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INTRODUCTION

We all know that legal rules are the products of political institutions engaged in formal procedures—the legislature, the courts, and the regulatory agency.[1] Yet, quite apart from the formal production of law by political institutions, law is constructed in another way as well. Judges, regulatory agencies, and the regulated community shape the law within the social context in which they operate, constructing legal interpretations, rules, and regimes that elaborate on or even vary from the basic law.[2] This Article focuses on neither the political institutions that create the formal law, nor on the social context in which it is implemented. Rather, it deals with yet a third form of construction: the activities carried on by legal scholars who critique, defend, and ultimately seek to reform the law.

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1. *See* IAN HACKING, THE SOCIAL CONSTRUCTION OF WHAT? 12-13 (1999) (contending that because law obviously results from social processes, little is gained by characterizing it as socially constructed); *see also* JOHN R. SEARLE, THE CONSTRUCTION OF SOCIAL REALITY 2-4 (1995) (discussing "the complex structure of social reality").

2. *See* MIA L. CAHILL, THE SOCIAL CONSTRUCTION OF SEXUAL HARASSMENT LAW 3-4 (2001); Lauren B. Edelman et al., *Professional Construction of Law: The Inflated Threat of Wrongful Discharge*, 26 LAW & SOC'Y REV. 47 (1992).

Scholars, myself included, rely upon socially constructed views of the existing regulatory system in the pursuit of reform. I use the concept of "regulatory system" broadly to include the formal structure and substance of the law, the manner in which it is implemented, and the capacities and activities of the implementing entities. A scholar's construction of the law, of what the law requires and how it operates, drives her perception of the law's defects and limitations, and consequently shapes her view of the necessary reforms. Thus, myopic reliance upon a single construction can lead the scholar to champion misdirected or incomplete reforms and to ignore other viable approaches for improving regulatory outcomes.

Sociologists working within the social problems discipline have developed a relatively well-defined constructionist approach over the last four decades, using it to examine discourse and activism concerning a range of social conditions. While the proper role and mode of constructionist analysis is still debated,[3] Sarbin and Kitsuse's formulation is instructive: "Constructionists focus on how ordinary members (and sometimes professionals) create and employ constructions, on observing how others interact with those constructions, and on interpreting and sometimes proposing alternate constructions."[4] This Article draws upon that strain of social problems literature to analyze the legal scholarship regarding reform of the so-called "command and control" regulatory system in environmental law. For these purposes, by command and control regulation, I mean the issuance of prescriptive rules intended to directly control the behavior of private actors.

Bashing traditional regulation has become something of a national pastime among legal scholars, supporting a stream of reform proposals from the seventies to present day.[5] Although the criticisms of command and control

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3. *See* IMAGES OF ISSUES: TYPIFYING CONTEMPORARY SOCIAL PROBLEMS 337 (Joel Best ed., 1995).

4. CONSTRUCTING THE SOCIAL, at x (Theodore R. Sarbin & John I. Kitsuse eds., 1994).

5. *See* Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257 (2001); James E. Krier, *The Irrational National Air Quality Standards: Macro- and Micro-Mistakes*, 22 UCLA L. REV. 323 (1974); Richard B. Stewart, *Regulation, Innovation, and Administrative Law: A Conceptual Framework*, 69

regulation are legion, they can be largely distilled down to three propositions which, when taken individually and together, reflect a broadly accepted view of our regulatory system. First, the *rigidity* proposition states that regulation essentially requires firms to use specified technologies to reduce pollution. Second, the *homogeneity* proposition posits that command and control regulation applies a one-size-fits-all approach that fails to distinguish among firms in terms of their economic, technological, or organizational capacities to reduce emissions. Third, the *competency* proposition holds that individual firms are better able than the government to collect and act upon information regarding pollution generation and management.

Using an empirical analysis of citation patterns in the legal literature, I argue that most legal scholars considering environmental regulation have uncritically adopted one or more of these propositions, leading to a particular social construction of the structure of regulation, as well as the relative capacities of the government agency and the regulated firm. This construction has framed the debate over the direction of regulatory reform within the legal academy. Take the rigidity proposition and the competency proposition—when combined, they create the scenario of the innovative firm frustrated in its efforts to manage pollution by the unyielding, centralized bureaucracy. Innovation is stifled, and pollution management is dominated by a one-size-fits-all approach developed by the uninformed, centralized regulatory agency. With the problem thus defined, reform efforts focused on the structure of traditional regulation as the root cause, and the innovative capacities of the firm as the solution. The search for alternative regulatory approaches was on.

There is, however, another perspective. What if the lack of innovation flowed not from the structure of the regulation but from something else? Suppose that the firm is not quite the mythic figure scholars expect. What if most firms were not hotbeds of innovation, but instead cautious and even sluggish mimics, preferring to follow rather than lead? In that case, the reforms flowing from the conventionally accepted construction of traditional regulation may be directed at a false target. Considering alternative

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CAL. L. REV. 1256 (1981); Cass R. Sunstein, *Administrative Substance*, 1991 DUKE L.J. 607.

constructions of existing regulation can help focus attention on more salient reforms.

This Article describes one such alternative construction. In this construction, regulation does not redirect firm behavior, but rather celebrates it, or at least the best of it. Moreover, it does not constrain innovation, but instead clears a path for it. That at least is the structure of the regulation. In practice, however, it appears that the full potential of the structure has yet to be achieved. While traditional regulation has spurred the diffusion of numerous existing technologies throughout a variety of industry sectors, there is little evidence that it has ignited the widespread development of new technologies. Likewise, businesses apparently have not seized upon the flexibility in the regulations to adopt facility-specific strategies for pollution reduction.

Thus the conventional and alternative constructions face a similar question: What are the barriers to the development and deployment of effective, innovative technologies and strategies for pollution reduction? The conventional construction fixes the blame on command and control regulation, seeking changes that free industry from government interference. The alternative construction admits the possibility that other factors, including the structure of the relevant industry sector and the internal features of the constituent firms, are the more formidable barriers.

One may fairly ask why we ought to apply a constructionist frame here—why not simply point out the empirical deficiencies in the existing literature and argue for different reforms or no reform at all? The answer reflects my focus on process rather than on specific substantive reforms. While the direction of reform is clearly important, this Article focuses on the means by which scholars develop and debate reform proposals. How is it that the majority of legal scholars engaged in the regulatory reform debates have come to base their substantive positions upon unsubstantiated and incomplete assumptions about legal texts, regulatory implementation, and the relative capacities of business and government? What are the consequences of that in terms of the usefulness of the resulting reform proposals? The constructionist lens provides a useful framework for getting at those questions, and emphasizes the point that the manner in which legal scholars frame "the problem" can unduly constrain the

range of reforms considered. Indeed, my point is not that my construction is "right" and that the conventionally accepted construction is "wrong." Instead, I argue that scholars ought to explicitly take into account the contingent nature of problems in considering whether and how our regulatory systems should be reformed.

Part I of this Article provides an overview of the concept of social construction, focusing on social problems literature. Sociologists working in this area ask how social interactions influence the identification of particular social conditions as problems requiring response by public authorities. Most formulations of constructionist social problems theory focus on two concepts: claims-making and institutionalization. Claims-making is the process by which actors define the existence, nature, and scope of a putative social problem. Institutionalization is the process by which government responds to a generally accepted social problem through policy. Joel Best, a leading social problems scholar, identified three foci for such constructionist analysis of the claims-making process: the claims, the claims-makers and their social links, and the competing claims. Parts II through IV of this Article examine each of those foci in turn, characterizing legal literature on regulatory reform as an exercise in claims-making.

For analytical purposes, Part II breaks the claims underlying the conventional construction into three components: grounds, warrants, and conclusions. Grounds essentially delineate the condition at issue by defining the purported problem, providing examples and case studies, and estimating its magnitude. Warrants are justifications for reform; they typically draw upon a set of commonly held values (such as protection of the young, economic efficiency, or equality of treatment) to drive a change in the status quo. The conclusions set out the necessary reform.

The conclusions of the conventional construction are clear: adoption of a variety of market–based reforms intended to leverage the regulated firms' natural pursuit of innovation and efficiency. Part II instead focuses on the grounds and warrants supporting the conventional construction. It posits that the legal literature uses the rigidity, homogeneity, and competency propositions as grounds for that construction. Further, Part II identifies two primary warrants used by proponents of the conventional construction: economic efficiency and technological innovation.

Part III turns to the empirical evidence regarding several aspects of the conventional construction. First, using the bibliometric technique of citation analysis and content analysis, it examines whether a conventional construction exists. Based upon examination of 135 articles and books published over the last three decades, it concludes that there was relatively broad reliance upon and acceptance of the three propositions and associated warrants by the relevant legal scholars. Part III also explores the empirical evidence garnered by the proponents of the conventional construction. This analysis demonstrates an astonishingly thin level of factual support for these three propositions.

Part IV presents an alternative construction of existing regulation.[6] Challenging the rigidity proposition, this construction conceptualizes traditional regulation as generally applicable performance standards based upon the best practices used within the relevant industry sector. Thus, a traditional rule typically sets out a performance standard such as a limit on the level of pollutants emitted from the regulated unit. This performance standard is set by reference to one or more technologies or operating practices—often called the "reference" technology—used by the best performing firms in the relevant sector. In achieving that emission limit, individual facilities may choose an alternative to the reference technology so long as that alternative achieves the performance standard. Part IV uses two core air quality programs to demonstrate the pervasive use of the best practices approach: the New Source Performance Standards (NSPS) and the National Emission Standards for Hazardous Air Pollutants (NESHAP).

Again using the NSPS and NESHAP programs, Part IV also demonstrates that the rules and rule development process are starkly different from the one-size-fits-all approach suggested by the homogeneity proposition. The regulatory agency works closely with the industry to collect, coordinate, and synthesize technical, economic, and operational data from affected facilities during the

6. Unlike the conventional construction, there is no broad network of legal scholars embracing this view. In fact, while various scholars have adopted aspects of this alternative view, this Article appears to be the first articulation of it as an integrated construction of traditional regulation.

rulemaking process. Similar operations and facilities are grouped together and emission standards are crafted to fit the characteristics of those customized groups. Likewise, Part IV challenges the competency proposition's depiction of rulemaking as "central planning" ill-suited to the capacities of government. It provides a comparative assessment of the relative capacity of firms, trade associations, and the government to identify industry best practices.

Part V concludes by considering the overall implications. At a general level, legal scholarship seeking to reform legal regimes or regulatory programs should be self-reflective; i.e., it should expressly articulate and challenge its own core propositions. Moreover, such scholarship would be greatly improved by more attention to empirical concerns. That said, the quest for more empirical data often fails to resolve differences between competing constructions, yet policy development must proceed. Part V offers two strategies for dealing with such uncertainty. The relative plausibility strategy calls for reliance upon the construction that is most plausible given the available information. The hedging strategy adopts a neutral stance and counsels development of a policy expected to produce acceptable outcomes under either construction.

I. CONSTRUCTIONISM AND THE LAW

Generally speaking, social constructionism holds that our understanding of the world is created and sustained through various social interactions.[7] The concept of social construction is widely used but rarely defined with any precision.[8] In large part, the difficulty in defining the

7. Taking a cue from Theodore Sarbin and John Kitsuse, I use the terms "constructionist" and "constructionism" throughout this Article rather than other variants, such as "constructivist." CONSTRUCTING THE SOCIAL, *supra* note 4, at x.

8. Since Berger and Luckmann first articulated social construction as a stand-alone theory in the mid-1960s, it has been used to analyze a host of subjects, including gender, nature, technological systems, women refugees, the market, illness, drug use, environmental regulation, and even pollution. PETER L. BERGER & THOMAS LUCKMANN, THE SOCIAL CONSTRUCTION OF REALITY: A TREATISE IN THE SOCIOLOGY OF KNOWLEDGE (1966); *see also* VIVIEN BURR, AN INTRODUCTION TO SOCIAL CONSTRUCTIONISM 14 (1995); HACKING, *supra* note 1, at 1-2 (describing works that apply social construction theories to gender, nature, technological systems, women refugees, illness, and many other subjects);

concept springs from its multidisciplinary nature. Social constructionism is derived from and used in a variety of social sciences, including sociology, social psychology, and linguistics.[9] Rather than being a clearly defined theory associated with a well delineated methodology, social constructionism has been described by one of its practitioners as "somewhat of a mess."[10] Another proponent more tactfully portrayed it as "a loose collection of theoretical perspectives" that share several tenets.[11] Two of those tenets are particularly relevant to my evaluation of legal scholars' treatment of regulation.

First, social constructionism is critical of "taken as granted" knowledge of the world around us. It questions whether commonly held perceptions and understandings of the world and of how it is structured actually reflect the "true" nature of things.[12] For example, it views concepts such as gender, race, and mental illness as constructs rather than objective reality.[13] Second, our understanding of the world is developed and sustained through social interactions. In their treatise on the sociology of knowledge, Berger and Luckmann describe the social process by which

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Stephen Fineman, *Street-level Bureaucrats and the Social Construction of Environmental Control*, 19 ORG. STUD. 953 (1998).

9. *See* BERGER & LUCKMANN, *supra* note 8 (developing social constructionism in the context of the sociology of knowledge); BURR, *supra* note 8, at 2; KENNETH J. GERGEN, AN INVITATION TO SOCIAL CONSTRUCTION (1999); Joseph W. Schneider, *Social Problems Theory: The Constructionist View*, 11 ANN. REV. SOC. 209 (1985) (providing an overview of social constructionism in social problems research by sociologists).

10. NANCY HARDING, THE SOCIAL CONSTRUCTION OF MANAGEMENT: TEXTS AND IDENTITIES 7 (2003).

11. BURR, *supra* note 8, at 3.

12. *Id.*; HACKING, *supra* note 1, at 6.

13. *See* BURR, *supra* note 8, at 3; GERGEN, *supra* note 9, at 63. There is significant debate among social constructionists regarding the nature of the external world. While some contend that there is no "reality" out there, others claim that there is an external reality that acts as a constraint upon the possible constructs. *See* HARDING, *supra* note 10, at 9; DAVID KERTZNER, RITUAL, POLITICS AND POWER 4 (1988) ("That people perceive the world through symbolic lenses does not mean that . . . all such constructs are equally tenable in the material world."); Lawrence Lessig, *The Regulation of Social Meaning*, 62 U. CHI. L. REV. 943, 950 n.19 ("What is 'possible' hangs upon particular histories and material conditions, and the constraints of both are real."); Schneider, *supra* note 9, at 223-24.

ideas or practices secure an aura of objective factual existence through repetition and broadened adoption by more and more members of the relevant social group.[14] New entrants into the social group internalize the idea or practice through socialization.[15]

The corresponding notion that law is shaped by social interaction dates back to Roscoe Pound's classic distinction between law in the books and law in action.[16] Since then, law and society scholars and researchers in other fields have explored that gap in a variety of contexts.[17] Of particular relevance to this Article, one thread of research examined how public and private parties charged with implementing laws shaped the content of those laws through social interactions.[18] So, for example, using the concept of the "street-level bureaucrat," organizational theorists, as well as law and society scholars, demonstrated that "front-line" law enforcement personnel "reconstitute" or "construct" the law through social interactions with each

14. Berger and Luckmann (and, I suppose, Stephen Colbert) call this "facticity." BERGER & LUCKMANN, *supra* note 8, at 20, 35, 60.

15. *Id.* at 61, 114, 129-73, 178-79, 163-73.

16. Roscoe Pound, *Law in Books and Law in Action*, 44 AM. L. REV. 12, 15 (1910); *see also* Lawrence M. Friedman, *The Law and Society Movement*, 38 STAN. L. REV. 763, 764 (1986) (dating the beginning of the law and society movement, with its view of the legal system as a social creation, to the nineteenth century); Edward L. Rubin, *The Practice and Discourse of Legal Scholarship*, 86 MICH. L. REV. 1835, 1855-58 (1988) (discussing the rise of legal scholarship with legal realism).

17. *See* Friedman, *supra* note 16, at 764-66; Carroll Seron & Susan S. Silbey, *Profession, Science, and Culture: An Emergent Canon of Law and Society Research*, *in* THE BLACKWELL COMPANION TO LAW AND SOCIETY 30, 32-35 (Austin Sarat ed., 2004); Richard L. Abel, *Law Books and Books About Law*, 26 STAN. L. REV. 175, 184-89 (1974) (book review) (discussing the nature and potential sources of the gap).

18. Seron & Silbey, *supra* note 17, at 36-49 (describing the law and society literature in this regard). Sociologists and legal scholars have also examined the role of local legal culture in shaping the application of procedural rules and substantive law in local courts. *See* Thomas W. Church, Jr., *Examining Local Legal Culture*, 1985 AM. B. FOUND. RES. J. 449; Lynn M. LoPucki, *Legal Culture, Legal Strategy, and the Law in Lawyers' Heads*, 90 NW. U. L. REV. 1498, 1501-02 (1996) (examining how lawyers within a community develop "shared mental model[s]" of what the law is); Teresa A. Sullivan et al., *The Persistence of Local Legal Culture: Twenty Years of Evidence from the Federal Bankruptcy Courts*, 17 HARV. J.L. & PUB. POL'Y 801, 804 (1994).

other and with the targets of regulation.[19] Professor Edelman and others have likewise examined the construction of employment law by human resource professionals within the regulated entities, as well as the lawyers that serve them.[20] She also identified a role for legal scholars, noting that "[a]cademics construct the law when they write critiques of judicial decisions and commentary on what they see as developing legal trends."[21]

Professor Edelman's evaluation of legal scholars' activity was somewhat limited in scope; she essentially used their construction of the common law of wrongful discharge as a foil for the more ominous construction given by human resource professionals.[22] Accordingly, there was little express discussion of *how* scholars engage in construction beyond references to production of law review articles. The constructionist social problems literature provides useful guidance in answering that question.

Constructionist social problems scholars are interested in how social interactions shape our shared characterization of particular social conditions (such as drug and alcohol abuse or teenage sex) as pressing issues requiring public action.[23] Most formulations focus on two concepts: "claims-

19. *See* MICHAEL LIPSKY, STREET-LEVEL BUREAUCRACY: DILEMMAS OF THE INDIVIDUAL IN PUBLIC SERVICES (1980) (explaining the origins of the street-level bureaucrat concept); Stephen Fineman, *supra* note 8, at 954; Ryken Grattet & Valerie Jenness, *The Reconstitution of Law in Local Settings: Agency Discretion, Ambiguity, and a Surplus of Law in the Policing of Hate Crime*, 39 LAW & SOC'Y REV. 893, 935 (2005).

