean ²⁶)	5th (80)	5th (24)	5th (30)	5th (26)			
envtl stnds. "fairly" or "very" important Rank (out of 5 factors —1A-1E) (Number of responses)							
B. Proximity to transportation (mean ²⁷) (Number of responses)	2.7 (80)	2.7 (24)	2.7 (30)	2.8 (26)	Kruskal- W.	0.591	No
C. Nature of labor force (e.g., age, skill, union membership) (mean ²⁸) (Number of responses)	2.7 (80)	2.6 (24)	2.7 (30)	2.7 (26)	Kruskal- W.	0.605	No
D. Tax incentives/subsidies (mean ²⁹) (Number of responses)	2.3 (80)	2.4 (30)	2.2 (24)	2.1 (26)	Kruskal- W.	0.251	No
E. Proximity to natural resources (mean ³⁰) (Number of responses)	1.9 (80)	2.0 (24)	1.9 (30)	1.8 (26)	Kruskal- W.	0.718	No

25. This subgroup of environmental regulators includes secretaries of state environmental agencies as well as members of the Secretary's staff.

26. The mean constitutes the average of the following responses and their values: "not a factor" = 0; "not too important a factor" = 1; "fairly important a factor" = 2; "very important a factor" = 3.

27. *Id.*

28. *Id.*

29. *Id.*

30. *Id.*

<p>2. How important do you believe industry considers the following env't'l factors when determining the location of an industrial plant? (mean)³¹ A. Time/expense in obtaining permits (Number of responses)</p>							
<p>B. State officials flexibility and willingness to help industry (Number of responses)</p>	2.2 (78)	2.1 (22)	2.1 (26)	2.0 (26)	Kruskal-W.	0.195	No
<p>C. Stringency of written env't'l stnds (Number of responses)</p>	1.7 (78)	1.9 (30)	1.4 (26)	1.4 (26)	Kruskal-W.	0.008	No
<p>3. How concerned are government officials in your state over industrial plant relocation or initial siting? (mean)³² (Number of responses)</p>	1.3 (73)	1.4 (28)	1.1 (24)	1.1 (24)	Kruskal-W.	0.241	No
<p>4. Percent claiming concern over poten. impacts on indus. has played a role in their or their agency's actions, decisions, or policies. (Number of responses)</p>	88% (65)	92% (25)	84% (19)				
<p>Percent claiming concern over industry relocation and siting has played a role in their agency/ an agency within their state/ themselves/ their organization/ 1-33</p>							

31. The mean constitutes the average of the following responses and their values: "not a factor" = 0; "not too important a factor" = 1; "fairly important a factor" = 2; "very important a factor" = 3.

32. The mean constituted the average of the following responses and their values, as recoded: "no concern" = 0; "minor concern" = 1; "major concern" = 2.

33. This statement should be read to precede the different phrase found in the brackets for each of Questions 5-14.

<p>5. [discouraging/ opposing adoption of envt'l stnd] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>30% (16 of 53) 69% (11 of 16) 56% (9 of 16) 25% (4 of 16) 63% (10 of 16)</p>	<p>25% (4 of 16) 50% (2 of 4) 50% (2 of 4) 0% (0 of 4) 100% (4 of 4)</p>	<p>43% (10 of 23) 80% (8 of 10) 50% (5 of 10) 40% (4 of 10) 40% (4 of 10)</p>	<p>14% (2 of 14) 50% (1 of 2) 100% (2 of 2) 0% (0 of 2) 100% (2 of 2)</p>			
<p>6. [delay/advocate delay of envt'l stnd] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>35% (19 of 54) 79% (15 of 19) 58% (11 of 19) 16% (3 of 19) 68% (13 of 19)</p>	<p>35% (6 of 17) 67% (4 of 6) 50% (3 of 6) 17% (1 of 6) 83% (5 of 6)</p>	<p>43% (10 of 13) 80% (8 of 10) 60% (6 of 10) 20% (2 of 10) 50% (5 of 10)</p>	<p>21% (3 of 14) 100% (3 of 3) 67% (2 of 3) 0% (0 of 3) 100% (3 of 3)</p>			
<p>7. [adopting/advocate adoption of a less stringent envt'l stnd] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>35% (18 of 52) 83% (15 of 18) 50% (9 of 18) 17% (3 of 18) 78% (14 of 18)</p>	<p>44% (7 of 16) 86% (6 of 7) 29% (2 of 7) 14% (1 of 7) 86% (6 of 7)</p>	<p>36% (8 of 22) 88% (7 of 8) 63% (5 of 8) 25% (2 of 8) 63% (5 of 8)</p>	<p>21% (3 of 14) 67% (2 of 3) 67% (2 of 3) 0% (0 of 3) 100% (3 of 3)</p>			