20. *See* Edelman et al., *supra* note 2, at 47-48. For these purposes, Edelman and her coauthors define construction of law as the "extraction, interpretation, and dissemination" of legal rules. In the article, however, they focus upon the professionals' construction of the threat of wrongful discharge. *Id.*; *see also* Lauren B. Edelman & Mark C. Suchman, *The Legal Environments of Organizations*, 23 ANN. REV. SOC. 479, 505 (1997) ("[O]rganizations (and organized professions) participate actively in the social construction processes that give new laws their meanings.").

21. Edelman et al., *supra* note 2, at 61.

22. *Id.* at 68-69.

23. *See* MALCOLM SPECTOR & JOHN I. KITSUSE, CONSTRUCTING SOCIAL PROBLEMS 73-76 (2001); Joel Best, *Constructing the Sociology of Social Problems: Spector and Kitsuse Twenty-Five Years Later*, 17 SOC. F. 699, 702-03 (2002); (discussing the emergence of the constructionist social problems literature); Schneider, *supra* note 9 (providing an overview of social problems theory and a survey of literature).

making" and institutionalization.[24] Claims-making is the process by which actors—individuals or organizations—attempt to define the existence, nature, and scope of a putative negative condition and secure recognition of it as a pressing social issue requiring action.[25] Like the processes articulated by Berger and Luckmann, claims-making generates consensus within the relevant social group to such an extent that the characterization of a social condition as a problem is widely assumed. Claims-makers use a variety of techniques to advance their claims, including performing research to identify the existence and impact of the putative condition and developing specialized rhetoric.[26]

Institutionalization is the process by which the government responds to a generally accepted social problem, usually through a law or administrative program.[27] For example, drunk driving emerged in the 1980s as a compelling social problem through claims-making by a

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24. One of the leading formulations speaks of the life cycle of a social problem, which begins with "claims-making" (or discovery), followed by institutionalization, reemergence of claims, and search for an alternative responding institution. SPECTOR & KITSUSE, *supra* note 23, at 142-54; *see also* LAURA E. GÓMEZ, MISCONCEIVING MOTHERS: LEGISLATORS, PROSECUTORS, AND THE POLITICS OF PRENATAL DRUG EXPOSURE 7 (1997) (proposing a streamlined conceptualization of the construction process with only two stages: discovery and institutionalization). The natural history approach has been the subject of significant criticism, and to some extent supplanted by an ecological approach, which focuses more on the competition among claims for attention in the public arena. *See* Stephen Hilgartner & Charles L. Bosk, *The Rise and Fall of Social Problems: A Public Arenas Model*, 94 AM. J. SOC. 53 (1988). For other approaches, see JOEL BEST, SOCIAL PROBLEMS (2008); and J. A. HANNIGAN, ENVIRONMENTAL SOCIOLOGY: A SOCIAL CONSTRUCTIONIST PERSPECTIVE (2006).

25. In fact, many constructionist theorists define the very concept of a social problem by reference to social interactions. In a seminal work, for example, Spector and Kitsuse define it as the "activities of individuals or groups making assertions of grievances and claims with respect to some putative conditions." SPECTOR & KITSUSE, *supra* note 23, at 75; *see also* GÓMEZ, *supra* note 24, at 5 ("[T]he constructionist approach views social problems as the product of interactions among social actors . . . .").

26. GÓMEZ, *supra* note 24, at 6; HANNIGAN, *supra* note 24, at 64-65; Schneider, *supra* note 9, at 211; Dorceta E. Taylor, *The Rise of the Environmental Justice Paradigm: Injustice Framing and the Social Construction of Environmental Discourses*, 43 AM. BEHAV. SCIENTIST 508, 510 (2000) (describing types of rhetoric employed by claims-makers).

27. GÓMEZ, *supra* note 24, at 7.

variety of groups such as Mothers Against Drunk Driving, leading to institutional responses by legislatures and law enforcement agencies in the form of increased enforcement, stiffer penalties, and support of treatment programs.[28] Likewise, environmental organizations, public health officials, scientists, and others in the public arena have engaged in successful claims-making on a range of environmental issues for years.[29] Our extensive environmental regulatory system reflects one type of institutional response.

Constructionist social problems theorists make two points regarding claims-making that are of particular importance to my thesis. First, claims-makers are not simply engaged in the articulation of a social problem. In identifying and defining the nature and scope of the problem, they seek to establish "ownership" of the problem—that is, to control the discourse about the existence, causes of, and remedies for the problem.[30] The notion that an individual or group can "own" a social problem implies that claims-making is often a competitive enterprise in which one or more entities battle over the right to define the claim and influence the institutional

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28. Joseph R. Gusfield, *The Control of Drinking-Driving in the United States: A Period in Transition?*, *in* SOCIAL CONTROL OF THE DRINKING DRIVER 109-11 (Michael D. Laurence et al. eds., 1988); Craig Reinarman, *The Social Construction of an Alcohol Problem: The Case of Mothers Against Drunk Drivers and Social Control in the 1980s*, 17 THEORY & SOC'Y 91 (1988).

29. *See* Kate Burningham, *A Noisy Road or Noisy Resident?: A Demonstration of the Utility of Social Constructionism for Analysing Environmental Problems*, 46 SOC. REV. 536 (1998); Sheldon Ungar, *The Rise and (Relative) Decline of Global Warming as a Social Problem*, 33 SOC. Q. 483 (1992); Jerry Williams, *Knowledge, Consequences, and Experience: The Social Construction of Environmental Problems*, 68 SOC. INQUIRY 476, 483-85 (1998). *But see* Riley E. Dunlap & William R. Catton, Jr., *Struggling with Human Exemptionalism: The Rise, Decline and Revitalization of Environmental Sociology*, 25 AM. SOC. 5, 20-23 (1994) (articulating the limitations of constructionist approaches). Studies of environmental social problems typically focus upon the *initial* claims-making activities and institutional responses rather than their aftermath. *See* Taylor, *supra* note 26 (examining origins of environmental justice claims-making); Ungar, *supra* (examining the rise and fall of global warming as a problem in the social arena).

30. JOSEPH R. GUSFIELD, THE CULTURE OF PUBLIC PROBLEMS: DRINKING-DRIVING AND THE SYMBOLIC ORDER 10-13 (1981).

response.[31] Second, claims-making and institutionalization are not mutually exclusive processes; claims-making activities—either by the initial proponents or new claims-makers—often continues during the institutionalization phase. Thus, groups within government may compete for control over the problem through a second round of claims-making. Alternatively, groups who are dissatisfied with the institutional response may seek to redefine the original social problem in some manner, or engage in supplemental claims-making regarding the nature or efficacy of the institutional response.[32]

Such a constructionist approach provides a useful way of thinking about the activities of legal scholars engaged in environmental regulatory reform efforts. For these purposes, the life story of environmental regulation can be broken into two periods: the initial flurry of claims-making activity from the late 1960s through the 1970s, and the thirty years since. The proliferation of federal environmental laws and agencies in the 1970s constitutes the institutional response to, among other things, the claims-making activities by the environmental movement and others regarding a range of putative conditions.[33] During the 1970s, as the statutes were implemented through regulation, competition over "ownership" of environmental social problems and their solution continued. By the end of that decade, however, so-called command and control regulation was in place throughout federal environmental law. Legal scholars began to articulate a variation on initial environmental social problems—call it ineffective institutional response—in their scathing criticism of command and control regulation. Thus, through their legal scholarship and other activities, they engaged in claims-making seeking to modify the government's

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31. GÓMEZ, *supra* note 24, at 6-7; GUSFIELD, *supra* note 30, at 43; DONILEEN R. LOSEKE, THINKING ABOUT SOCIAL PROBLEMS: AN INTRODUCTION TO CONSTRUCTIONIST PERSPECTIVES 53-54 (2d ed. 2003).

32. GÓMEZ, *supra* note 24, at 7, 33 (drawing a distinction between first and second round claims-making).

33. *See* Riley E. Dunlap & Angela G. Mertig, *The Evolution of the U.S. Environmental Movement from 1970-1990: An Overview*, *in* AMERICAN ENVIRONMENTALISM: THE U.S. ENVIRONMENTAL MOVEMENT, 1970-1990, at 1, 4 (Riley E. Dunlap & Angela G. Mertig eds., 1992).

institutional response to the earlier waves of claims-making.

Constructionism is more than a theory; it is also a useful analytic tool.[34] While constructionist analysis is still vigorously debated even among its adherents,[35] Joel Best's identification of three potential foci for constructionist analysis appears to be generally accepted.[36] First, analysis may concentrate on the claims themselves, and in particular on the rhetoric of claims-making used to typify and support the claims. A second focal point is claims-makers, their identity, interests, and social links. Third, analysis might consider the structure of the claims-making process, including the nature of the audience and the existence of other claims-makers asserting competing claims.[37] Sarbin and Kitsuse provide a somewhat more controversial perspective of this third focus, defining the task for analysts as "interpreting and sometimes proposing alternate constructions."[38] In the parts that follow, this Article engages in each of these three analytical steps, beginning with identification of the specific claims and their supporting rhetoric.

But first a word about the notion of regulation itself is in order. Even accepting the general usefulness of constructionist analysis, one might still question its value in evaluating legal scholarship regarding regulation. After all, few legal scholars would take the position that legal texts have fixed meanings disconnected from the social context in which they are created and applied.[39] Rather, much sophisticated legal scholarship takes the indeterminacy of words as a given, and engages in a normative discourse about how the words ought to be interpreted, knowing full well that alternative interpretations exist. Thus, there is no

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34. IMAGES, *supra* note 3, at 348-49.

35. *See* HANNIGAN, *supra* note 24, at 63-64; IMAGES, *supra* note 3, at 337.

36. HANNIGAN, *supra* note 24, at 64-66 (setting out Best's approach and discussing its application by other scholars); IMAGES, *supra* note 3, at 349-50. Other commentators have modified Best's approach, employing a "framing" perspective. *See* LOSEKE, *supra* note 31, at 55-70.

37. IMAGES, *supra* note 3, at 350-51.

38. CONSTRUCTING THE SOCIAL, *supra* note 4, at x.

39. *See* Rubin, *supra* note 16, at 1858 (noting that most legal scholars do not view legal text as "sources of inherent meaning").

"taken-as-granted," broad acceptance of a particular scholar's interpretation as *the* proper reading of a legal text.

This argument suffers from two distinct flaws. First, it mistakenly assumes that social construction only occurs where there is uncontested, unthinking acceptance of the constructed "fact." To the contrary, constructionist social problems theory recognizes that alternative constructions of putative problems often exist, competing in the social arena for acceptance and institutional response.[40] Second, the argument limits the concept of regulation to the legal text. As the next part of this Article demonstrates, while the text certainly plays a part (albeit a surprisingly small one) in claims-making by legal scholars, that claims-making concentrates as much on the law in action as the law in the books, and perhaps more. In other words, the social construction of regulation is mostly about shared perceptions concerning the actions, interactions, and capacities of the regulators and the regulated. Using a variety of techniques, legal scholars have cast these perceptions as empirically-based factual depictions.

II. CONSTRUCTION BY LEGAL SCHOLARS: IDENTIFYING THE CLAIMS

My thesis is that a fairly well-accepted view of the structure and operation of "command and control regulation" has spread through the legal academy over time. This view, which identifies traditional regulation as a social problem in need of reform, is the product of claims-making activities by legal scholars. Though articulated in a variety of ways, their essential claim is that traditional regulation inappropriately displaces "local" private management of pollution with centralized, government decision making. The diverse range of solutions offered for this putative problem share a common theme: regulation should become substantially less directive, affording businesses greater freedom of action in managing pollution subject to performance-based constraints.

This study examines the claims-making activities as reflected in law review articles.[41] Clearly legal scholars

40. GÓMEZ, *supra* note 24, at 6; HANNIGAN, *supra* note 24, at 74-75.

41. *See* IMAGES, *supra* note 3, at 350 (identifying "scholarly and professional books and periodical articles" as sources of claims); Edelman et al., *supra* note 2,

advance their claims through other means as well, including conference presentations, testimony, casebooks, teaching, and informal interactions. I focus on law review articles because they presumably reflect the most rigorous, complete articulation of the claims, and because they are the most available and comprehensive source for evaluation, coding and tracking of the claims through the social network of scholars.

Claims-making is essentially a rhetorical activity; claims-makers seek to persuade others that a particular condition is a social problem requiring a particular response.[42] Recognizing this, Professor Best and others have applied principles of rhetoric to analyze claims, identifying three components of claims-making: grounds, warrants, and conclusions.[43] Grounds are statements of the "facts," themselves socially constructed knowledge, regarding a particular problem, including definitions, examples or case studies, and estimates of the size or scope of the problem. Warrants are statements offered to justify drawing particular conclusions from the grounds; they bridge the gap between the identified problem and the need to act.[44] Conclusions are the policy prescriptions offered by the claim-makers.[45] In many cases they will take the form of "new social control policies by existing bureaucratic institutions."[46]

This part uses Professor Best's approach to describe the claims-making activities of legal scholars. The reforms proposed in the legal literature—primarily the adoption of a

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at 61 (identifying law review articles as the means through which legal scholars construct the law).

42. Joel Best, *Rhetoric in Claims-Making: Constructing the Missing Children Problem*, 34 SOC. PROBS. 101, 102 (1987).

43. *Id.* Other commentators have relied upon the rhetoric use of "frames" to define problems and support solutions. *See* HANNIGAN, *supra* note 24, at 64-65; Taylor, *supra* note 26, at 510-16.

44. HANNIGAN, *supra* note 24, at 64; Best, *supra* note 42, at 109-12. In his examination of the professional literature on elder abuse, Baumann identified similar warrants, the vulnerable and dependant nature of the elderly, and the sanctity of life. Eleen A. Baumann, *Research Rhetoric and the Social Construction of Elder Abuse*, *in* IMAGES, *supra* note 3, at 55, 63-66.

45. Best, *supra* note 42, at 112.

46. HANNIGAN, *supra* note 24, at 65.

variety of "market-based" regulatory tools such as emissions trading, information disclosure and contractual regulation[47]—are well known and widely-debated on their own terms. I am more interested in how legal scholarship has so resolutely determined that reform is necessary, and that the nature of that reform should be tied so closely to neoclassical economic theory. Accordingly, this part focuses on aspects of claims-making that have drawn significantly less express attention than the conclusions—namely, the grounds and warrants utilized by legal scholars in law review publications.

A. *Grounds for the Problem*

As noted above, the grounds of a claim are statements of the problem, consisting of definitions, examples or case studies, and estimates. Broadly stated, the conventional construction casts "command and control" regulation as a top-down, heavily prescriptive system that both undervalues and heavily constrains decision making by businesses. As one might expect, legal scholars articulate this view in a variety of ways. Nonetheless, this diverse set of characterizations can be distilled down to three basic propositions that are used individually or in combination to define the "problem." Taken individually and together, these three propositions form the underlying basis of widespread criticism of this form of regulation. They also provide guideposts for reform, as legal scholars search for regulatory alternatives that avoid the deficiencies highlighted by the three propositions. Scholars advocating these propositions make use of examples, case studies, and estimates as support.

The first proposition, the *rigidity proposition,* focuses on the core structure of traditional regulation—that is, the manner in which the substantive standards are articulated. The rigidity proposition asserts that these substantive standards unnecessarily limit the regulated firms' range of options in reducing pollution. Generally speaking, regulatory standards can be structured either as "design

47. *See* Jody Freeman, *The Contracting State*, 28 FLA. ST. U. L. REV. 155, 189-197 (2000) (discussing contractual regulation); Kenneth R. Richards, *Framing Environmental Policy Instrument Choice*, 10 DUKE ENVTL. L. & POL'Y F. 221, 230 (2000) (providing a taxonomy of various instruments).

standards" or "performance standards." A design standard requires the facility to use a specific type of equipment or work practice to control emission. A performance standard instead sets an emission rate or other measure of performance to be attained, leaving it to the regulated entity to select the particular technology or work practice. A performance standard may be health-based (established by reference to the expected public health impacts of the standard) or technology-based (set by reference to the expected performance of a particular technology).[48]

This rigidity proposition itself takes several forms. The *strong* form broadly states that command and control regulation requires firms to use specific control technologies or operational practices.[49] The *moderate* form recognizes some variability in the structure of command and control regulation, claiming that regulation often, or at least sometimes, uses design standards.[50] The *functional* form is perhaps the most nuanced of the three. It acknowledges that as written, most command and control standards are structured as performance standards. However, it contends that this theoretical flexibility is lost in practice because firms are pressured to adopt the underlying reference technology on which the performance standard had been based.[51]

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48. Timothy F. Malloy & Peter Sinsheimer, *Innovation, Regulation and the Selection Environment*, 57 RUTGERS L. REV. 183, 183-84 (2004).

49. *See* Lisa Heinzerling, *Selling Pollution, Forcing Democracy*, 14 STAN. ENVTL. L.J. 300, 302 (1995) ("In a command-and-control system, the government dictates the technology that must be installed to control pollution . . ."); Cass R. Sunstein, *Problems with Rules*, 83 CAL. L. REV. 953, 1019 (1995) ("[A]ll industries must adopt the same control technology . . .").

50. *See, e.g.*, James E. Krier, *Marketable Pollution Allowances*, 25 TOL. L. REV. 449, 451 (1994) ("Under [command and control regulation], sources are told how much they must control or what devices they must install."); Bradford C. Mank, *The Environmental Protection Agency's Project XL and Other Regulatory Reform Initiatives: The Need for Legislative Authorization*, 25 ECOLOGY L.Q. 1, 31 n.159 (1998) ("Congress . . . often specified technology-based pollution controls . . . .").

51. *See* Robert W. Hahn & Gordon L. Hester, *Marketable Permits: Lessons for Theory and Practice*, 16 ECOLOGY L.Q. 361, 361 (1989) ("In many cases, regulatory authorities issued standards effectively specifying the actual technology that was required to achieve compliance.").