<p>Percent claiming concern over industry relocation and siting has played a role in their agency/ an agency within their state/ themselves/ their organization/</p>	<p>8. [reducing/ advocating reduction in amount of info demanded in typical envt'l permit] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>30% (16 of 54) 63% (10 of 16) 69% (11 of 16) 13% (2 of 16) 81% (13 of 16)</p>	<p>24% (4 of 17) 50% (2 of 4) 75% (3 of 4) 0% (0 of 4) 75% (3 of 4)</p>	<p>43% (10 of 23) 70% (7 of 10) 60% (6 of 10) 10% (1 of 10) 90% (9 of 10)</p>	<p>14% (2 of 14) 50% (1 of 2) 100% (2 of 2) 50% (1 of 2) 50% (1 of 2)</p>				
	<p>9. [allowing/ advocating allowing envt'l permittee to perform less monitoring] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>12% (6 of 52) 100% (6 of 6) 83% (5 of 6) 17% (1 of 6) 50% (3 of 6)</p>	<p>11% (2 of 18) 100% (2 of 2) 100% (2 of 2) 0% (0 of 2) 100% (2 of 2)</p>	<p>18% (4 of 22) 100% (4 of 4) 75% (3 of 4) 25% (1 of 4) 25% (1 of 4)</p>	<p>0% (0 of 12) 0% (0 of 0) 0% (0 of 0) 0% (0 of 0) 0% (0 of 0)</p>				

<p>10. [reducing/advocate reducing steps in permit review process] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>46% (25 of 54) 60% (15 of 25) 64% (16 of 25) 29% (7 of 24) 71% (17 of 24)</p>	<p>50% (9 of 18) 78% (7 of 9) 89% (8 of 9) 56% (5 of 9) 44% (4 of 9)</p>	<p>45% (10 of 22) 50% (5 of 10) 60% (6 of 10) 11% (1 of 9) 89% (8 of 9)</p>	<p>43% (6 of 8) 50% (3 of 6) 33% (2 of 6) 17% (1 of 6) 83% (5 of 6)</p>					
<p>11. [allowing/ advocating allowing larger permitted discharges] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>26% (14 of 53) 86% (12 of 14) 57% (8 of 14) 0% (0 of 14) 100% (13 of 13)</p>	<p>35% (6 of 17) 83% (5 of 6) 67% (4 of 6) 0% (0 of 6) 100% (5 of 5)</p>	<p>32% (7 of 22) 86% (6 of 7) 43% (3 of 7) 0% (0 of 7) 100% (7 of 7)</p>	<p>7% (1 of 14) 100% (1 of 1) 100% (1 of 1) 0% (0 of 1) 100% (1 of 1)</p>					
<p>12. [granting/advocating granting of env'tl permit] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>17% (9 of 54) 78% (7 of 9) 33% (3 of 9) 0% (0 of 9) 78% (7 of 9)</p>	<p>18% (3 of 17) 100% (3 of 3) 67% (2 of 3) 0% (0 of 3) 100% (3 of 3)</p>	<p>14% (3 of 22) 100% (3 of 3) 0% (0 of 3) 0% (0 of 3) 67% (2 of 3)</p>	<p>20% (3 of 15) 33% (1 of 3) 33% (1 of 3) 0% (0 of 3) 0% (0 of 3)</p>					