The second proposition focuses on whether the government differentiates among firms in setting its standards. The *homogeneity proposition* states that traditional regulation applies a one-size-fits-all approach that fails to distinguish among firms in terms of their economic, technological, or organizational capacities to reduce emissions.[52] Although the homogeneity and rigidity propositions are often conflated, they are actually distinct components of the mainstream construction. Thus, a regulation could be rigid in its imposition of technology requirements, yet still recognize differences across firms. For example, the EPA could identify several different categories of firms within a single industrial sector, imposing rigid but dissimilar standards on each category. Nonetheless, the two propositions are related to one another. As rigidity increases, the negative impact of homogenous regulation intensifies because firms are less and less able deploy alternatives approaches.

The third proposition, the *competency proposition*, consists of two prongs, each focused on the respective capacities of government and industry. First, it posits that individual firms have greater access than government to information regarding pollution generation and management.[53] Second, it holds that individual firms are better able to develop and implement pollution management strategies than a centralized government agency.[54]

52. *See* Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1335 (1985) ("Uniform BAT requirements waste many billions of dollars annually by ignoring variations among plants and industries in the cost of reducing pollution and by ignoring geographic variations in pollution effects."); Daniel J. Fiorino, *Toward a New System of Environmental Regulation: The Case for an Industry Sector Approach*, 26 ENVTL. L. 457, 469 (1996) ("The economic and technological feasibility of pollution prevention requirements vary substantially by firm size or type of operation.").

53. *See* Richard B. Stewart, *Madison's Nightmare*, 57 U. CHI. L. REV. 335, 343 (1990) ("Bureaucrats in Washington simply cannot gather and process the vast amount of information needed to tailor regulations to the nation's many variations in circumstances and the constant changes in relevant conditions."); Cass R. Sunstein, *Paradoxes of the Regulatory State*, 57 U. CHI. L. REV. 407, 420 (1990) ("Government is rarely in a good position to know what sorts of innovations are likely to be forthcoming; industry will have a huge comparative advantage here.").

54. *See, e.g.*, Ackerman & Stewart, *supra* note 52, at 1343 ("Instead of giving the job of economic and technological assessment to bureaucrats, the

Government decision making is characterized as slow, unresponsive, and politicized, while firm decision making is seen as efficient, nimble, and objective.[55]

In defining command and control regulation through these three propositions, legal scholars make use of two major tools identified by Professor Best: examples or case studies and estimates of the size or scope of the problem.[56] Two types of examples and case studies are most prevalent.[57] First, many scholars rely upon generic references to various sections of federal statutes with little or no discussion of the specifics of those sections.[58] Second, a number of articles directly or indirectly reference *Clean Coal/Dirty Air*, Professors Ackerman and Hassler's classic case study of an early air quality regulation covering coal-

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marketable rights mechanism would put the information-processing burden precisely where it belongs: upon business managers and engineers who are in the best position to figure out how to cut back on their plants' pollution costs.").

55. *See, e.g.*, David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy*, 55 WASH. & LEE L. REV. 289, 297 (1998) ("[T]he polluter knows its facility better than the regulator and can determine how to deliver any given decrease in pollution more efficiently than the regulator."); Richard B. Stewart, *Models for Environmental Regulation: Central Planning Versus Market-Based Approaches*, 19 B.C. ENVTL. AFF. L. REV. 547, 552 (1992) ("[A] technology-based approach requires a large centralized government bureaucracy to study industries and choose technologies. Decisions are slow, unresponsive, and costly. Because of the problems in gathering and processing information in a control bureaucracy, the standards produced are often inappropriate to local circumstances or obsolescent.").

56. IMAGES, *supra* note 3, at 189.

57. To a lesser degree, some scholars use generic examples of types of industries to support the homogeneity and competency propositions. *See* Fiorino, *supra* note 52, at 469 (batch processing within the chemical industry); Karkkainen, *supra* note 5, at 267 (farming, energy generation, and steel production). Also, some scholars reference surveys or modeling of pollution control costs across industrial plants to support claims regarding the homogeneity proposition. *See* Ackerman & Stewart, *supra* note 52, at 1335-36.

58. *See* Heinzerling, *supra* note 49, at 304 (rigidity proposition); Richards, *supra* note 47, at 239 (rigidity proposition); Richard B. Stewart, *The Discontents of Legalism: Interest Group Relations in Administrative Regulation*, 1985 WIS. L. REV. 655, 670-71 (homogeneity proposition); James T.B. Tripp & Daniel J. Dudek, *Institutional Guidelines for Designing Successful Transferable Rights Programs*, 6 YALE J. ON REG. 369, 369 (1989) (homogeneity proposition).

fired power plants[59] to support one or more of the propositions.[60]

Scholars establishing grounds for the competency proposition often use estimates to emphasize the overwhelming scope of the task facing the regulatory agency, positing that the sheer volume of information to be processed is beyond the capacity of government.[61] Scholars also use such estimates to describe the scope of the rigidity proposition, pointing out the astounding jurisdictional reach of the design standards.[62] Some articles stress the number of regulated entities, while others focus on the volume and complexity of the regulations. For example, Professors Pildes and Sunstein offer the image of a federal government attempting to collect, synthesize and act upon information relating to "hundreds, thousands, or millions of companies and individuals in an exceptionally diverse nation."[63]

Taken individually and together, therefore, these three propositions form the core of the conventional construction of traditional regulation. Using examples, case studies, surveys, and estimates—combined with viscerally compelling analogies to central economic planning—scholars have thus established the grounds for this construction. By linking the propositions to warrants for reform, scholars advance their claims of the need for reform.

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59. BRUCE A. ACKERMAN & WILLIAM T. HASSLER, CLEAN COAL/DIRTY AIR (1981).

60. *See* David R. Allardice et al., *Industry Approaches to Environmental Policy in the Great Lakes Region*, 25 U. TOL. L. REV. 357, 363 (1994) (rigidity and homogeneity propositions); Gary E. Marchant, *Freezing Carbon Dioxide Emissions: An Offset Policy for Slowing Global Warming*, 22 ENVTL. L. 623, 629 (1992) (rigidity proposition); Richard H. Pildes & Cass R. Sunstein, *Reinventing the Regulatory State*, 62 U. CHI. L. REV. 1, 98 (1995) (rigidity and homogeneity propositions)

61. *See* T.H. TIETENBERG, EMISSIONS TRADING: AN EXERCISE IN REFORMING POLLUTION POLICY 14-16 (1985) (referring to 27,000 major stationary sources); Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171, 174 (1988) ("[Regulation] involves . . . controls on hundreds of thousands of pollution sources.").

62. *See* Pildes & Sunstein, *supra* note 60, at 97.

63. *Id.*; *see also* Daniel A. Farber, *Environmental Protection as a Learning Experience*, 27 LOY. L.A. L. REV. 791, 794 (1994) (referring to enormous rule-making records consisting of "tens of thousands of pages").

Before turning to the warrants for reform, however, a caveat is in order. My description of these propositions is both a summary and synthesis of 135 articles.[64] As such, it necessarily sacrifices finer grained resolution for a broader view of the literature's essential features. The discussion of the rigidity proposition is a case in point. While I identified only three forms of the proposition, other variations on the notion of rigidity are likewise nestled within the articles. For example, Professor Stewart and others have focused on what Professor Driesen called "spatial specificity," in which the mandated emission reduction must occur at a specified emission point at the facility from a particular piece of equipment or process, rather than from other points within the facility or from other facilities.[65] I leave this type of rigidity as well as other putative features of the conventional construction to the side because they have not been prominently deployed by scholars in their collective indictment of traditional regulation.[66]

B. *Warrants for Reform*

Warrants are statements used by the claims-makers to justify drawing particular conclusions from the grounds presented, creating the inferential bridge between the two.[67]

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64. Indeed, the foregoing analysis is itself an exercise in social construction.

65. Ackerman & Stewart, *supra* note 52, at 1341-42; Driesen, *supra* note 55, at 303. Imagine a manufacturing facility that has four industrial boilers emitting tons of NO_x. Now suppose that the regulation establishes a NO_x emission limit for such boilers which allows the facility to select the best means of reducing emissions at any given boiler, be it alternate fuels, low NO_x burners, scrubbers or something else. Such regulation would be inconsistent with the rigidity proposition as I use the term. Nonetheless, that regulation would still exhibit *spatial specificity* if it precludes the facility from complying with the emission standard at one boiler through some form of trading, either by over-controlling emissions at one of the other three boilers or by relying upon over-control at boilers or other emission sources at other locations.

66. In the seminal work in this area, Ackerman and Stewart focused on this type of rigidity, observing that it unnecessarily increased the costs of regulation by preventing allocation of the emissions reductions obligation to those firms having the lowest reduction costs. Ackerman & Stewart, *supra* note 52, at 1341-42. Reasonable minds can differ on the extent to which traditional regulation historically incorporated trading approaches, on the technical and administrative constraints on its use, and on its expected costs and benefits.

67. HANNIGAN, *supra* note 24, at 64; Best, *supra* note 42, at 108.

In practice, warrants create such bridges by explicitly or implicitly appealing to particular values of importance to the audience.[68] For example, in his analysis of claims-making regarding missing children, Professor Best identified six prominent value-infused warrants, including the inherent value of children, the blameless nature of the victims, and the right to personal freedom and happiness.[69] Of the variety of warrants that legal scholars deploy in seeking regulatory reform, two stand out: achieving economic efficiency and encouraging technological innovation.[70] This section briefly addresses each in turn.

The economic efficiency warrant is the most widely used justification for reform.[71] Advancing principles of the free market and minimal government intervention, this warrant calls for economically efficient regulation—that is, regulation that optimizes the social benefits of pollution reduction while minimizing the costs of such reduction to

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68. *See* Best, *supra* note 42, at 108; S. Michelle Driedger & John Eyles, *Organochlorines and Breast Cancer: The Uses of Scientific Evidence in Claimsmaking*, 52 SOC. SCI. & MED. 1589, 1591 (2001).

69. Best, *supra* note 42, at 109-12; *see also* E.A. Baumann, *supra* note 44, at 63-65 (identifying warrants from professional literature on elder abuse).

70. *See* Mark A. Stach, *The Gradual Reform of Environmental Law in the Twenty-First Century: Opportunities Within a Familiar Framework*, 22 J. CORP. L. 621, 626-28 (1997); Sunstein, *supra* note 5, at 634-40. Other warrants include reducing complexity, minimizing moral hazards associated with agency capture by industry and rent-seeking by powerful agencies, and promoting democratic decision making. *See* Ackerman & Stewart, *supra* note 61, at 189-90; Eric W. Orts, *Reflexive Environmental Law*, 89 NW. U. L. REV. 1227, 1237-40 (1995) (describing the "juridification" of environmental regulation and the problem of moral hazard); Carol M. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 DUKE L.J. 1, 1. See *infra* notes 71-83 and accompanying text for discussion of the full range of warrants used in the regulatory literature.

71. *See* Jonathan H. Adler, *The Ducks Stop Here? The Environmental Challenge to Federalism*, 9 SUP. CT. ECON. REV. 205, 226 (2001) (noting the inefficient allocation of costs); Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era from an Old Idea?* 18 ECOLOGY L.Q. 1, 6 (1991); Stach, *supra* note 70, at 626 (identifying inefficiency as a major reproach of command and control regulation); Richard B. Stewart, *A New Generation of Environmental Regulation?*, 29 CAP. U. L. REV. 21, 31 (2001); Sunstein, *supra* note 49, at 1019; Gerald Torres, *Who Owns the Sky?*, 19 PACE ENVTL. L. REV. 515, 561 (2002).

industry and the economy generally.[72] Pursuing economic efficiency requires attention to how and by whom the reductions are achieved. In particular, the reductions should be made by the companies who can do so at the lowest cost.[73] Many legal academics consistently claim that command and control is "wildly inefficient,"[74] and that alternative regulatory schemes based upon market principles would result in efficient regulation.[75]

Scholars link the economic inefficiency warrant to the three propositions in a variety of ways. In some cases, they focus primarily on a single proposition at a time. For example, Professor Adler ties inefficiency to the homogeneity proposition, observing that:

> Mandating the use of a given technology or even imposing percentage emission reductions on a given industry may produce widely divergent costs across firms. Some firms will find it less expensive to reduce emissions through some means other than that mandated by law, perhaps by making different modifications to the production process.[76]

He has much company among legal scholars on this point.[77] Likewise, Mark Stach singles out the competency proposition as one leading cause of inefficiency, noting that "[o]ne reason for such inefficiency is that regulations, crafted by bureaucrats, are substituted for the judgment

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72. *See* Daniel H. Cole & Peter Z. Grossman, *When is Command-and-Control Efficient? Institutions, Technology, and the Comparative Efficiency of Alternative Regulatory Regimes for Environmental Protection*, 1999 WIS. L. REV. 887, 893 ("The nominal efficiency of a regulatory regime is determined by comparing its social costs and benefits; the regime is nominally efficient if it produces benefits in excess of its costs.").

73. *Id.*

74. Orts, *supra* note 70, at 1236 ("wildly inefficient" or even "irrational"); Sunstein, *supra* note 5, at 628 ("wildly inefficient").

75. Sunstein, *supra* note 5, at 628.

76. Adler, *supra* note 71, at 226.

77. *See* Adam Chase, *The Efficiency Benefits of "Green Taxes": A Tribute to Senator John Heinz*, 11 UCLA J. ENVTL. L. & POL'Y 1, 14 (1992); Hahn & Stavins, *supra* note 71, at 6 (homogeneity); Richard J. Lazarus, *Debunking Environmental Feudalism: Promoting the Individual Through the Collective Pursuit of Environmental Quality*, 77 IOWA L. REV. 1739, 1771 (1992).

and experience of those within the industry who are intimately familiar with the business."[78]

In other cases, scholars connect the propositions. For example, Professor Stewart links the homogeneity and competency propositions, arguing that an agency's decision making limitations lead it to adopt uniform, inefficient requirements.[79] Other scholars couple the rigidity proposition with the competency proposition in challenging command and control regulation as inefficient, arguing that by mandating a particular technology, government regulators may unwittingly bar the use of a cheaper approach unknown to them but identifiable by individual facilities.[80]

Quite apart from their view of the importance of efficiency, virtually every legal scholar recognizes the advancement of technological innovation as critical to effective regulation.[81] Innovation in pollution management approaches can substantially reduce the costs associated with current regulatory programs and also allows policy to keep pace with new environmental challenges that inevitably arise with economic and technological expansion over time.[82] Most legal academics claim that command and control regulation impedes innovation, using the warrant of encouraging technological innovation to justify reform.[83]

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78. Stach, *supra* note 70, at 626. As with the homogeneity proposition, Stach finds significant support for this warrant among other scholars. *See* Adler, *supra* note 71, at 230-31; Robert W. Hahn & Albert M. McGartland, *The Political Economy of Instrument Choice: An Examination of the U.S. Role in Implementing the Montreal Protocol*, 83 NW. U. L. REV. 592, 600 (1989); Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: Some Evidence of Market Manipulation*, 112 HARV. L. REV. 1420, 1556 (1999).

79. Stewart, *supra* note 71, at 31; *see also* Stewart, *supra* note 58, at 670-71.

80. *See* Karkkainen, *supra* note 5, at 270; Marchant, *supra* note 60, at 629-31.

81. *See* Malloy & Sinsheimer, *supra* note 48, at 184-85.

82. *Id.*; *see also* Stewart, *supra* note 5, at 1260-61.

83. *See, e.g.*, Ackerman & Stewart, *supra* note 52, at 1334-51; Daniel J. Dudek & John Palmisano, *Emissions Trading: Why is This Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217, 222-36 (1988); Richard B. Stewart, *Environmental Regulation and International Competitiveness*, 102 YALE L.J. 2039, 2095 (1993).

Here again, each of the three propositions are implicated. Some scholars focus on the rigidity proposition, emphasizing the notion that design standards (or their functional equivalents) "lock-in" existing technology. So, for example, Professors Gaines and Westin lament that "[r]egulation suppresses innovation because it may direct the use of one technology, or because the difficulties in using alternative technology favors the reference technology."[84] Others acknowledge the role of the rigidity proposition, but concentrate primarily on the institutional deficiencies of government agencies and the competency proposition, pointing out the inability of central authorities to identify and nurture emerging technologies.[85] Still, others tie together the competency and homogeneity propositions.[86]

This, then, is the basic shape of the conventional construction, defined by one or more of three central propositions, supported by examples, case studies, and estimates, and drawing persuasive weight from the warrants of economic efficiency and technological innovation. But what is the source of this construction, both in terms of the social network that created it and the empirical evidence that supports it? Part III takes up that question.

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84. *See* ASBJÖRN ERIKSSON ET AL., TAXATION FOR ENVIRONMENTAL PROTECTION 4 (Sanford E. Gaines & Richard A. Westin eds., 1991); *see also* NEIL GUNNINGHAM ET AL., SMART REGULATION: DESIGNING ENVIRONMENTAL POLICY 39 n.5 (1998) ("[A]gency [technology] guidance becomes *de facto* requirement and technological lock-in occurs."); Cass R. Sunstein, *Congress, Constitutional Moments, and the Cost-Benefit State*, 48 STAN. L. REV. 247, 260 (1996) (control technology mandates provide little incentive for innovation).

85. *See* Jonathan Remy Nash, *Too Much Market? Conflict between Tradable Pollution Allowances and the "Polluter Pays" Principle*, 24 HARV. ENVTL. L. REV. 465, 528 (2000); *see also* David W. Case, *The EPA's Environmental Stewardship Initiative: Attempting to Revitalize a Floundering Regulatory Reform Agenda*, 50 EMORY L.J. 1, 29 (2001) ("[Command and control regulation] unwisely requires regulators to make business and operating decisions that could be made more efficiently, effectively and competently by regulated industry.").

86. *See* Karkkainen, *supra* note 5, at 269 ("Unable to set source-specific standards, the regulator typically decides on the best available technology for an entire *category* of sources. . . . Because the regulator cannot anticipate the future trajectory of technological change, the standard may freeze in place those technologies "available" at the time the regulation is promulgated.").

III. MAPPING THE CONVENTIONAL CONSTRUCTION

This part addresses two questions. First, is there a generally accepted conventional construction of command and control regulation within the legal literature? If so, is the conventional construction as presented by the claims-makers based upon empirical evidence? To answer these questions, Part III examines data from 135 law review articles and books that deal substantively with command and control regulation. But first, it provides a brief description of the bibliometric methodology used.

Bibliometrics is the collection and analysis of data regarding written communication "to shed light on . . . the nature and course of development of a discipline."[87] Citation analysis, which typically examines citation patterns by researchers within a particular field, is one of the most common bibliometric techniques.[88] Communications researchers typically use citation analysis to investigate scholar communication[89]—that is, the manner in which

87. Alan Pritchard, *Statistical Bibliography or Bibliometrics?*, 25 J. DOCUMENTATION 348, 348 (1969); *see also* Christine L. Borgman, *Editor's Introduction* to SCHOLARLY COMMUNICATION AND BIBLIOMETRICS 10, 13 (Christine L. Borgman ed., 1990).

88. *See* Leah A. Lievrouw, *Reconciling Structure and Process in the Study of Scholarly Communication*, *in* SCHOLARLY COMMUNICATION AND BIBLIOMETRICS, *supra* note 87, at 59, 60-61 (discussing citation analysis). In the law, citation analysis has been used primarily to identify the frequency of citation of particular authors, articles, or faculties. *See* Fred R. Shapiro, *Origins of Bibliometrics, Citation Indexing, and Citation Analysis: The Neglected Legal Literature*, 43 J. AM. SOC'Y INFO. SCI. 337 (1992); Fred R. Shapiro, *The Most-Cited Law Review Articles*, 73 CAL. L. REV. 1540 (1985). There has been less research in the legal literature or elsewhere regarding citation practices of legal scholars. Richard Delgado's work contending that established male, white legal scholars excluded minority scholars from the discourse on civil rights issues is a significant exception. *See* Richard Delgado, *The Imperial Scholar Revisited: How to Marginalize Outsider Writing, Ten Years Later*, 140 U. PA. L. REV. 1349 (1992); Richard Delgado, Commentary, *The Imperial Scholar: Reflections on a Review of Civil Rights Literature*, 132 U. PA. L. REV. 561 (1984); *Symposium on Trends in Legal Citations and Scholarship*, 71 CHI.-KENT L. REV. 909 (1996).

89. *See* Borgman, *supra* note 87, at 13. One of the most common forms is co-citation analysis, which maps connections between individual authors (in "author co-citation analysis") and articles (in "document co-citation analysis") based on their joint citation by other authors. Howard D. White, *Author Co-Citation Analysis: Overview and Defense*, *in* SCHOLARLY COMMUNICATION AND BIBLIOMETRICS, *supra* note 87, at 84, 85.

scholars "use and disseminate information through formal and informal channels."[90] In particular, assorted types of citation analysis are often used to delineate the boundaries of various scientific disciplines or to trace the spread of a particular idea within a discipline.

This Article uses citation analysis to track the treatment of the three propositions by legal scholars over time. In particular, it performs content analysis, a technique in which the manifest content of a communication is described in a systematic way.[91] For each law review article reviewed in this study, the content analysis focused on four factors. First, it determined what position, if any, the author took on each of the three propositions. Second, it identified any other legal scholars cited with respect to the proposition in question, and characterized the citation as positive (i.e., the author agreed with the cited work), negative, or neutral. Third, it tracked the types of warrants, if any, relied upon by scholars to link propositions to reforms. Last, it determined the nature of the empirical evidence, if any, used with respect to each proposition. As the discussion of the results demonstrates, this type of content analysis permits quantification of the strength of the conventional construction, and identification of subgroups of scholars who reject that construction.

This analysis proceeded in stages. We began with a pool of approximately 375 law review articles, reports, and books published in 1979 through 2002 that discussed the use of command and control regulation in environmental law.[92]

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90. Borgman, *supra* note 87, at 13.

91. *See* William Paisley, *The Future of Bibliometrics*, *in* SCHOLARLY COMMUNICATION AND BIBLIOMETRICS, *supra* note 87, at 281, 288 (noting that content analysis includes the translation of survey responses into coded responses); *see also* Christine L. Borgman & Jonathan Furner, *Scholarly Communication and Bibliometrics*, 36 ANN. R. INFO. SCI. & TECH. 3, 22 (2002) (describing "citation content analysis" as the examination of the content of individual links "to determine their function, purpose, role, or meaning").

92. We began with an initial pool of more than 900 articles using the search term "command w/5 control and environmental law" in the Lexis database *US & Canadian Law Reviews, Combined*. We then excluded articles that focused on subjects tangential to the evaluation and reform of United States command and control regulation. In particular, we excluded articles that focused explicitly (as indicated by their title or introduction) on international law, tort law, environmental justice, enforcement, securities law, Superfund, and ISO 14000. This revised initial pool was supplemented with any articles or books that were

Each article was reviewed to determine how, if at all, it described command and control regulation. We retained any article that engaged in a significant, substantive discussion of command and control regulation, regardless of whether that discussion reflected the conventional construction. We removed those articles that did not engage in significant discussion of the nature or operation of command and control. Typically, such removed articles described a regulation as command and control without elaboration.[93]

Ultimately, 135 articles and books were included in a database for further citation analysis.[94] These works were produced by 137 authors. In numerous cases the pieces were coauthored by two or more scholars. Some authors were quite prolific; for example, Professor Stewart had fifteen individual and coauthored pieces in the database. Many other authors had only one article or book in the database.

Traditionally, citation analysis has made two critical assumptions about the act of citing another scholar's work. First, it assumes that the citing researcher actually used or relied upon the research underlying the cited work, as opposed to finding and citing it as an afterthought.[95] Second, it generally assumes that the cited article was singled out for use, and ultimately citation, because of its merit and substantive relevance.[96] Studies of citation practices in the

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cited by an article in the pool (a "citing article") or by an article or book which itself had been added to the revised initial pool because of citation by an article in the pool.

93. *See, e.g.*, David B. Spence, *Paradox Lost: Logic, Morality, and the Foundations of Environmental Law in the 21st century*, 20 COLUM. J. ENVTL. L. 145, 175 (1995) (mentioning command and control without engaging in any evaluation or critique); Cass R. Sunstein, *Social Norms and Social Roles*, 96 COLUM. L. REV. 903, 955 (1996) (making passing reference to command and control regulation).

94. My research assistant, Renee Floyd, deserves much credit and sympathy for her tireless efforts with respect to this laborious, and at times, mind-numbing review.

95. Sydney J. Pierce, *Disciplinary Work and Interdisciplinary Areas: Sociology and Bibliometrics*, *in* SCHOLARLY COMMUNICATION AND BIBLIOMETRICS, *supra* note 87, at 46, 48. For a refreshingly funny but nonetheless insightful look at citation practices and motives in the legal academy, see J.M. Balkin & Sanford Levinson, *How to Win Cites and Influence People*, 71 CHI.-KENT L. REV. 843 (1996).

96. *See* Pierce, *supra* note 95, at 48.

sciences suggest that the act of citing is a more complex cognitive and social act than these two assumptions reflect. An individual researcher likely has a mix of motives in selecting particular authors or works for citation, which could include the persuasiveness and relevance of the cited work, but also could include uncritical, ritualistic acknowledgement of "classics" or pandering to friends.[97] Thus, one must be cautious in ascribing particular meaning to citation choices in any single case. Nonetheless, there is good reason to believe that citation analysis can provide insight into the source, diffusion, and importance of certain concepts.[98]

A. *In Search of the Convention Construction*

There is no standard test or criteria for demonstrating the existence of a particular social construction. I adopt a functional approach grounded in the basic definition of claims-making: Is there meaningful reliance upon the basic propositions and warrants underlying the putative construction within the relevant community? For these purposes I define the notion of relevant community as the population of legal scholars who have been actively engaged in the debate regarding the appropriate design of substantive regulation. That population is the group of almost 140 authors whose articles were included in the database; the criterion for inclusion in the database was

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97. *See* Terrence A. Brooks, *Evidence of Complex Citer Motivations*, 37 J. AM. SOC'Y INFO. SCI. 34 (1986). For assessments in the legal literature based more on intuition, see Balkin & Levinson, *supra* note 95, at 843; and Richard S. Markovits, *The Professional Assessment of Legal Academics: On the Shift from Evaluator Judgment to Market Evaluations*, 48 J. LEGAL EDUC. 417, 423-24 (1998) who writes:

> Since many frequently cited articles are cited because they contain succinct statements of boilerplate propositions of law or of a particular academic approach to some set of issues, or because they fall squarely within a particular academic paradigm whose proponents make a practice of citing each other, the frequency of an author's citations has little to do with his influence, much less with the quality of his work.

98. *See* Janet Beavin Bavelas, *The Social Psychology of Citations*, 19 CAN. PSYCHOL. REV. 158, 161 (1978) (noting with caveats that citations used to support the citer's credibility still reflect some level of scholarly impact of the cited source); White, *supra* note 89, at 90-92.

engagement "in substantive discussion of command and control regulation."[99]

One could argue that acceptance of the propositions and warrants by a broader audience—such as policymakers or scholars outside the defined population—is needed to establish the ascendancy of a socially constructed problem. The more limited focus here is justified on two grounds. First, I am most interested in how legal scholars' construction of a problem constrains the scope of the debate, and the range of potential reforms, within the legal literature. Accordingly, it is the claims-making—rather than the ultimate institutional response—that is of most relevance. In this regard, my definition is consistent with the constructionist approach to social problems, which itself directs substantial attention to the activities of the claims-makers, rather than the reactions of the broader audience of policymakers.[100] Second, concentration on the engaged legal scholars and their written product provides a practical and tractable framework for analysis.

Clearly, this functional approach is a largely qualitative exercise. I do not offer definitive proof of the existence of the conventional construction. Nonetheless, two sets of evidence support the conclusion that the conventional construction is present in legal scholarship. First, as an absolute and relative matter, the majority of legal scholars have adopted one or more of the three propositions, albeit to differing degrees. Second, each of those scholars has also linked one or more of the propositions to a common set of warrants for reform, demonstrating claims-making in action.

1. *Defining the Social Problem: Adoption of the Propositions.* There appears to be relatively broad adoption of the propositions in the relevant population of scholars.

Table 1 focuses upon the individual propositions, identifying the respective number and percentage [101] of the

99. *See supra* p. 295.

100. *See* IMAGES, *supra* note 3, at 6 ("Constructionists examine what claimsmakers say about conditions . . . ."). Some theorists have extended the analysis to consider "audience." *See* GÓMEZ, *supra* note 24, at 7-8 (institutionalization in a study of prenatal drug exposure policies); Hilgartner & Bosk, *supra* note 24 (using a public arena model to examine the outcome between competing constructions).

101. Of the 137 authors, nineteen were characterized as neutral, meaning that they either did not discuss any of the three propositions, or did not directly or

137 scholars who either supported or rejected each of the propositions.[102]

Table 1
Scholar Support/Rejection by Proposition

	Rigidity Proposition	Homogeneity Proposition	Competency Proposition
Number (%) of Scholars Supporting	71 (52%)	34 (25%)	43 (31%)
Number (%) of Scholars Rejecting	30 (22%)	4 (3%)	2 (1%)

This table demonstrates that the rigidity proposition is the most widely accepted of the three—slightly more than half of the engaged scholars have adopted it. Ironically, it is also the most contested proposition, with almost 20% of the scholars rejecting it. With acceptance rates of 24% and 31%, respectively, the homogeneity and competency propositions likewise find significant support among engaged scholars, with almost no opposition.

Table 2 turns to the depth of support for the propositions as a set. It sets out the respective numbers of the 137 scholars who either supported or rejected one or more of the three basic propositions of the conventional construction.[103]

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indirectly take a position with respect to any of the three. In calculating the percentages in Tables 1 and 2, the full 137 authors were considered.

102. Please note that because individual scholars could support or reject one or more different propositions, scholars could appear in more than one cell of the table.

103. Here again, one scholar can appear in more than a single cell. For example, a scholar adopting all three propositions would appear in each of the three cells in the first row of the table.

Table 2
Scholar Support/Rejection
by Proposition Sets

	At Least One Proposition	At Least Two Propositions	Three Propositions
Number (%) of Scholars Supporting	101 (74%)	38 (28%)	9 (7%)
Number (%) of Scholars Rejecting	31 (23%)	4 (3%)	0 (0%)

As Table 2 indicates, a substantial majority of the 137 scholars writing in this area adopted at least one of the propositions, typically the rigidity proposition. A significant number of engaged scholars supported at least two of the propositions, while a core group of nine academics embraced all three propositions. That is not to say that the propositions are without opposition. Nonetheless, the number of scholars promoting at least one proposition is more than three times larger than the number rejecting at least one. Moreover, nine times as many scholars support at least two propositions as rebuff at least two.

While the data presented in these tables reflects relatively significant diffusion of the three propositions within the community of scholars, the evidence is of course not conclusive. For example, while there is strong support for the rigidity proposition in particular, there is also meaningful opposition. Given such opposition, one could argue that the proposition has not achieved the "taken as granted" status associated with socially constructed facts or concepts. Such an argument, however, mistakenly assumes that constructionist theory views complete or near complete consensus as a necessary precondition to social construction. To the contrary, the constructionist social problems literature fully expects that competing

constructions will often be present in the social arena.[104] Moreover, opposition to the rigidity proposition is not tantamount to rejection of the conventional construction more broadly. Fully one third of those scholars that rejected the rigidity proposition otherwise embraced the competency proposition, the homogeneity proposition, or both.[105]

Putting aside opposition to the rigidity proposition, one might also challenge the notion of a conventional construction by pointing to the apparent lack of broad-based, affirmative support for the three propositions as a set. While almost three quarters of all engaged scholars expressly embrace at least one proposition, only 28% of scholars actively support two propositions, and fewer than 10% accept all three.[106] Clearly, some scholars have focused on one proposition or another in making the case for regulatory reform, while others have developed a more textured depiction of command and control regulation. Here again, social problems theory would expect such differences in framing the definition of the "social problem" by claims-makers seeking reform.

Indeed, although groups of scholars focused on different configurations of the three propositions, they were remarkably consistent across groups in their use of warrants for reform. We looked at the warrants used by three groups of scholars: those adopting one, two, or three propositions, respectively. Table 3 identifies the warrants relied upon in each of the three groups in rank order:

104. *See* CONSTRUCTING THE SOCIAL, *supra* note 4, at x (acknowledging the existence of competing constructions); IMAGES, *supra* note 3, at 350.

105. Ten of the twenty-seven scholars who rejected the rigidity proposition embraced one or both of the other two propositions.

106. *See supra* p. 298 tbl. 1.

Table 3
Warrant Use by Group

Warrant Use by Authors Adopting Only One Proposition			Warrant Use by Authors Adopting Two Propositions			Warrant Use by Authors Adopting Three Propositions	
Warrant	Authors (n=63)		Warrant	Authors (n=29)		Warrant	Authors (n=9)
Inefficient[107]	31		Inefficient	17		Inefficient	9
Inhibit Innovation[108]	14		Inhibit Innovation	9		Inhibit Innovation	7
Ignore Local Conditions[109]	4		Ignore Local Conditions	5		Delay	5
Delay[110]	3		Delay	2		Ignore Local Conditions	4
Other[111]	4		Other[112]	6		Other[113]	9

The authors in each of these groups relied quite heavily on the same four warrants in linking their grounds (i.e., the

107. See *supra* pp. 289-90 for a discussion of the inefficiency warrant.

108. See *supra* pp. 291-92 for a discussion of the inhibition of innovation warrant.

109. This refers to the contention that the regulations do not address local environmental conditions.

110. This refers to the contention that disputes in the rulemaking process and subsequent litigation create delays in addressing the salient environmental conditions.

111. They are complexity (1), regulatory capture (1), and bad priority (2).

112. They are complexity (1), regulatory capture (2), undermines democracy (2), and bad priority (1).

113. They are complexity (3), undermines democracy (2), bad priority (2), resentment (1), and political overload (1).

selected propositions and the associated examples, estimates and case studies) to their recommended reforms.[114] Thus, all of these scholars appear to be engaged in a common enterprise, relying upon the same group of warrants to justify regulatory reform.

B. *Conventional Construction: Sources and Support*

Legal scholars tend to rely upon two types of sources in supporting their constructions of law: existing scholarship and empirical evidence.[115] While the notion of existing scholarship is largely self-explanatory, the term "empirical evidence" could use some elaboration. For these purposes, the term includes any observed data or information regarding the structure and operation of the regulatory system. This includes authoritative documents (e.g., statutes and regulations, regulatory history, or case law) as well as quantitative or qualitative data (such as surveys, statistical information, or case studies). This section turns now to the sources of the conventional construction, beginning with examination of the leaders within the scholarly network, followed by consideration of the empirical evidence that they and other network participants bring to bear.

Concentrating upon the conventional network, Professors Richard Stewart and Bruce Ackerman stand out in terms of centrality. Professor Stewart was cited with approval twenty-eight times by twenty-one different authors. These citations were to eight of his various articles and books. Professor Ackerman was a close second, with three of his pieces being cited favorably a total of twenty-five times by twenty-five separate authors. By far, the most widely cited article was their coauthored *Reforming Environmental Law*.[116] Thus to a large degree, their joint

114. It should be noted that not every author relied upon a warrant. For example, among the sixty-three authors adopting one proposition, twelve did not rely upon a warrant in supporting a reform.

115. The two are not mutually exclusive. For example, Article 1 may cite empirical evidence in support of the rigidity proposition. When Article 2 cites Article 1 for the proposition, it can be said that Article 2 relies upon both existing scholarship and empirical evidence. As we shall see, because the existing scholarship makes very little use of empirical evidence, this point is of little concern in this context.

116. Ackerman & Stewart, *supra* note 52.

and individual work is the centerpiece of the conventional construction. No other scholar in this area even approaches them in terms of citations.[117]

Their analyses of traditional regulation are sophisticated and nuanced. For example, their classic *Reforming Environmental Law* provides a richly textured critique of traditional regulation, focusing both on structural and normative concerns. It also reflects an appreciation of the subtle aspects of technology-based regulation. Likewise, Ackerman and Hassler's *Clean Coal/Dirty Air* presents a carefully researched, insightful examination of the effect of politics and institutional capacity on the development and implementation of law.[118] Not surprisingly, neither Stewart nor Ackerman embrace the strong form of the rigidity proposition. Instead, in various articles, Professor Stewart constructs a layered view of regulation, drawing upon both the moderate and functional forms of that proposition. He acknowledges that traditional regulation uses both design and performance standards, but stresses that in practice administrative pressures impose constraints on permitting officials and individual facilities, transforming the performance standards into *de facto* design standards.[119] For his part, Professor Ackerman declines to embrace the rigidity proposition in any of its forms, noting in *Clean Coal/Dirty Air* that the Clean Air Act expressly rejects design standards except in limited circumstances.[120] In contrast,

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117. Evaluating the significance of a scholar by counting citations is a time-honored tradition in the legal academy and elsewhere. *See* Lawrence A. Cunningham, *Scholarly Profit Margins: Reflections on the Web*, 81 IND. L.J. 271, 273-74 (2006). This Article is unique in that it focused on specific content, tracing the flow of discrete substantive points through the scholarly network.