<p>13. [dropping/advocating dropping enforcement action] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>17% (9 of 54) 78% (7 of 9) 56% (5 of 9) 11% (1 of 9) 56% (5 of 9)</p>	<p>17% (3 of 18) 67% (2 of 3) 67% (2 of 3) 33% (1 of 3) 67% (2 of 3)</p>	<p>19% (4 of 21) 75% (3 of 4) 50% (2 of 4) 0% (0 of 4) 25% (1 of 4)</p>	<p>13% (2 of 15) 100% (2 of 2) 50% (1 of 2) 0% (0 of 2) 100% (2 of 2)</p>	
<p>14. [levy/advocating levying smaller or lighter civil or criminal penalty for envt'l violation] (Number of responses) A. Percent claiming such role was fairly or very great (Number of responses) B. Percent claiming role was played within the last 12 months (Number of responses) C. Percent claiming role played: Frequently (Number of responses) From time-to-time (Number of responses)</p>	<p>31% (16 of 51) 69% (11 of 16) 56% (9 of 16) 13% (2 of 16) 75% (12 of 16)</p>	<p>18% (3 of 17) 67% (2 of 3) 33% (1 of 3) 33% (1 of 3) 67% (2 of 3)</p>	<p>43% (9 of 21) 78% (7 of 9) 78% (7 of 9) 11% (1 of 9) 67% (6 of 9)</p>	<p>31% (4 of 13) 50% (2 of 4) 25% (1 of 4) 0% (0 of 4) 100% (4 of 4)</p>	
<p>15. For those claiming "no role" in response to #4, how well do following explain this? (mean³⁴) A. Env't'l qual. more imp. than industry (Number of responses) B. Want to attract nonpolluting indus. (Number of responses) C. Fed. stnds reduced discretion to use more lax stnds to attract industry (Number of responses)</p>	<p>1.4 (10)</p>	<p>1.3 (3)</p>	<p>1.5 (4)</p>	<p>1.3 (3)</p>	<p>Kruskal-W. 0.966</p>
<p>B. Want to attract nonpolluting indus. (Number of responses)</p>	<p>1.4 (10)</p>	<p>2.0 (3)</p>	<p>1.0 (4)</p>	<p>1.3 (3)</p>	<p>Kruskal-W. 0.472</p>
<p>C. Fed. stnds reduced discretion to use more lax stnds to attract industry (Number of responses)</p>	<p>1.5 (10)</p>	<p>1.7 (3)</p>	<p>1.3 (4)</p>	<p>1.7 (3)</p>	<p>Kruskal-W. 0.782</p>

34. The mean constitutes the average of the following responses and their values: "not a reason" = 0; "a minor reason" = 1; "a fairly important reason" = 2; "a very important reason" = 3.

D. Availability of indus. inducements other than lax envt'l stnds (Number of responses)	1.1 (10)	1.0 (3)	1.3 (4)	1.0 (3)	Kruskal- W.	0.844	No
16. Familiarity with (mean ³⁵):							
A. Neighboring states (Number of responses)	1.8 (79)	1.7 (24)	1.9 (29)	1.9 (26)	Kruskal- W.	0.528	No
B. States in same geo. region (Number of responses)	1.6 (79)	1.5 (24)	1.7 (29)	1.7 (26)	Kruskal- W.	0.477	No
C. States outside geo. region (Number of responses)	1.1 (79)	0.9 (24)	1.3 (29)	1.1 (26)	Kruskal- W.	0.077	No
17. Likelihood of knowing about (mean ³⁶):							
A. Other state's envt'l qual. stnds (Number of responses)	1.8 (70)	1.7 (21)	1.9 (26)	1.9 (23)	Kruskal- W.	0.510	No
B. Other state's permitting req'mts (Number of responses)	1.6 (70)	1.3 (21)	1.7 (26)	1.8 (23)	Kruskal- W.	0.066	No
C. Whether other state's envt'l stnds more stringent than yours (Number of responses)	2.0 (70)	1.8 (21)	2.0 (26)	2.2 (23)	Kruskal- W.	0.062	No
D. Whether other state's envt'l stnds less stringent than yours (Number of responses)	2.0 (70)	1.8 (21)	2.0 (26)	2.2 (23)	Kruskal- W.	0.214	No
E. Whether other state's envt'l stnds more stringent than federal stnds. (Number of responses)	1.8 (70)	1.7 (21)	1.9 (26)	2.0 (23)	Kruskal- W.	0.404	No
18. Source of info. about other state's envt'l programs (mean ³⁷):							
A. Industry representatives (Number of responses)	1.1 (69)	1.1 (21)	1.0 (26)	1.3 (22)	Kruskal- W.	0.204	No
B. Federal agencies (Number of responses)	1.3 (70)	1.1 (21)	1.3 (26)	1.6 (23)	Kruskal- W.	0.049	Yes