118. ACKERMAN & HASSLER, *supra* note 59.

119. For the functional form, see Stewart, *supra* note 55, at 550; and Stewart, *supra* note 5, at 1268-69. For the moderate form, see Stewart, *supra* note 83, at 2057, n.79, and Stewart, *supra* note 53, at 341 (offering use of specific pollution control technologies as one example of command and control regulation). This vacillation between forms may be explained by the fact that in the second set of citations, he was *expressly* including hazardous waste regulation and workplace safety rules which, in a number of circumstances, do call for certain types of management approaches.

120. ACKERMAN & HASSLER, *supra* note 59, at 18.

both Ackerman and Stewart endorse the homogeneity and competency propositions.[121]

As impressive as their work is, it does not bear the weight placed on it by the conventional construction. Consider the rigidity proposition. Although neither scholar adopts the strong form of that proposition, they are nonetheless often cited for that very point.[122] While this misplaced reliance raises interesting questions regarding citation practice more generally,[123] it is relevant here because it undermines the foundation of the strong form of the rigidity proposition. Scholars seeking authority for the proposition cite these two central figures in vain, and must look elsewhere if they hope to establish credible empirical support. However, as I discuss in detail below and in Part IV.A, that search for alternative support will be fruitless.[124]

Moreover, for those propositions which Professors Stewart and Ackerman do embrace, neither author offers compelling empirical support. This is not to say that their scholarship completely lacks any empirically-based backdrop; Professor Stewart in particular makes skillful use of case studies, economic modeling, and statutory analysis to make his case in favor of emerging market-based

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121. *See, e.g.*, Ackerman & Stewart, *supra* note 52, at 1354-57 (adopting both propositions); Stewart, *supra* note 53, at 352-56 (adopting both propositions); Stewart, *supra* note 71, at 31-33 (adopting homogeneity proposition).

122. *See* Natalie M. Derzko, *Using Intellectual Property Law and Regulatory Processes to Foster the Innovation and Diffusion of Environmental Technologies*, 20 HARV. ENVTL. L. REV. 3, 19 (1996) (citing PETER S. MENELL & RICHARD B. STEWART, ENVIRONMENTAL LAW AND POLICY 374-76 (1994) for the strong form of proposition 1); Driesen, *supra* note 55, at 300-01; Evan Goldenberg, *The Design of an Emissions Permit Market for Reclaim: A Holistic Approach*, 11 UCLA J. ENVTL. L. & POL'Y 297, 301 (1993) (citing *Reforming Environmental Law* for the strong form of proposition 1); Heinzerling, *supra* note 49 (citing *Reforming Environmental Law* for the strong form of proposition 1); Marchant, *supra* note 60 (citing CLEAN COAL/DIRTY AIR for the moderate form of proposition 1); Sunstein, *supra* note 49 (citing *Reforming Environmental Law* for the strong form of proposition 1); Wendy E. Wagner, *The Triumph of Technology-Based Standards*, 2000 U. ILL. L. REV. 83, 90 n.26 (observing that scholars tend to cite CLEAN COAL/DIRTY AIR as support for proposition 1).

123. *See* Heidi Lee Hoerman & Carole Elizabeth Nowicke, *Secondary and Tertiary Citing: A Study of Referencing Behavior in the Literature of Citation Analysis Deriving from the Ortega Hypothesis of Cole and Cole*, 65 LIBR. Q. 415 (1995) (discussing presence of substantive mis-citing in scientific literature).

124. *See* discussion *infra* Part IV.A.

regulation. That said, upon close examination, his evidence is surprisingly limited, leaving all but narrow slices of the propositions largely unsupported. The functional form of the rigidity proposition is illustrative. Here, he provides no empirical evidence that agency personnel directly or indirectly pressure entities to select the agency's reference technology, or that entities independently choose the reference technology in order to smooth the permitting process.[125] Indeed, there is not even evidence that a majority of facilities subject to NSPS or MACT standards actually choose to install the reference technologies.[126] While the story he tells may feel intuitively plausible, as Part IV.A demonstrates, it is certainly not the only reasonable story one could tell about technology choice by regulated companies.[127]

The same is largely true with his and Professor Ackerman's treatment of the homogeneity proposition. Here they present a story of uniform standards, standards that purportedly ignore wide differences between regulated facilities, including variations in the cost of pollution abatement.[128] In their story, the differential costs of abatement render uniform command and control regulation

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125. *See* Stewart, *supra* note 55, at 550; Stewart, *supra* note 5, at 1269.

126. As I discuss in greater detail below, in a comprehensive 1995 assessment of traditional regulation, the Office of Technology Assessment concluded that there were no data supporting the functional form of the rigidity proposition. OFFICE OF TECH. ASSESSMENT, ENVIRONMENTAL POLICY TOOLS: A USER'S GUIDE 97 (1995). The OTA report, however, overstates the lack of evidence. *See infra* pp. 310-11 (discussing Professor LaPierre's work).

127. In fairness to Professor Stewart, one should note that he does provide evidence of another type of rigidity, namely, spatial specificity. *See supra* text accompanying notes 65-66.

128. Ackerman & Stewart, *supra* note 52, at 1335; Richard B. Stewart, *United States Environmental Regulation: A Failing Paradigm*, 15 J.L. & COM. 585, 587-88 (1996). They also identify another aspect of homogeneity—what one might call "impact homogeneity"—which holds that facilities differ in terms of the environmental quality or character of their surroundings. Ackerman & Stewart, *supra* note 52, at 1335 ("Uniform BAT requirements waste many billions of dollars annually by ignoring variations among plants and industries in the cost of reducing pollution and *by ignoring geographic variations in pollution effects*. A more cost-effective strategy of risk reduction could free enormous resources for additional pollution reduction or other purposes." (emphasis added)).

excessively expensive.[129] In several different articles, Professor Stewart relies heavily for support upon a set of economic studies described in Thomas Tietenberg's *Emissions Trading: An Exercise in Reforming Pollution Policy*.[130] Yet these studies fall far short of the mark. At the methodological level, they consist almost exclusively of economic modeling rather than actual data regarding "on-the-ground" costs of abatement, and fail to account for monitoring and implementation costs associated with market-based approaches.[131] Moreover, Professors Ackerman and Stewart deploy these studies without addressing the numerous conflicting economic studies described by Professors Cole and Grossman.[132] Those conflicting studies indicate that, under circumstances closer to those actually facing regulators, command and control regulation can be as or even more efficient than its market-based competitors.[133]

Of course, reasonable dispute over the import of empirical studies is an integral part of the scholarly enterprise. Yet, even if one accepts the studies relied upon by Professors Ackerman and Stewart at face value, at best those studies only show that certain command and control programs may be more costly than reified market-based alternatives. What is particularly striking here is that the studies simply accept without question the basic assumption underlying the homogeneity proposition—that command and control regulations apply uniformly without regard to the characteristics of individual facilities. The studies essentially assume, as do Professors Ackerman and Stewart, that such uniformity exists. Accordingly, the studies tell us little about the source of the purported economic inefficiency of traditional regulation and nothing at all about whether such regulation actually treats all facilities uniformly.

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129. *See* Ackerman & Stewart, *supra* note 52, at 1335; Stewart, *supra* note 128, at 587-88; Richard B. Stewart, *Controlling Environmental Risks Through Economic Incentives*, 13 COLUM. J. ENVTL. L. 153, 156 (1988).

130. TIETENBERG, *supra* note 61.

131. *See* Cole & Grossman, *supra* note 72, at 889-92; *see also* Driesen, *supra* note 55, at 289 (discussing limitations of the studies in Tietenberg's book).

132. Cole & Grossman, *supra* note 72.

133. *Id.* at 889-92.

Turning to the competency proposition, Professors Ackerman and Stewart fare even worse. They present no empirical evidence for this proposition, save a citation to *National Lime Ass'n v. Environmental Protection Agency*.[134] Professor Stewart relies upon that case in a brief 1996 symposium piece in support the following statement: "EPA regulation writers face grave difficulties in gathering information about the diverse circumstances of different facilities and devising requirements that are responsive to these different circumstances."[135] *National Lime Ass'n* is a curious choice. In that case, the court remanded air quality regulations for rotary kilns used to produce lime, finding that the EPA had failed to demonstrate that the standard was generally achievable across the industry.[136] The EPA had used test data from five facilities to establish the achievability of the standard without showing that those facilities were representative of the range of operations within the industry.[137] Contrary to Professor Stewart's point, the court concluded that gathering and evaluating the necessary information regarding representative facilities was fairly straightforward and quite manageable and found that the EPA's failure to do so justified a remand.[138] In fact, following the remand, the EPA collected additional information from twelve more individual plants, the industry trade association, and pollution control equipment vendors, and later issued a revised proposed rule.[139]

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134. 627 F.2d 416 (D.C. Cir. 1980).

135. Stewart, *supra* note 128, at 587.

136. 627 F.2d at 452-53.

137. *Id.* at 435.

138. *Id.* at 454-55.

139. *See* Standards of Performance for New Stationary Sources; Lime Manufacturing Plants, 47 Fed. Reg. 38,832, 38,835 (proposed Sept. 2, 1982) (to be codified at 40 C.F.R. pt. 60) ("Information was requested in writing from 14 plants, and 12 responses were received. The Agency also surveyed new or modified lime plants to determine if process and emission control technology had changed since the development of standards for lime manufacturing plants. . . . In addition, EPA sought information from the Industrial Gas Cleaning Institute (IGCI), a national organization of manufacturers of industrial air pollution control equipment, from the NLA, and from a review of the technical literature on lime manufacturing.").

Thus, the two central actors in this scholarly network provide minimal factual support for the conventional propositions, and citations to their articles accordingly carry no meaningful empirical weight. A review of the articles by the other scholars completes the analysis, demonstrating a pervasive lack of factual support for the conventional construction. Table 4 sets out the types of evidence employed in support of each of the three conventional propositions, including the evidence marshaled by Professors Ackerman and Stewart.

Table 4
Types of Evidence Used to Support Conventional Construction

Evidence Type	Total Uses of Evidence	No. of Uses of Evidence to Support Rigidity Proposition	No. of Uses of Evidence to Support Homogeneity Proposition	No. of Uses of Evidence to Support Competency Proposition
Case Study: CLEAN COAL/ DIRTY AIR	2	2	0	0
Economic Analysis (Teitenberg; Crandall)	4	1	3	0
Statute/ Regulation/ Case Law	15	12	2	1
Gov't Report	1	1	0	0
Total	**22**	**16**	**5**	**1**

Two aspects of the table are particularly important. First, proponents of the conventional construction make surprisingly little use of empirical information. Of the 98 articles making conventional claims, only nineteen purport to rely upon empirical support. Those nineteen articles make use of empirical evidence in twenty-two total instances. Second, close examination of that smaller set of nineteen articles reveals that for the most part the cited evidence provides dubious support for the propositions.

Indeed, only one provides actual evidence for any proposition.

Turning first to the case study and economic analyses, the two citations to Professors Ackerman and Hassler's *Clean Coal/Dirty Air* study as support for the rigidity proposition were misplaced; their study in fact rejected that proposition.[140] Two references to Professor Tietenberg's *Emissions Trading* also require little discussion. As noted above, those studies were more modeling exercises than actual evidence of real world effects of regulation, and in any event, did not go to the essential aspects of the relevant propositions.[141] Lastly, in speaking to the homogeneity proposition, Professors Hahn and Stavins relied upon Crandall's economic study to illustrate the differential costs between facilities.[142] However, no one seriously disputes the notion that the costs of pollution abatement can vary across facilities and across industries. The contested aspect of the homogeneity proposition is whether regulation fails to take such differences into account. The cited study provides no support for the latter point.[143]

The references to statutes and regulations in support of the conventional propositions likewise need not detain us long. The bulk of these were generic citations to the Clean Air Act and Clean Water Act. The authors cited the entire statute, titles, or sections within the statute, without any specific identification or discussion of the particular language relied upon. Such broad incantations do little to advance the case for the conventional construction. In fact, the only specific regulatory citation in the sixteen articles actually cuts against the proposition for which it was cited.

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140. *See supra* text accompanying notes 119-21.

141. *See supra* text accompanying notes 130-31.

142. Hahn & Stavins, *supra* note 71, at 6 (citing Robert W. Crandall, *The Political Economy of Clean Air: Practical Constraints on White House Review*, *in* ENVIRONMENTAL POLICY UNDER REAGAN'S EXECUTIVE ORDER 205, 210-15 (V. Kerry Smith ed., 1984)).

143. Indeed, Crandall's study cites statistics showing differing incremental costs of pollution control between new sources and existing sources, as well as variances across industries. These are exactly the types of differences that underlie the categorical distinction made between industry sectors and between facilities within the same sectors in identifying reference technologies. *See infra* Part IV.B.

That article relied upon an air quality regulation for the synthetic organic manufacturing industry in arguing:

> Process, technology, and design standards require, for example, that machinery be installed, pipes inspected, workers trained, wastes treated in a prescribed way, reports filed at specified intervals or following certain events. Regulated entities either meet these explicit requirements or they do not; the regulators need not analyze whether the actions satisfy some nebulous policy goal. This is one reason policy makers rely so extensively on *technology and process requirements* to achieve their goals.[144]

Ironically, the cited regulation is in fact bursting with performance standards, rather than technology and process requirements. For example, Section 40 C.F.R. 113(a)(2)—which is representative of the wide array of standards set out in the regulation—allows the facility to choose from several options in addressing process vent emissions, including simply ensuring that emissions are reduced by a specified percentage or mass.[145]

One must go back to 1977 to uncover effective use of empirical evidence, in this case, supportive of the functional form of the rigidity proposition. In his treatment of technology-forcing regulation, Professor LaPierre posited that facilities may be strategically selecting EPA reference technologies to comply with the Clean Water Act so as to avoid penalties in the event the facilities were unable to meet the applicable performance standards.[146] The factual predicate for his hypothesis—that facilities "blindly" selected the reference technologies—was supported by survey data found in the staff report of the National Commission on Water Quality.[147] Nonetheless, even this evidence does not directly support the central point of the rigidity proposition; namely, that this uniformity of choice is explained by administrative pressure or fear of enforcement rather other factors. Section IV.C.2 addresses this point in more detail.

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144. Fiorino, *supra* note 52, at 478 (emphasis added) (footnote omitted).

145. 40 C.F.R. § 63.113(a)(2) (2008).

146. D. Bruce LaPierre, *Technology-Forcing and Federal Environmental Protection Statutes*, 62 IOWA L. REV. 771, 825-26 (1977).

147. *Id.* at 825 n.324; *see* NAT'L COMM'N ON WATER QUALITY, STAFF REPORT II-68 (1976).

This part has set out the basic framework of the conventional construction, drawn from statements and references in scores of law review articles. One could argue it reads too much into isolated statements scattered throughout these articles. More specifically, almost all of the articles advanced one reform or another; the discussions of command and control regulation could simply be general background understandably relying upon broadly framed descriptions of its structure and operation. For example, because the passing remark "[i]t makes no sense to say that all industries must adopt the same control technology"[148] sacrifices nuance for clarity and directness, it may not reflect the authors' deeper understanding of the intricacies of command and control regulation. As Edward L. Rubin warned in another context:

> Because they are operating within an ongoing discourse, many scholars tend to lapse into a conceptual shorthand, reifying law or texts in ways that they would not defend. . . . But a serious critique must aim at the most advanced, well-reasoned portions of its subject matter, rather than trying to pick off waifs and stragglers.[149]

Professor Rubin's admonition is well-taken; no doubt some of the discussion of command and control regulation in the literature is academic shorthand, or perhaps even carelessness—the "waifs and stragglers."[150] Even Professor Stewart sometimes slips into characterizing command and control regulation as requiring the use of "specific pollution control technologies."[151] Nonetheless, for the most part the claims made by the conventional construction's leading proponents and by many of its adopters are, in fact, quite well articulated, as the analysis of their grounds and warrants demonstrate. Moreover, the perspective reflected in the conventional construction is more than simple background or context; it is presented as the underlying

148. Sunstein, *supra* note 49, at 1019.

149. Rubin, *supra* note 16, at 1854-55.

150. Indeed, the coders in the current project had to make fairly nuanced decisions in some cases about whether the author was expressing one of the propositions or not.

151. Stewart, *supra* note 53, at 341. As discussed above, Professor Stewart has adopted a much more nuanced form of the rigidity proposition elsewhere. *See* Stewart, *supra* note 55, at 550; Stewart, *supra* note 5, at 1269-70.

basis for reform. This is not the case of academic nods to a long-resolved debate, or the traditional recitation of the discipline's canon. Instead, these articles use expansive, largely unsubstantiated statements about how the regulatory system functions and about the relative capacities of government and industry to justify fundamental reforms. The conventional literature lacks meaningful consideration of alternative depictions of the regulatory system and an appreciation of what an alternative depiction might suggest about the course for reform. Part IV examines one such alternative construction.

IV. UNDER CONSTRUCTION: DEFAULT STANDARDS

This part sets out an alternative construction of traditional command and control regulation, focusing on the air quality regulatory system. Although this alternative construction has not been expressly articulated as such in the existing literature, its threads can be found in the work of a number of scholars.[152] To varying degrees these scholars reject the conventional construction, taking issue with one or more of the three propositions and its associated theoretical framework.[153]

This alternative construction offers a quite different view of the law, the agency, and the firm than the conventional construction. In the alternative construction,

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152. *See, e.g.*, Driesen, *supra* note 55, at 289 (describing "economic incentive" programs); Timothy F. Malloy, *Regulating by Incentives: Myths, Models, and Micromarkets*, 80 TEX. L. REV. 531 (2002); Sidney A. Shapiro & Thomas O. McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 1991 DUKE L.J. 729; Wagner, *supra* note 122, at 83.