35. The mean constitutes the average of the following responses and their values: "not at all familiar" = 0; "not too familiar" = 1; "fairly familiar" = 2; "very familiar" = 3.
 36. The mean constitutes the average of the following responses and their values: "will not know this" = 0; "unlikely to know this" = 1; "fairly likely to know this" = 2; "pretty sure to know this" = 3.
 37. The mean constitutes the average of the following responses and their values: "not our information source" = 0; "a minor information source" = 1; "a major information source" = 2.

C. Nat'l orgs. of state officials (Number of responses)	1.7 (70)	1.6 (21)	1.7 (26)	1.8 (23)	Kruskal- W.	0.542	No
D. Business organizations (Number of responses)	0.9 (69)	0.9 (21)	0.9 (26)	0.9 (22)	Kruskal- W.	0.941	No
E. Research by agency in state (Number of responses)	1.2 (70)	1.1 (21)	1.3 (26)	1.3 (23)	Kruskal- W.	0.721	No
F. Citizen groups (Number of responses)	0.6 (68)	0.4 (20)	0.5 (26)	0.8 (22)	Kruskal- W.	0.078	No
G. Other source (Number of responses)	1.6 (24)	1.6 (9)	1.7 (10)	1.4 (5)	Kruskal- W.	0.733	No
19. Agreement with following description of relationship of own state's envt'l stands with envt'l stands of neighboring states (mean ³⁸):							
A. Important to be less stringent (Number of responses)	1.2 (76)	1.2 (22)	1.1 (28)	1.3 (26)	Kruskal- W.	0.392	No
B. Important to be more stringent (Number of responses)	1.9 (77)	2.0 (22)	1.9 (29)	1.8 (26)	Kruskal- W.	0.485	No
C. Important to be about same (Number of responses)	2.9 (76)	2.8 (22)	3.0 (28)	2.8 (26)	Kruskal- W.	0.585	No
20. Agreement with race-to-the-bottom hypothesis (mean ³⁹)							
(Number of responses)	2.0 (77)	2.2 (22)	2.2 (29)	1.7 (26)	Kruskal- W.	0.037	Yes
20A. Claim no race-to-the-bottom because (mean ⁴⁰):							
(Number of responses)	2.3 (54)	2.4 (13)	2.4 (18)	2.1 (23)	Kruskal- W.	0.421	No
i. Existence of federal envt'l stands elim. states' ability to compete through lax envt'l stands (Number of responses)							
ii. States know envt'l stands not imp. to industry location (Number of responses)	1.2 (54)	1.2 (13)	1.2 (18)	1.2 (23)	Kruskal- W.	0.993	No

38. The mean constituted the average of the following responses and their values: "disagree strongly" = 1; "disagree somewhat" = 2; "agree somewhat" = 3; "agree strongly" = 4.
39. *Id.*

40. The mean constituted the average of the following responses and their values: "not a reason" = 0; "minor reason" = 1; "fairly major reason" = 2; "major reason" = 3.

iii. States recognize imp. of env'tl qual. to state residents (Number of responses)	1.9 (54)	2.1 (13)	1.7 (18)	1.9 (23)	Kruskal- W.	0.414	No
21. Agreement with race-to-the-top hypothesis (mean ⁴¹) (Number of responses)	2.1 (73)	2.0 (21)	2.0 (28)	2.1 (24)	Kruskal- W.	0.783	No
22. Percent claiming state revised stnd upon learning of another state's similar less stringent stnd (Number of responses)	27% (18 of 67)	33% (7 of 21)	22% (6 of 27)	26% (5 of 19)	Chi- square	0.000	Yes
A. Percent claiming their state revised stnd to match the other state's less stringent stnd. (Number of responses)	56% (10 of 18)	57% (4 of 7)	67% (4 of 6)	40% (2 of 5)			
23. Percent claiming state revised stnd upon learning of another state's similar more stringt. stnd (Number of responses)	21% (14 of 67)	20% (4 of 20)	24% (6 of 25)	18% (4 of 22)	Chi- square	0.006	Yes
A. Percent claiming their state revised stnd to match the other state's more stringent stnd. (Number of responses)	50% (7 of 14)	25% (1 of 4)	50% (3 of 6)	75% (3 of 4)			