153. *See generally* Cole & Grossman, *supra* note 72, at 887 (rejecting rigidity proposition and questioning the efficiency warrant); Driesen, *supra* note 55, at 296-308 (rejecting the homogeneity proposition); Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and "Fine Tuning" Regulatory Reform*, 37 STAN. L. REV. 1267, 1268-69 (1985) (rejecting the homogeneity proposition); Malloy, *supra* note 152, at 545 (rejecting the competency proposition and associated innovation warrant); 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) (rejecting the "race to the bottom" proposition); Sidney A. Shapiro & Robert L. Glicksman, *Goals, Instruments, and Environmental Policy Choice*, 10 DUKE ENVTL. L. & POL'Y F. 297 (2000) (rejecting the rigidity proposition); Wagner, *supra* note 122, at 89 (rejecting the competency proposition).

the regulations establish emission limits based on the best practices within the relevant industry, yet essentially leave it to the regulated businesses to select the means of achieving those standards. It draws finer distinctions between categories of firms—differentiating between those categories based upon the known financial and technical capacities of the firms within them—and the relative health and environmental risks they may pose. Lastly, it reverses the conventional construction's characterization of the relative competencies of "government" and "firm" in terms of information collection and synthesis.

A. *Emission Levels and Default Technologies: Responding to the Rigidity Proposition*

According to the rigidity proposition, traditional regulation imposes express or *de facto* technology requirements on businesses. Under the alternative construction, the agency sets up emission standards rather than design standards. It sets emission levels by reference to the best performing businesses, identifying the emission level generally attained by responsible companies using state of the art technologies. The resulting "technology-based" regulation requires similarly situated businesses to meet that emission level, but leaves the means of achieving the level up to the individual business.[154] Thus, so long as a facility complies with the emission level, it can use the same technology relied upon by the agency, or it can adopt an entirely different technology.[155]

The actual language and structure of existing regulation supports this construction. As part of this study,

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154. This description refers to "self-executing" regulations, which are requirements that apply to particular types of activities whether the facility is otherwise required to obtain an environmental permit for its operations. Default standards also appear in permitting programs.

155. Reliance on technology-based standards could result in both over-regulation and under-regulation. Over-regulation would occur where the technology reduces emissions to levels below those necessary to protect humans or the environment. Two mechanisms limit the likelihood of this to some degree. First, in choosing which sectors to regulate under the NSPS and MACT programs, EPA must first make the determination that under-regulation results when the industries' best practices are not sufficiently protective, exposing populations to significant residual risk even after attainment of the emission standard.

we reviewed two major sets of federal air quality regulations: the New Source Performance Standards (the "NSPS" program)[156] and National Emission Standards for Hazardous Air Pollutants (the "MACT" program).[157] Together, these two programs establish emission limits and operating standards for hundreds of diverse emission sources in a broad spectrum of industries ranging from professional dry cleaning to petrochemical manufacturing.[158] The review, which focused on whether program rules mandated specific control technologies, revealed three significant features of these classic programs.[159]

First, most of the rules do not mandate the use of any particular control technology. In the NSPS program, ninety-three percent of the rules examined set an emission limit that could be met through any available technology.[160] Only

156. The NSPS provisions establish technology-based standards for emissions of "criteria" pollutants. *See* Standards of Performance for New Stationary Sources; Glass Manufacturing Plants, 45 Fed. Reg. 66,742, 66,743 (Oct. 7, 1980) (to be codified at 40 C.F.R. pt. 60) ("Standards of performance are promulgated under Section 111 of the Clean Air Act. Section 111(b)(1)(A) requires that the Administrator establish standards of performance for categories of new, modified, or reconstructed stationary sources which, in the Administrator's judgment, cause or contribute significantly to air pollution, which may reasonably be anticipated to endanger public health or welfare.").

157. The MACT program establishes standards to control hazardous air pollutants. *See* National Emission Standards for Hazardous Air Pollutants Phosphoric Acid Manufacturing and Phosphate Fertilizers Production, 64 Fed. Reg. 31,358, 31,359 (June 10, 1999) (to be codified 40 C.F.R. pt. 9, pt. 63) ("Section 112 of the [Clean Air] Act requires the Agency to promulgate regulations for the control of [hazardous air pollutant ("HAP")] emissions from both new and existing major sources. The statute requires the regulations to reflect the maximum degree of reduction in emissions of HAPs that is achievable taking into consideration the cost of achieving the emission reduction, any nonair quality health and environmental effects, and energy requirements. This level of control is commonly referred to as the maximum achievable control technology (MACT).").

158. *See* 40 C.F.R. §§ 60.100-60.109 (2008) (petroleum refinery standards); 40 C.F.R. §§ 60.620-60.625 (2008) (petroleum dry cleaning standards); 40 C.F.R. §§ 63.320-63.326 (2008) (perchloroethylene standards for dry cleaning facilities); 40 C.F.R. § 63.640-63.679 (2008) (national emission standards for hazardous air pollutants for petroleum refineries).

159. The review data (in the form of two Excel spreadsheets) is on file with the Buffalo Law Review.

160. *See* NSPS Excel spreadsheet (on file with the Buffalo Law Review). We examined eighty-three rules promulgated between 1977 and 2000.

six rules set out a technology mandate; in each of those cases the agency determined that it was infeasible to prescribe or enforce a performance standard.[161] The MACT program made use of more design standards, primarily with respect to so-called "fugitive" emissions; that is, emissions that were not discharged through a stack or vent, and thus, are difficult to collect or measure. Typical sources of fugitive emissions include large storage tanks, surface impoundments, wastewater treatment systems and also valves, pumps and flanges, all of which are in wide use across a number of industrial sectors. In such cases, the rules typically establish either design standards (for the tanks and impoundments) or fairly specific work practices in the form of leak detection and repair practices (for valves and flanges). That said, however, the primary regulatory instrument even for the MACT program remains performance standards.

Our evaluation was consistent with a 1995 evaluation by the Office of Technology Assessment ("OTA"), which concluded that performance standards were the primary regulatory tool used in Clean Air Act regulations.[162] (Indeed, the OTA study goes even further, reaching the identical conclusion with respect to all regulatory programs.)[163] Given the actual language of the Clean Air Act, these findings are unsurprising. The organic provisions for both programs direct the EPA to establish "emission limitations" and "emission standards" based on technologies used by industry,[164] but expressly prohibit the EPA from requiring

161. *See, e.g.*, Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills, 56 Fed. Reg. 24,468, 24,484 (May 30, 1991) (to be codified at 40 C.F.R. pts. 51, 52, 60) (prescribing "best demonstrated system of continuous emission reduction" for new municipal solid waste landfills); Standards of Performance for New Stationary Sources; Petroleum Dry Cleaners, 47 Fed. Reg. 56,118, 56,124 (December 14, 1982) (to be codified at 40 C.F.R. pt. 60) (rejecting performance standards for petroleum drycleaners as impracticable).

162. OFFICE OF TECH. ASSESSMENT, U.S. CONGRESS, ENVIRONMENTAL POLICY TOOLS: A USER'S GUIDE 14-15 (1995).

163. *Id.*

164. *See* 42 U.S.C. § 7411 (a)(1), (b)(1)(B) (2006) (describing the NSPS program); 42 U.S.C. § 7412(d)(2)-(3) (2006) (describing MACT standards).

the use of specific technologies absent an infeasibility finding.[165]

Second, while most rules do not *require* adoption of specific control technologies, they do reflect the reality that the emission limits were established by reference to technologies commonly used by industry. The bureaucratic bow to the so-called "reference" technologies comes in the form of monitoring, recordkeeping, and operation and maintenance ("O&M") provisions associated with the emission limit. Monitoring and recordkeeping standards are necessary for the facility, the regulators and the public to determine whether the facility is meeting the limit. O&M plans assure that once installed, the technology will continue to be operated properly. Recognizing that most facilities will likely use a reference technology, the rules include default performance testing, recordkeeping and O&M provisions tailored to the relevant reference technologies.[166] But even here, a facility has significant flexibility. Many provisions provide the opportunity for submission of alternative monitoring, recordkeeping and O&M practices, even with respect to reference technologies.[167]

Third, the relatively few rules that do mandate specific control technologies also invariably provide the facility with opportunities to use alternative technologies. Both the NSPS and MACT programs allow facilities to adopt an "alternative means of emissions limitation" upon approval by the EPA.[168] The facility must demonstrate that the

165. *See* § 7411(h)(1); § 7412(h)(1).

166. *See, e.g.*, 40 C.F.R. § 60.313 (2008) (setting out performance testing requirements for control technologies used to manage emissions from the surface coating of furniture under the NSPS program); 40 C.F.R. § 63.9580-60.9652 (2008) (prescribing testing, monitoring, and recordkeeping requirements for reference technologies under the MACT program for taconite iron ore processing).

167. *See* 40 C.F.R. § 60.8(b) (2008) (describing alternative performance test protocols under the NSPS program); 40 C.F.R. §§ 63.7(e), 63.8(f), 63.10(f) (2008) (describing alternative MACT testing, monitoring and recordkeeping requirements).

168. *See* § 7411(h)(3); § 7412(h)(3). EPA has included the equivalency determination process in a variety of rules under both programs. *See, e.g.*, 40 C.F.R. §§ 60.114b (volatile organic liquid storage vessels); 60.632(c) (onshore natural gas processing plants); 60.592(c) (petroleum refineries); 60.716 (magnetic tape coating facilities); 61.12(d) (alternative means of emission

alternative is as effective as (or better than) the required technology in reducing emissions and must include custom monitoring and reporting protocols.[169] Other mechanisms for alternative management strategies exist. For example, since 1977, the NSPS program has offered innovative technology waivers, providing facilities with additional time to comply with emission limits when using new technologies.[170] More recently, the MACT program established the "equivalency-by-permit" mechanism by which facilities may adopt alternative control strategies through state site-specific permitting.[171]

The impact of these three features on the rigidity proposition varies with the form of the proposition being considered. Recall that the rigidity proposition has strong, moderate, and functional forms. The strong form, which states that traditional regulation expressly mandates specific control technology, is clearly untenable in the face of the three features. Likewise, the three features conclusively undermine the moderate form of the rigidity proposition, which posits that technology mandates are *often* or *sometimes* used in traditional regulation. In fact, technology mandates are *rarely* used in the regulations; when they are established, facilities may seek waivers for the use of alternative approaches.

The functional form of the rigidity proposition remains viable. It acknowledges that traditional regulation does not explicitly mandate particular technology, but instead claims that the regulatory environment effectively forces facilities to adopt the EPA's reference technology.[172] For some proponents of the functional form, this rigidity springs from the businesses' desire to "play it safe," to avoid onerous

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limitation); 63.177 (alternative controls for equipment, design or operational requirement); *see also* Recent Posting to the Applicability Determination Index (ADI), 69 Fed. Reg. 7,926 (Feb. 20, 2004) (to be codified at 40 C.F.R. pt. 60, 61, 63) (describing owner or operator requests to EPA).

169. *See, e.g.*, 40 C.F.R. § 60.114b (2008).

170. *See* § 7411(j).

171. *See* 40 C.F.R. § 63.94 (2008) ("State may seek approval of State permit terms and conditions to be implemented and enforced in lieu of specified existing and future Federal section 112 rules, emission standards, or requirements . . . .").

172. *See* Hahn & Hester, *supra* note 51.

enforcement actions should their chosen technology fail to meet the mandated emission limit.[173] For others, it results from conservative implementation by the agencies' permit writers purportedly unwilling to approve alternatives to reference technologies.[174]

Yet there is virtually no evidence to support the functional form and its claim of a *de facto* effect. Even the OTA study, which adopts the functional rigidity proposition, confesses that no supporting data exists[175] and that "[t]he prevalence of de facto technology specifications is unknown."[176] Nonetheless, the proposition offers an intuitively appealing story, a believable explanation for the commonly accepted perception that facilities almost always adopt the reference technology.[177] It is a story—and a not unreasonable one—about how the regulatory system works;

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173. *See* Robert M. Friedman et al., *Environmental Policy Instrument Choice: The Challenge of Competing Goals*, 10 DUKE ENVTL. L & POL'Y F. 327, 356-57 (2000) (describing inefficient outcomes because of uniform treatment of sources); Dennis D. Hirsch, *Symposium Introduction: Second Generation Policy and the New Economy*, 29 CAP. U. L. REV. 1, 2 (2001) (discussing choice of EPA "reference technology" to avoid compliance concerns); Stewart, *supra* note 55, at 552 (explaining compliance).

174. *See* NEIL GUNNINGHAM ET AL., SMART REGULATION 39 n.5 (1998) (permit writer conservatism).

175. OFFICE OF TECH. ASSESSMENT, *supra* note 26, at 97.

176. *Id.* at 16.

177. Remarkably, there appears to be no significant empirical evidence to support even this perception. I have been unable to find any reports or other sources that collate and evaluate information regarding the actual nature of technology choices made by facilities under the NSPS or MACT programs. The apparently low level at which facilities utilize the alternative means of emission limitation mechanisms under those programs provides some indication of uniformity. Despite the ubiquitous nature of these mechanisms, research reveals only one request, which EPA denied in 1982. *See* Standards of Performance for New Stationary Sources: Petroleum Liquid Storage Vessels; Notice of Final Equivalency Determinations, 47 Fed. Reg. 54,259 (Dec. 1, 1982) (to be codified at 40 C.F.R. pt. 60) (explaining that seal systems for petroleum liquid storage vessels are not equivalent to the systems required by Subpart Ka of 40 CFR Part 60). Approvals must be noticed by EPA in the Federal Register. A Lexis search of the Federal Register turned up only the seal system rejection referenced above. EPA's response to a FOIA request confirmed this. For an analysis of underuse of innovative technology waivers under the Clean Water Act, see generally U.S. EPA, PROVIDING WAIVERS FROM NPDES PERMIT COMPLIANCE SCHEDULES FOR INDUSTRIAL POLLUTION PREVENTION TECHNOLOGY 29-37 (1994).

a story of rigid, bureaucratic agencies and frustrated yet fearful businesses.

This narrative provides a plausible explanation for technology choices by regulated businesses, but those choices are equally consistent with at least two alternative stories. In one, it is the businesses rather than the regulations or agencies that are rigid. Despite the freedom to choose alternatives, the business hews to the standard technology. This inflexibility may flow from external forces; perhaps the firm's environmental consultant or technology vendor champions the standard technology in response to market incentives.[178] Then again, it may result from inertia within the firm, a resistance to innovation that has been linked to excessively rigid internal operating procedures, incentive structures, and resource allocation practices within companies.[179]

The other alternative story focuses instead on the quality of the government's analysis of best practices within the industry sector. Suppose for a moment that in setting a performance standard for a given industry sector, the EPA has managed to identify best pollution control practices within that sector accurately. Along the way, the agency carefully segmented the sector into appropriate subcategories, taking into account size, technical capacities, relevant process differences and cost of control.[180] If the agency has done its job properly, the reference technology should be the best fit—both technically and economically—of all existing technologies. In that case, we should expect to see widespread adoption of the reference technology, not because of the company's fear of enforcement or the bureaucrat's desire for conformity, but because using the reference technology makes the most sense.

Of course none of the proffered stories, neither mine nor Professor Stewart's, are supported by a conclusive body of evidence. Indeed, it is entirely likely that all have some relevance to the apparent lack of innovation and diversity in technology choice. That is the point. By uncritically accepting the rigidity proposition, many scholars have

178. *See* Malloy & Sinsheimer, *supra* note 48, at 206-07.

179. *See* Malloy, *supra* note 152, at 555-92.

180. See Part IV.B for a discussion of the standards for establishing subcategories.

closed off consideration of these alternative stories. Taking alternative stories seriously would lead to further research and discourse about why businesses appear to forgo existing opportunities to use innovative technologies and approaches. Opening the discussion in this way may also lead to different reform proposals. For example, if innovative opportunities are missed because of an industry deficiency, then changing regulations to provide broader, more accessible opportunities may be largely futile.

B. *Variegated Standards: Rejecting the Homogeneity Proposition*

The homogeneity proposition holds that traditional regulation applies a "one size fits all" approach to regulation, failing to take into account important differences between facilities.[181] These differences include variations in the processes used[182] and the relative cost of controls.[183] Scholars tend to characterize the regulators as

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181. *See e.g.*, Daniel A. Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297, 316 (1999); Stewart, *supra* note 71, at 31.

182. Fiorino, *supra* note 52, at 459.

183. *See* Allardice et al., *supra* note 60, at 363; Chase, *supra* note 77, at 14; Stewart, *supra* note 128, at 587. Some authors also focus on the failure to consider geographical or locational differences between facilities. *See e.g.*, Lazarus, *supra* note 77, at 1771; Pildes & Sunstein, *supra* note 60, at 97. The EPA has taken location into account, particularly where the facility creates some significant constraint on the efficacy or cost of a potential control technology. *See, e.g.*, Federal Standards for Marine Tank Vessel Loading Operations, 60 Fed. Reg. 48,388, 48,393 (Sept. 19, 1995) (to be codified at 40 C.F.R. pts. 9, 63) (creating a subcategory for the Valdez Marine Terminal due to, among other things, climatic and economic conditions that required constant flow of oil through the pipeline and severe meteorological conditions resulting in increased loading irregularity); Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. 62,213, 66,216 (Oct. 28, 2005) (to be codified at 40 C.F.R. pt. 60) (proposing different emissions standards for boilers depending upon the precipitation levels in the areas in which the boilers were located). Location also raises issues of exposure and harm. Distant, isolated facilities may pose less threat to human health than those located near large populations. While technology-based standards typically do not consider such factors, neither do market–based instruments such as trading regimes or taxes. In practice, however, both technology-based and market-based systems could be crafted so as to address location-related issues of harm. *See generally* Roberta Mann, *Waiting to*

unwilling to craft rules and variances that acknowledge "a given firm or industry's special circumstances," tracing this bureaucratic reticence to the regulator's need to economize on information costs and simplify enforcement efforts.[184]

The alternative construction tells a different story. In this version, the agency actively uses its information collection authority and the rulemaking process to develop an extensive understanding of the industry and its production processes. Examination of rules and the rulemaking documents reveals the EPA time and again considering the technical and economic landscape and adapting its rules to reflect differences among firms within the affected industrial sectors. These adaptations take a variety of forms, ranging from exemptions for certain-sized firms, or types of processes, to standards that vary with the size, nature or other variable attributes of the regulated activity or firm.

Both the NSPS and MACT provisions strike a balance between uniformity and flexibility. Regarding uniformity, each requires that the agency identify and regulate "categories" of air pollution sources,[185] defined by the EPA as groups of sources "having some common features suggesting that they should be regulated in the same way and on the same schedule."[186] Yet each also recognizes that differences that justify divergent regulation will exist even within those general categories. Thus, the statute expressly authorizes the EPA to "distinguish among classes, types and sizes" of sources within categories in establishing standards.[187] In

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Exhale?: Global Warming and Tax Policy, 51 AM. U.L. REV. 1135, 1209 (2002); Stewart, *supra* note 71, at 100-02.

184. Stewart, *supra* note 58, at 670-71.

185. *See* 42 U.S.C. § 7411(b) (2006); 42 U.S.C. § 7412(c)(1) (2006).

186. Initial List of Categories of Sources Under Section 112(c)(1) of the Clean Air Act Amendments, 57 Fed. Reg. 31,576, 31,578 (July 16, 1992).

187. *See, e.g.*, 42 U.S.C. § 7411(b)(2) (2006); 42 U.S.C. § 7412(d)(1), (2) (2006). Having identified the relevant source category and, as appropriate, each subcategory nested within it, EPA next determines the reference technology; that is, the control strategy to be used by the agency in determining the applicable emission limit for that category or subcategory. The criteria for reference technology selections are different for the two programs. For the MACT program, EPA must identify the "maximum achievable control technology," defined as "maximum degree of reduction in emissions . . . that the Administrator . . . determines is achievable for new or existing sources in the

exercising that authority under the MACT program, the EPA typically considers a variety of factors, such as "[p]rocess operations (including differences between batch and continuous operations), emissions characteristics, control device applicability and costs, safety, and opportunities for pollution prevention."[188] The agency takes essentially the same criteria in account under the NSPS program.[189]

Recognizing that customizing rules in every case to fit each facility's specific circumstances is very often impractical,[190] the agency has not generally engaged in standard setting at the facility level.[191] However, neither has

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category or subcategory." § 7412(d)(2), (g)(2). The NSPS program calls for "the degree of emission limitation achievable through the application of the best system of emission reduction." § 7411(a)(1).

188. Initial List of Categories of Sources Under Section 112(c)(1) of the Clean Air Act Amendments, 57 Fed. Reg. 31,576, 31,580 (July 16, 1992).

189. *See* Standards of Performance for New Stationary Sources: Glass Manufacturing Plants, 45 Fed. Reg. 66,742, 66,743 (Oct. 7, 1980) (to be codified at 40 C.F.R. pt. 60) (differentiating among glass manufacturing plants on the basis of the potential for particulate emission control); *see also* Standards of Performance for New Stationary Sources: Volatile Organic Liquid Storage Vessels, 49 Fed. Reg. 29,698, 29,706 (July 23, 1984) (to be codified at 40 C.F.R. pt. 60) (establishing different classes of storage tanks based on volatility of the stored material and the size of the tanks). While this discussion focuses upon these two Clean Air Act programs, much the same could be said about the agency's other major media-oriented program, the Clean Water Act. *See, e.g.*, E. I. Du Pont De Nemours & Co. v. Train, 430 U.S. 112, 128 (1977) (holding that under Section 301 of the Clean Water Act, EPA has the authority to promulgate uniform effluent limitations by regulation on an industry-wide basis for classes and categories of existing plants, "so long as some allowance is made for variations in individual plants"); *see also* Tex. Oil & Gas Assoc. v. EPA, 161 F.3d 923, 940-41 (5th Cir. 1998) ("The EPA is authorized—indeed, is required—to account for substantial variations within an existing category or subcategory of point sources.").

190. *See* E. I. Du Pont De Nemours & Co. v. Train, 430 U.S. at 132 (noting, in the context of the Clean Water Act, the impracticability of requiring the agency "to give individual consideration to the circumstances" of each of the 42,000 facilities regulated under Section 301 of the Act.).

191. In some cases, however, where the record supports it, EPA has tailored specific rules to one or just a few facilities. *See* 40 C.F.R. § 63.562(d) (2008) (establishing unique MACT standards for the Valdez Marine Terminal); *see also* National Emission Standards for Hazardous Air Pollutants: Phosphoric Acid Manufacturing and Phosphate Fertilizers Production, 64 Fed. Reg. 31,358,

it broadly adopted a "one-size-fits-all" regulatory approach. Instead, the EPA has consistently "disaggregated" industrial categories so as to tailor the NSPS and MACT standards to the technical and economic conditions facing identifiable segments within the regulated industry sectors.[192] As the EPA explained in one preamble, "Subcategorization was necessary to reflect major variations in production methods, raw material usage and/or [hazardous air pollutant] emissions that potentially affect the applicability of controls."[193]

The rulemaking history under both programs provides ample support for the view that, contrary to the story told under the conventional construction, the agency shapes the standards to the contours of the relevant industry. In particular, the record reflects significant attention to differences in two areas: the manufacturing processes utilized by the facilities and the relative cost of controls.

Manufacturing processes vary along a variety of dimensions, including size, characteristics of the inputs, and nature of the process (for example, whether the process operates continuously or in batches). Each of these features can affect the nature and magnitude of the emissions, as well as the efficacy of various potential control strategies. The EPA has consistently looked to these features in establishing variegated emission standards for the subcategories and classes lying within the source categories in question. For example, in distinguishing between two types of aluminum recovery furnaces, the EPA focused upon the type of scrap metals and nature of flux charged to the furnaces, and the resulting differences in emissions.[194]

31362 (June 10, 1999) (to be codified at 40 C.F.R. pts. 9, 63) (establishing a subcategory for a lone superphosphoric acid process line source).

192. *See* National Emission Standards for Hazardous Air Pollutants: Printing, Coating and Dyeing of Fabrics, 67 Fed. Reg. 46,028, 46,039 (July 11, 2002) (to be codified at 40 C.F.R. pt. 63) ("As part of the regulatory development process, we evaluate the similarities and differences between industry segments or groups of affected sources comprising a source category.").

193. National Emission Standards for Hazardous Air Pollutants, 60 Fed. Reg. 30,801, 30,802 (proposed June 12, 1995) (to be codified at 40 C.F.R. pt. 63).

194. *See* National Emission Standards for Hazardous Air Pollutants for Source Categories, 64 Fed. Reg. 6,946, 6,949 (Feb. 11, 1999) (to be codified at 40 C.F.R. pt. 63). Group 1 furnaces, which process aluminum containing paint, lubricants, and coatings, or process clean charge with reactive fluxing (i.e., flux containing

Likewise, the NSPS provisions for glass manufacturing establish different particulate matter emission standards for three subcategories of pressed and blown glass processes due to significant variations among those processes in the potential for controlling such emissions.[195]

Contrary to claims made under the conventional construction,[196] rules often distinguish between continuous processes and batch processes within a single category. In a continuous process, product is typically produced in bulk on a continuous basis without significant changes in feedstock or processing. Batch processes typically produce materials in separate lots, and are substantially more variable in terms of raw materials, throughput and even operating parameters.[197] Consider continuous and batch processes used to distill products within the synthetic organic chemical industry. Emissions from such continuous operations exhibited relatively constant rates and compositions within a process unit. By contrast, gas streams emitted from batch distillation units typically had highly variable flow rates and composition. On this basis, the EPA excluded batch operations from the NSPS rule for distillation operations, concluding that the control technology would not be effective in such circumstances.[198]

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or forming hazardous air pollutants), are subject to a series of emission limits for a variety of pollutants. Group 2 furnaces process clean scrap aluminum and engage in either no fluxing or in fluxing using only nonreactive, non-HAP-containing/non-HAP-generating gases. Accordingly, no emission limits were established for group 2 furnaces. *See* 40 C.F.R. §§ 63.1503, 1505 (2008); National Emission Standards for Hazardous Air Pollutants for Secondary Aluminum Production, 65 Fed. Reg. 15,690, 15,692 (Mar. 23, 2000) (to be codified at 40 C.F.R. pt. 63).

195. *See* Standards of Performance for New Stationary Sources: Glass Manufacturing Plants, 45 Fed. Reg. 66,742, 66,746 (Oct. 7, 1980) (to be codified at 40 C.F.R. pt. 60) ("In the process of selecting the major categories of glass production it was found that the pressed and blown glass category had within itself areas of production that were individually unique as to their potential for particulate emission control.").

196. *See, e.g.*, Fiorino, *supra* note 52, at 469.

197. Malloy, *supra* note 152, at 599; A. Ghosh, *Batch Processes and Their Automation*, *in* INSTRUMENT ENGINEERS' HANDBOOK: PROCESS CONTROL 1544 (Bela G. Liptak ed., 2006).

198. *See* Standards of Performance for New Stationary Sources; Volatile Organic Compound (VOC) Emissions from the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations, 55 Fed. Reg. 26,931,

In other instances, the EPA has responded to differences between continuous and batch operations by establishing distinct emission standards. Take the case of steel pickling operations in which heavy scale on the surface of steel is removed by treating the steel with a hydrochloric acid solution.[199] The agency acknowledged that batch and continuous processes were markedly different[200] and set two separate emission limits for new batch processes and new continuous processes.[201] Most recently, the EPA proposed differential standards for "process vents" associated with continuous and batch processes in specified types of chemical manufacturing facilities.[202] While there is ample room for substantive disagreement over the distinctions the EPA has drawn between continuous and batch processes in particular cases, it is clear that the agency does indeed draw such distinctions on a regular basis.[203]

26,940 (June 29, 1990) (to be codified at 40 C.F.R. pt. 60); *see also* Standards of Performance for New Stationary Sources; Polypropelene, Polyethelyne, Polystyrene and Poly- (ethylene terephthalate) Manufacturing Industry, 55 Fed. Reg. 51,010, 51,018 (Dec. 11, 1990) (to be codified at 40 C.F.R. pt. 60) (excluding batch operations from the NSPS rule for the polypropylene, polyethylene, polystyrene, and poly-(ethylene terephthalate) manufacturing industry).

199. EPA describes the two processes as follows: "The category includes both continuous and batch pickling operations. In the continuous pickling process the steel is fed through a sequence of tanks in a countercurrent direction to the flow of the acid solution; next, the steel is passed through a series of rinse tanks or a rinsing section. In the batch pickling process, the steel is immersed in an acid solution until the scale or oxide film is removed, lifted from the bath, allowed to drain, and then rinsed by spraying or immersion in rinse tanks." National Emission Standards for Hazardous Air Pollutants for Steel Pickling Facilities HCL Process, 62 Fed. Reg. 49,052, 49,053 (Sept. 18, 1997) (to be codified at 40 C.F.R. pt. 63).

200. *Id.* at 49,060 ("Batch operations differ significantly from continuous operations in three ways: (1) The physical arrangement of the unit must allow the steel to be placed into and withdrawn from the top instead of the ends of the tank, (2) emissions may vary substantially between the immersion and draining phases of the operation, and (3) emission capture requirements are different for the two types of operations.").

201. 40 C.F.R. § 63.1158 (2008).

202. *See* National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources, 73 Fed. Reg. 58,352, 58,359 (Oct. 6, 2008) (to be codified at 40 C.F.R. 63).

203. *See e.g.*, National Emission Standards for Hazardous Air Pollutants for Polyether Polyols Production, 62 Fed. Reg. 46,804, 46,805 (Sept. 4, 1997) (to be

Quite apart from differences in manufacturing processes, under both programs the EPA has also drawn distinctions between facilities based on the relative costs of pollution control. On repeated occasions, the NSPS program has distinguished between types of facilities based on the incremental cost of pollution controls for those facilities.[204] As early as 1984, the agency relied upon the relative cost-effectiveness of controls to distinguish between different types of tanks used to store volatile organic liquids such as petroleum products or solvents. In that case, the EPA observed that as the size of the tank and the volatility of the liquid decreased, the controls became less and less cost-effective.[205] Based on that analysis, the agency established size and volatility cut-offs below which controls were not required.[206] Most recently, in 2008, the EPA proposed

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codified 40 C.F.R. pt.63) (distinguishing between batch and continuous processes in the production of polyether polyols); National Emission Standards, 60 Fed. Reg. 16,090, 16,092 (Mar. 29, 1995) (to be codified at 40 C.F.R. pt. 63) (describing batch and continuous processes for production of Group IV polymers and resins); *see also* Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Medical Waste Incinerators, 60 Fed. Reg. 10,654 (Feb. 27, 1995) (to be codified at 40 C.F.R. pt. 60) (proposing NSPS rule for municipal waste incinerators); National Emission Standards for Hazardous Air Pollutants: Halogenated Solvent Cleaning, 58 Fed. Reg. 62,566, 62,568 (Nov. 29, 1993) (to be codified at 40 C.F.R. pt. 63) (proposing six subcategories of the halogenated solvent cleaning source category based upon size and type—batch or continuous—of processing); *see also* Standards of Performance for New Stationary Sources; Polypropelene, Polyethelyne, Polystyrene and Poly- (ethylene terephthalate) Manufacturing Industry, 55 Fed. Reg. 51,010 (Dec. 11, 1990) (to be codified at 40 C.F.R. pt. 60) (describing rules for that industry).

204. The incremental cost per ton is the difference in annual costs between a baseline (either no control or a different control option) and the proposed control divided by the difference in annual emissions. EPA typically uses this metric as a measure of the economic feasibility of applying emission control technology to a source. *See* National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines, 68 Fed. Reg. 1,888, 1,896 (Jan. 14, 2003) (to be codified at 40 C.F.R. pt. 63).

205. *See* Standards of Performance for New Stationary Sources: Volatile Organic Liquid Storage Vessels, 49 Fed. Reg. 29,698, 29,706 (July 23, 1984) (to be codified at 40 C.F.R. pt. 60) (including petroleum liquid storage vessels constructed after July 23, 1984).

206. 40 C.F.R. § 60.110(b). EPA used this approach in a number of other rulemakings in the NSPS program. *See* Standards of Performance for New Stationary Sources; Magnetic Tape Manufacturing Industry, 51 Fed. Reg. 2996, 3004 (proposed Jan. 22, 1986) (to be codified at 50 C.F.R. pt. 60); Standards of

disparate limits for particulate matter emissions from coal preparation plants handling different types of coal. The agency identified the use of chemical suppressants as the reference technology for plants processing bituminous coal and fabric filters (also known as "baghouses") for all other plants.[207] This distinction was based upon the relative cost-effectiveness of the two control technologies when used at the different types of plants.[208]

For the MACT program, however, treatment of differences between facilities concerning the cost of control is a mixed bag. The nuance here flows from the Clean Air Act's layered definition of maximum achievable control technology, which includes an open-ended narrative standard "backstopped" by a narrowly drawn minimum requirement. Section 112(d) defines MACT broadly as "the maximum degree of reduction in emissions . . . taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements," a definition that would seem to explicitly require consideration of the cost of control.[209] However, the statute also establishes minimum criteria for MACT, a floor below which it may not fall but above which it may be set.[210] Generally speaking, for an existing source that floor is based upon the average emission level achieved by the best performing sources in the relevant category. In *National Lime Ass'n v. Environmental Protection Agency*, the court concluded that the EPA may not take cost into account in determining the MACT *floor* for a given category, although cost is an allowable consideration in the event the EPA decides to go beyond the floor.[211] Thus, all sources in a single category must be held to the MACT floor—the

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Performance for New Stationary Sources Polymeric Coating of Supporting Substrates, 52 Fed. Reg. 15,906 (proposed Apr. 30, 1987) (to be codified at 40 C.F.R. pt. 60).

207. Standards of Performance for Coal Preparation Plants, 73 Fed. Reg. 22,901, 22,904-05 (proposed Apr. 28, 2008) (to be codified at 40 C.F.R. pt. 60).

208. *Id.*; *see also* Standards of Performance for Petroleum Refineries, 73 Fed. Reg. 35,838, 35,849 (June 24, 2008) (to be codified at 40 C.F.R. pt. 60) (establishing differential standards for large and small sulfur recovery units at petroleum refineries based on incremental cost-effectiveness).

209. 42 U.S.C. § 7412(d)(2) (2006).

210. *Id.* § 7412(d)(3).

211. 233 F.3d 625, 640 (D.C. Cir. 2000).

standards achieved by the best performers—regardless of the cost implications.[212]

Nonetheless, this wrinkle does not prove the legitimacy of the homogeneity proposition. While the agency cannot distinguish between facilities based on cost in setting the MACT floor, it has broad discretion to break them into subcategories and classes. The factors used for subcategorization, such as nature of emissions, applicability of controls, and facility size, often drive variations in control costs among the facilities.[213] Thus, by drawing distinctions

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212. Previously, EPA had repeatedly taken the position that it could use control cost as a factor in disaggregating a category into separate subcategories. *See* National Emissions Standard for Hazardous Air Pollutants for Source Categories, 62 Fed. Reg. 49,052, 49,060 (proposed Sept. 18, 1997) (to be codified at 40 C.F.R. pt. 63) (The rulemaking for steel pickling operations identifies the criteria for subcategorization and includes "process operations (including differences between continuous and batch operations), emission characteristics, control device applicability and costs, safety, and opportunities for pollution prevention"); National Emissions Standard for Hazardous Air Pollutants; Rubber Tire Manufacturing, 65 Fed. Reg. 62,414, 62,423 (proposed Oct. 18, 2000) (to be codified at 40 C.F.R. pt. 63) (taking same position in rubber tire manufacturing rulemaking). This position found some support in the legislative history; the Senate Environment and Public Works Committee observed: "Cost and feasibility are factors which may be considered by the Administrator when establishing an emissions limitation for a category under section 112. . . . Nothing in this language authorizes the establishment of a category based wholly on economic grounds . . . ." *See* S. REP. NO. 101-228, at 166 (1989), *reprinted in* 1998 U.S.C.C.A.N. 8341, 8506). Nonetheless, *National Lime* raised serious questions regarding the position—questions intensified by the later decision in *National Resources Defense Council v. Environmental Protection Agency*, 489 F.3d 1364, 1376 (D.C. Cir. 2007). *But see* Sierra Club v. Envtl. Prot. Agency, 479 F.3d 875, 884-85 (D.C. Cir. 2007) (concurring opinion suggesting that costs may be relevant in subcategorization). In any event, EPA had abandoned the position by 2003. *See* National Emissions Standards for Hazardous Air Pollutants for Brick and Structural Clay Products Manufacturing, 68 Fed. Reg. 26,690, 26,697 (May 16, 2003) (to be codified at 40 C.F.R. pt. 63).