41. *Id.*

Table 7: Summary of Responses of State Environmental Regulators by Geographic Region

Description of Survey Question	North-east - MidAtl. ⁴²	Mid-west ⁴³	South Atlantic ⁴⁴	South Central ⁴⁵	West ⁴⁶
Number of Respondents	8	20	14	11	27
1. How important do you believe industry considers the following factors when determining the location of an industrial plant? (mean ⁴⁷) Stringency of envt'l stnds (Number of responses)	1.37 (8)	1.4 (20)	1.8 (14)	1.7 (11)	1.7 (27)
Proximity to transp. facil. (Number of responses)	2.5 (8)	2.7 (20)	2.8 (14)	2.7 (11)	2.8 (27)
Nature of labor force (Number of responses)	3.0 (8)	2.8 (20)	2.7 (14)	2.5 (11)	2.6 (27)
D. Tax incentives to new plants (Number of responses)	2.5 (8)	2.2 (20)	2.1 (14)	2.3 (11)	2.3 (27)
Proximity to nat. resources (Number of responses)	1.86 (8)	1.8 (20)	2.0 (14)	2.3 (11)	1.7 (27)
2. How important do you believe industry considers the following envt'l factors when determining the location of an industrial plant? (mean ⁴⁸) A. Time/expense in obtaining permits (Number of responses)	2.47 (7)	2.21 (19)	2.1 (14)	2.2 (11)	2.1 (27)
B. State officials flexibility and willingness to help industry (Number of responses)	2.28 (7)	2.26 (19)	2.0 (14)	2.0 (11)	2.2 (27)
C. Stringency of written envt'l stnds (Number of responses)	1.44 (7)	1.63 (14)	1.9 (14)	1.6 (11)	1.9 (27)
3. How concerned are government officials in your state that existing industrial plants may relocate or new plants may choose to locate in states other than yours? (mean ⁴⁹) (Number of responses)	1.5 (8)	1.35 (20)	1.1 (14)	1.5 (11)	1.1 (27)

42. The Northeast-Mid-Atlantic region includes: New York, New Jersey, Pennsylvania, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut.

43. The midwest states consist of: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, and Nebraska.

44. Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida.

45. Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

46. Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii.

47. The mean constitutes the average of the following responses and their values: "not a factor" = 0; "not too important a factor" = 1; "fairly important a factor" = 2; "very important a factor" = 3.

48. The mean constitutes the average of the following responses and their values: "not a factor" = 0; "not too important a factor" = 1; "fairly important a factor" = 2; "very important a factor" = 3.

49. The mean constituted the average of the following responses and their values, as recoded: "no concern" = 0; "minor concern" = 1; "major concern" = 2.

4. Percent claiming concern over poten. impacts on indus. has played a role in their agency's actions, decisions, or policies. (Number of responses)	88% (7 of 8)	80% (12 of 15)	91% (10 of 11)	91% (10 of 11)	86% (18 of 20)
5. Percent claiming concern over industry relocation and siting has played a role in their agency [] ⁵⁰					
6. [not adopting an envt'l health and safety stdn] (Number of responses)	50% (3 of 6)	36% (4 of 11)	22% (2 of 9)	20% (2 of 10)	29% (5 of 17)
7. [delaying the adoption of an envt'l. health and safety stdn] (Number of responses)	57% (4 of 7)	42% (4 of 11)	11% (1 of 9)	30% (2 of 10)	38% (6 of 16)
8. [adopting a less stringent envt'l health and safety stdn than the agency might have adopted in the absence of this concern] (Number of responses)	40% (2 of 5)	27% (3 of 11)	10% (1 of 10)	60% (6 of 10)	38% (6 of 16)
9. [reducing the amount of info. demanded of a permittee prior to granting or denying an envt'l permit] (Number of responses)	60% 3 of 5	25% (3 of 12)	30% (3 of 10)	10% (1 of 10)	35% (6 of 17)
10. [allowing a permittee to perform less frequent or comprehensive monitoring] (Number of responses)	17% (1 of 6)	18% (2 of 11)	0% (0 of 4)	0% (0 of 10)	19% (3 of 16)
11. [reducing steps in the typical permit review process] (Number of responses)	83% (5 of 6)	36% (4 of 11)	40% (4 of 10)	40% (4 of 10)	47% (8 of 17)
12. [in your agency reducing the number of steps your agency employs in its typical permit review process?] (Number of responses)	20% (1 of 5)	27% (3 of 11)	20% (2 of 10)	50% (5 of 10)	18% (3 of 17)
13. [granting a permit that might not otherwise have been granted] (Number of responses)	40% (2 of 5)	18% (2 of 11)	20% (2 of 10)	10% (1 of 10)	11% (2 of 18)
14. [dropping an enforcement action] (Number of responses)	50% (3 of 6)	9% (1 of 11)	10% (1 of 10)	0% (0 of 10)	24% (4 of 17)
15. [levying a smaller civil or a lighter criminal penalty for an envtl violation] (Number of responses)	75% (3 of 4)	27% (3 of 11)	22% (2 of 9)	20% (2 of 10)	35% (6 of 17)

50. This statement should read to precede the different phrases found in brackets for each of Questions 5-14.

16. (For those respondents who claimed that concern over industry relocation and location played no role in agency's envt'l actions, decisions and policies): How important are following in explaining why indus relocation and siting has played "no role"? (mean ⁵¹) A. Because envt'l quality is more important to our residents than the benefits accompanying industry location (Number of responses)	1.0 (1)	0.3 (3)	3.0 (2)	1.0 (1)	1.7 (3)
B. Because state is interested in attracting nonpolluting industries (Number of responses)	2.0 (1)	0.3 (3)	2.0 (2)	1.0 (1)	1.0 (3)
C. Because of the current existence of fed. minimum stnds. (Number of responses)	3.0 (1)	2.0 (3)	1.5 (2)	2.0 (1)	2.0 (3)
D. Because of the existence of other inducements (subsidies/tax breaks) (Number of responses)	1.0 (1)	0.3 (3)	1.5 (2)	2.0 (1)	2.0 (3)
17. How familiar are your state envt'l policymakers with the envt'l stnds of the following other states? (mean ⁵²) A. Neighboring states (Number of responses)	2.1 (8)	2.1 (19)	2.4 (14)	1.8 (11)	1.8 (27)
B. States w/in your same geographic region (Number of responses)	1.88 (8)	1.7 (19)	1.9 (14)	1.7 (11)	1.7 (27)
C. States outside your same geographic region (Number of responses)	1.75 (8)	1.0 (19)	1.3 (14)	1.0 (11)	1.0 (27)
18. How likely are officials in your state agency to know about the following? (mean ⁵³) A. Other state's envt'l stnds (Number of responses)	2.0 (7)	1.9 (18)	2.2 (13)	1.8 (10)	1.8 (22)
B. Other state's permitting procedures (Number of responses)	1.53 (7)	1.6 (18)	2.0 (13)	1.6 (10)	1.6 (22)
C. Whether the other state's stnds are more stringent (Number of responses)	1.8 (7)	1.9 (18)	2.2 (13)	2.1 (10)	2.1 (22)
D. Whether the other state's standards are less stringent (Number of responses)	1.94 (7)	2.0 (18)	2.2 (13)	2.1 (10)	2.1 (22)

51. The mean constitutes the average of the following responses and their values: "not a reason" = 0; "a minor reason" = 1; "a fairly important reason" = 2; "a very important reason" = 3.

52. The mean constituted the average of the following responses and their values: "not at all familiar" = 0; "not too familiar" = 1; "fairly familiar" = 2; "very familiar" = 3.

53. The mean constitutes the average of the following responses and their values: "will not know this" = 0; "unlikely to know this" = 1; "fairly likely to know this" = 2; "pretty sure to know this" = 3.

E. Whether the other state's standards are more stringent than fed. std. (Number of responses)	1.67 (7)	1.9 (18)	2.2 (13)	2.0 (10)	2.0 (22)
19. From whom do the regulators in your state get their info about other state's env'tl programs? (mean ⁵⁴): A. Industry representatives (Number of responses)	1.2 (7)	1.2 (17)	1.8 (13)	0.9 (10)	0.9 (22)
B. Federal agencies (Number of responses)	0.97 (7)	1.2 (18)	0.8 (13)	1.7 (10)	1.7 (22)
C. Nat'l orgs of state officials (Number of responses)	1.72 (7)	1.7 (18)	1.8 (13)	1.9 (10)	1.9 (22)
D. Business orgs. (Number of responses)	1.06 (7)	0.8 (17)	1.5 (13)	0.7 (10)	0.7 (22)
E. Research by a state agency (Number of responses)	1.44 (7)	1.4 (18)	1.5 (13)	1.0 (10)	1.0 (22)
F. Citizen groups (Number of responses)	0.3 (6)	0.5 (17)	0.7 (13)	0.4 (10)	0.4 (22)
20. Do officials in your state agree or disagree with the following stmts? (mean ⁵⁵) A. Its important that our state's stnds be less stringent than neighboring state (Number of responses)	1.3 (8)	1.1 (17)	1.4 (14)	1.4 (10)	1.5 (27)
B. It's important that our state's stnds be more stringent than neighboring state (Number of responses)	2.1 (8)	1.7 (18)	2.0 (14)	1.5 (10)	1.4 (27)
C. It's important that our stnds be of about the same stringency neighbor state (Number of responses)	3.25 (8)	3.2 (17)	2.8 (14)	3.0 (10)	1.5 (27)
21. Agree that interstate competition for industry leads states to race to relax env'tl stnds to attract or retain industry (mean ⁵⁶) (Number of responses)	2.0 (8)	1.7 (18)	2.4 (14)	2.0 (10)	3.0 (27)
21A. Competition for industry does not lead states to race to relax stnds because (mean ⁵⁷): I. Fed. Minimum env'tl stnds eliminate states' ability to compete (Number of responses)	2.0 (5)	2.5 (15)	1.3 (9)	2.3 (6)	2.0 (19)

54. The mean constitutes the average of the following responses and their values: "not our information source" = 0; "a minor information source" = 1; "a major information source" = 2.

55. The mean constituted the average of the following responses and their values: "disagree strongly" = 1; "disagree somewhat" = 2; "agree somewhat" = 3; "agree strongly" = 4.

56. *Id.*

57. The mean constituted the average of the following responses and their values: "not a reason" = 0; "minor reason" = 1; "fairly major reason" = 2; "major reason" = 3.

II. State officials know that envt'l stnds are a minor factor in indus. location decisions (Number of responses)	1.1 (5)	1.3 (15)	1.0 (9)	1.5 (6)	2.3 (19)
III. Env't'l quality so important states will not relax stnds to compete for new industrial firms (Number of responses)	1.6 (5)	1.7 (15)	1.3 (9)	1.8 (6)	1.5 (19)
22. Agree that states race to enact tougher envt'l stnds to satisfy those desiring high envt'l quality (mean ⁵⁸)	1.8 (8)	2.4 (17)	1.8 (14)	0.9 (10)	1.8 (24)
23. Percent claiming state revised stnd upon learning of another state's less stringent standard. (Number of responses)	57% (4 of 7)	29% (5 of 17)	18% (2 of 11)	30% (3 of 10)	18% (4 of 22)
A. Percent claiming their state revised stnd to match the other state's less stringent stnd. (Number of responses)	75% (3 of 4)	40% (2 of 5)	0% (0 of 2)	67% (2 of 3)	75% (3 of 4)
24. Percent claiming state revised stnd upon learning of another state's more stringent standard. (Number of responses)	14% (1 of 7)	35% (6 of 17)	18% (2 of 11)	27% (3 of 11)	10% (2 of 21)
A. Percent claiming their state revised stnd to match the other state's more stringent stnd. (Number of responses)	100% (1 of 1)	33% (2 of 6)	50% (1 of 2)	67% (2 of 3)	50% (1 of 2)

58. *Id.*