213. Compare the proposed and final rules for clay ceramics manufacturing in which EPA justified separate standards for small tunnel kilns based on cost in the proposal, but rejected cost as an appropriate factor and instead relied upon technological differences and air flow. National Standards for Hazardous Air Pollutants for Brick and Structural Clay Products Manufacturing; and National Emissions Standards for Hazardous Air Pollutants for Clay Ceramics Manufacturing, 67 Fed. Reg. 47,894, 47,904 (proposed July 22, 2002) (to be codified at 40 C.F.R pt. 63) (proposed rule); 68 Fed. Reg. 26,690, 26,696-97 (May 16, 2003) (to be codified at 40 C.F.R. pt. 63) (final rule).

between the classes of facilities based on non-economic factors, the EPA often accommodates difference in cost as well. In addition, the EPA clearly has the authority, indeed the obligation, to consider cost differences in establishing "beyond-the-floor" standards and has done so.[214]

All that said, one cannot escape the reality that existing regulation does not respond to the individual economic and technological circumstances of each facility. Even after slicing industries into subcategories and classes, the agency still engages in generalizations, often expressly developing representative "model plants" for purposes of "projecting national impacts, including HAP emission reduction levels, costs, energy, and secondary impacts."[215] Actual impacts for individual facilities will likely vary, and some "outlier" facilities may face unusually high compliance costs. In appropriate circumstances, traditional regulation could be improved to take greater account of such individual differences. For example, emissions trading regimes could provide an alternative compliance option to such facilities, allowing them to purchase emission credits generated by an "over-performing" facility in lieu of incurring those high compliance costs.[216] Trading programs, however, have their

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214. *See* National Emissions Standards for Hazardous Air Pollutants; Miscellaneous Organic Chemical Manufacturing, 68 Fed. Reg. 63,852, 63,871 (Nov. 10, 2003) (to be codified at 40 C.F.R. pt. 63) ("The revised cost analysis shows that for processes with continuous process vents, the cost of the subpart TT program (the MACT floor) is $3,200/Mg, the cost of the subpart UU program is $2,800/Mg, and the incremental cost to go beyond the MACT floor to the subpart UU program is $470/Mg. These costs are considered reasonable. Conversely, for batch processes, the costs of the beyond-the-floor option were determined to be unreasonable. Therefore, we decided to set the standard at the MACT floor for processes with only batch process vents, and we selected the beyond-the-floor option of subpart UU for processes with at least one continuous process vent.").

215. Standards of Performance for New Stationary Sources; Perchloroethylene Dry Cleaners, 56 Fed. Reg. 64,382 (proposed Dec. 9, 1991) (to be codified at 40 C.F.R. pt. 60).

216. In many cases, the emissions trading regime is simply layered over traditional regulation, as in EPA's open market trading system, providing an additional compliance option. Roger K. Raufer, *Market-Based Pollution Control Regulation: Implementing Economic Theory in the Real World*, 26 ENVTL. POL. & L. 177, 179-80 (1996). In other, so-called "cap and trade" regimes, an aggregate quantity of allowable emissions is set for the entire population of covered facilities, with tradable emission allowances allocated on some basis to those facilities. *Id.* at 179-81. For example, the South Coast Air Quality Management

own substantial limitations, including disproportional impact on local communities, emissions monitoring concerns, and thin markets, which constrain their practical use.[217]

The point here though is not that existing regulation is so finely textured that it accounts for all significant individual facility conditions. While that is true in some cases, in many, it is not. Clearly, in some circumstances it can be improved or even replaced with other regulatory approaches. Rather, the point is that the conventional construction, with its oft-repeated "one-size-fits-all" moniker, substantially overstates the level of generalization involved. The alternative construction's perspective, which is grounded in actual practice, emphasizes that the agency has consistently exercised the significant flexibility provided by the statute to take economic, technological, locational and other circumstances into account in setting performance standards.[218]

District's RECLAIM cap and trade program for NO_x based the emissions cap on the aggregate emissions that would have been produced under existing and planned command and control regulations. *See* David Harrison, Jr., *Tradable Permits for Air Pollution Control: The US Experience*, *in* IMPLEMENTING DOMESTIC TRADABLE PERMIT FOR ENVIRONMENTAL PROTECTION 37 (Organisation for Economic Co-Operation and Development ed., 1999). The cap for the federal acid rain trading program resulted as much (or perhaps more) from political compromise as from scientific evaluation and principled policy analysis. *See generally* Lisa Heinzerling, *Selling Pollution, Forcing Democracy*, 14 STAN. ENVTL. L.J. 300 (1996).

217. *See, e.g.*, Raul P. Lejano & Rei Hirose, *Testing the Assumptions Behind Emissions Trading in Non-Market Goods: The RECLAIM Program in Southern California*, 8 ENVTL. SCI. & POL'Y 367, 374-75 (2005); Noga Morag-Levine, *The Problem Of Pollution Hotspots: Pollution Markets, Coase, and Common Law*, 17 CORNELL J.L. & PUB. POL'Y 161 (2007); Jonathan Remy Nash & Richard L. Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 Ecology L.Q. 569 (2001). As more toxicity information becomes available, trading in emissions previously thought to have little local health effects can become problematic. *See* Lejano & Hirose, *supra*, at 372 (noting that researcher have begun to identify toxicity associated with NO_x).

218. This discussion has focused on the flexibility afforded by the subcategorization process. The Clean Air Act and other environmental statutes provide flexibility through other mechanisms as well, including variances, waivers, and emissions averaging.

C. *Role Reversal: Challenging the Competency Proposition*

The competency proposition presents two opposing images: the lumbering government bureaucracy and the nimble, self-aware business entity. While such imagery can be viscerally compelling, the proponents of the competency proposition provide virtually no empirical support for it. Instead, they rely heavily on rhetoric and metaphor, such as Professor Stewart's oft-repeated comparison of command and control regulation to "Soviet-style central planning" and references to Hayek's economic theories.[219] All this aside, there is good reason to believe that a central government agency is particularly well-suited to collect, evaluate, and act upon the type of information required to achieve the policymakers' goal: identifying and enforcing default performance standards of the nature discussed in Section III.A, above. Likewise, individual small and large businesses face significant constraints in selecting and implementing effective pollution control approaches. This section sets out this alternative construction of the relative capacities of government and industry, but first it challenges the rhetoric of the conventional construction.

1. *Rhetorical Frame: Command and Control as Soviet-style Central Planning.* Few people in the United States would argue that a government agency is well equipped to displace the market economy in allocating resources and setting prices. Nonetheless, comparing the EPA's command and control regulation to centralized planning in socialist or communist economies distorts the role of that agency in two distinct ways. First, it misrepresents the agency's ultimate goal, exaggerating the limited market intervention in which the agency engages. Second, it misstates the scope and nature of the information required by the EPA in setting the default performance standards.

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219. Ackerman & Stewart, *supra* note 52, at 1334; *see* Jonathan H. Adler, *Legal Obstacles to Private Ordering in Marine Fisheries*, 8 ROGER WILLIAMS U. L. REV. 9, 16 (2002) (discussing Hayek's theories); Bernard S. Black & Richard J. Pierce, Jr., *The Choice Between Markets and Central Planning in Regulating the U.S. Electricity Industry*, 93 COLUM. L. REV. 1342, 1389-90 (1993) (comparing environmental and energy regulation to central planning as used by the Soviet Union); Stewart, *supra* note 128, at 587 (comparing command and control regulation to central planning of economic activity).

Generally speaking, in a socialist state, the central planner controls and allocates resources throughout the national economy so as to maximize social welfare.[220] An effective central planning agency must collect an enormous amount of information about a multitude of variables, including virtually every aspect of the manufacturing process, factors of production, the logistics of distribution, and the needs and wants of consumers.[221] Having obtained that information, the planner must perform the necessary analysis to allocate resources.[222] The required information, which includes tacit as well as explicit knowledge, is distributed across thousands and perhaps millions of persons and entities and can change in significant ways in short order.[223] As Mises, Hayek, and others argued, such information is more effectively communicated and acted upon by individual actors within a market economy reacting to price signals than through a centralized planning system.[224]

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220. *See* Karen I. Vaughn, *Economic Calculation Under Socialism: The Austrian Contribution*, 18 ECON. INQUIRY 535, 536 (1980).

221. *See* Richard A. Posner, *Hayek, Law and Cognition*, 1 N.Y.U. J. L. & LIBERTY 147, 149 (2005).

222. *Id.* Vilfredo Pareto, better known for the Pareto principle, warned of the analytical problems faced even if the necessary data were somehow obtained: "We have seen that in the case of 100 persons and 700 commodities . . . we shall therefore have to solve a system of 70,699 equations. This exceeds practically the power of algebraic analysis, and this is even more true if one contemplates the fabulous number of equations which one obtains for a population of forty millions and several thousand commodities." F. A. v. Hayek, *Socialist Calculation: The Competitive 'Solution'*, 7 ECONOMICA 125, 125-26 (1940) (quoting VILFREDO PARETO, MANUEL D'ECONOMIE POLITIQUE 233-34 (2d ed. 1927)); *see* Peter G. Klein, *Economic Calculation and the Limits of Organization*, 9 REV. AUSTRIAN ECON. 3, 9 (1996) (discussing the response of "market socialism," which substituted a trial and error approach to resource allocation for the extensive calculations addressed by Pareto). Of course, much has changed since Pareto wrote that in 1927, and the computation problems he identified are less compelling today. Klein, *supra*, at 10 n.10 (recounting that Lange contended in 1970 that high speed computers resolved the calculation problem identified by Pareto).

223. F. A. Hayek, *The Use of Knowledge in Society*, 35 AMER. ECON. REV. 519, 522-26 (1945) (describing the difficulties for central planning presented by tacit knowledge and changing conditions).

224. *See* Hayek, *supra* note 222; Vaughn, *supra* note 220.

The goal of traditional environmental regulation is substantially different in nature and significantly more modest in its ambition. Rather than divining the optimum use of resources for the economy as a whole, traditional regulation simply seeks to establish a minimum standard of behavior for industry so as to reduce externalities imposed upon the general public and the environment. Hayek himself recognized that intervention to address externalities is an appropriate government function, as reflected in his justification of building regulations as being "unquestionably desirable":

> The first [justification] is the now familiar consideration of the harm that may be done to others by the erection of buildings which constitute fire or health hazards; in modern conditions the people to be considered include the neighbors and all the users of a building who are not occupants . . . and who need some assurance (or at least some means of ascertaining) that the building they enter is safe.[225]

Hayek cautioned against the use of rigid technology prescriptions (or what he called "specification codes"), noting that by limiting experimentation and supporting the status quo they obstruct economic development.[226] Consistent with his admonition, traditional environmental regulation establishes a minimum standard, leaving the specific method of attaining that standard to the facility.[227]

Also, unlike the central planning regimes, traditional regulation relies heavily upon local knowledge in setting such minimum standards. It does so by setting emission limits by reference to best practices within the regulated industry sector, thus following the lead of industry itself. Traditional regulation's use of industry best practices as the benchmark for emission limits is consistent with Hayek's

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225. F. A. HAYEK, THE CONSTITUTION OF LIBERTY 354-55 (1960).

226. *Id.* at 355. Elsewhere in THE CONSTITUTION OF LIBERTY, Hayek discusses the abstract nature of "true law," observing that "[t]he rules merely provide the framework within which the individual must move but within which the decisions are his. . . . They are instrumental, they are means put at his disposal, and they provide part of the data which, taken together with his knowledge of particular circumstances of time and place, he can use as the basis for his decision." *Id.* at 152.

227. *Id.* at 355 (encouraging the use of minimum standards or "performance codes").

perspective on the appropriate role of government. Hayek believed that norms of behavior are better developed through custom (or what he called "spontaneous order") than through legislative or bureaucratic pronouncements. For him, government should enforce such customs rather than formulate and impose rules from on high.[228] While the comparison of traditional regulation to the enforcement of spontaneous order is not perfect—the agency is clearly more involved in shaping the particulars of the regulation than Hayek would like—it is certainly a better fit than the comparison to socialist central economic planning.

Quite apart from difference in underlying goals, central planning and traditional regulation differ in the nature and scope of information required. The type of information collected by the EPA in a typical rulemaking is limited substantially more than the overwhelmingly extensive set of constantly shifting data required for central economic planning. For any given industry sector or industrial process, the EPA focuses primarily on the type and level of emissions, the manner of pollution management, and the effectiveness and costs of such management options. This is largely explicit knowledge available from a relatively small set of industry members and other manageable sources.[229] As we shall see, while the effort involved is substantial, it does not rise to the level of complexity and scope presented by central economic planning. Even Hayek, a leader of the intellectual attack on socialist central planning, recognized that the relative values of centralized and decentralized

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228. F. A. HAYEK, THE POLITICAL ORDER OF A FREE PEOPLE 41 (1979); F. A. HAYEK, RULES AND ORDER 94-97, 124-26 (1973). For an excellent concise summary and critique of Hayek's theory of law, see Posner, *supra* note 221, at 148-54.

229. Tacit knowledge is highly context specific knowledge generated by subjective experience, which is difficult to formalize and communicate. *See* Andrew C. Inkpen & Adva Dinur, *Knowledge Management Processes and International Joint Ventures*, 9 ORG. SCI. 454, 456 (1998). Polanyi, a leader in the study of tacit knowledge, defined it as "nonverbalizable, intuitive, and unarticulated." *Id.* Perhaps Louis "Satchmo" Armstrong provided the best definition in his response to a request that he explain the concept of jazz: "'Man, if you have to ask what it is, you'll never know.'" *See* ROBERT BURLEIGH & DAVID CATROW, WHO SAID THAT?: FAMOUS AMERICANS SPEAK 38-39 (1997). By contrast, explicit knowledge "is transmittable in formal, systematic language and may include explicit facts, axiomatic propositions, and symbols." Inkpen & Dinur, *supra*, at 456.

decision making depend heavily upon the type of information involved:

> Which of these systems is likely to be more efficient depends mainly on the question under which of them we can expect that fuller use will be made of the existing knowledge. . . . It will at once be evident that on this point the position will be different with respect to different kinds of knowledge; and the answer to our question will therefore largely turn on the relative importance of the different kinds of knowledge; those more likely to be at the disposal of particular individuals and those which we should with greater confidence expect to find in the possession of an authority made up of suitably chosen experts.[230]

To answer Hayek's question, one must determine whether aggregated knowledge acted upon by the EPA is more likely to achieve the relevant goal—identification of best practices—than individual action based on local knowledge or aggregated knowledge processed by some inter-firm institution.

2. *Assessing the Relative Capacities.* In assessing the relative capacities of business institutions and government agencies, the central question is the capacity to do what? The conventional construction focuses on the capacity to choose a control technology for individual facilities. It rejects centralized decision making by a distant agency on two counts: local conditions, resources, and opportunities vary, and plant personnel possess amorphous tacit knowledge about facility operations. This analysis might be relevant if the goal of traditional regulation—the end sought—was selection of the best technology on an individual basis.[231] But that is not the case. Rather, the goal is to identify industry best practices and translate them into generally applicable performance standards (in the form of emission limits wherever possible.) Once the ends are established, it is left to the individual facilities to select the most appropriate means for meeting them, and it is here that local conditions and idiosyncratic tacit knowledge become determinative.

One can reasonably object to the ends of traditional regulation, and many have. Why tie performance standards

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230. Hayek, *supra* note 223, at 521.

231. Even there, the analysis may significantly overstate the capacity of individual businesses.

to existing best practices? Generally speaking, policymakers turned to technology-based standards because of the informational barriers, scientific uncertainty, and political constraints that undermine health-based standards. Rather than accepting limited progress using health-based standards, policymakers adopted technology-based standards with the goal of making meaningful headway against what was and is generally perceived as serious pollution problems.[232] Would it not be more rational or prudent to base standards on health concerns rather than technology? Perhaps so, and there is significant discussion of this issue in the literature.[233] That particular debate is largely irrelevant to the question that faces us here however. Given that the goal is diffusion of best practices across the relevant industry sector, the question becomes which entity is best suited to identifying best practices.

The individual facility potentially has the most information regarding its own existing control practices and its relevant economic, organizational and environmental attributes. There may be significant gaps, however, in its local knowledge. In some cases the facility may not have considered formally or systematically the magnitude, nature or impacts of emissions from a particular process. Despite the heroic vision of business presented by much of the conventional construction literature, many companies face barriers to comprehensive management of environmental issues. These barriers include limited resources, fragmentation of departments within the firm, financial management systems that do not properly account for environmental costs, and institutional and cognitive biases that emphasize short-term results over long-term planning and growth. [234] Nonetheless, even if the company

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232. *See* Rena I. Steinzor, *Reinventing Environmental Regulation: The Dangerous Journey from Command to Self-Control*, 22 HARV. ENVTL. L. REV. 103, 114 (1998); Wagner, *supra* note 122, at 94-99.

233. John S. Applegate, *The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substances Control*, 91 COLUM. L. REV. 261, 267-68 (1991); John D. Graham, *The Failure of Agency-Forcing: The Regulation of Airborne Carcinogens Under Section 112 of the Clean Air Act*, 1985 DUKE L.J. 100.

234. *See* George I. Kassinis, *Location, Networks and Firm Environmental Management Practices*, 44 J. ENVTL. PLAN. & MGMT. 815, 816 (2001) (identifying

does not have the necessary information regarding its operations on hand, clearly it is in the best position to collect that information.[235]

The individual facility's advantage, however, in access to local information is, by definition, limited primarily to its own operations. Various personnel at the facility will likely have some knowledge regarding practices of other facilities whether directly through past employment or through various social networks including common vendors, professional associations, or joint undertakings.[236] This information will be spotty, and certainly not comprehensive enough to support an assessment of best practices within the larger national or regional industry sector. So, for example, while a firm manager may be aware of the types of control technologies used by competing firms, he or she is unlikely to have specific information regarding capital and operating costs, performance, and other factors typically considered by the EPA in identifying reference technologies. Nor would an individual likely facility be to successfully supplement this informally collected information through formal methods such as surveying or interviewing.

While individual facilities or even individual companies do not have the capacity to identify best practices for an entire industry sector, inter-firm institutions such as trade associations may be able to play that role. Trade associations are non-profit entities consisting primarily of competitors in a single industry.[237] Starting as informal networking organizations in the late nineteenth century, by

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barriers for small- and medium-sized enterprises); Malloy, *supra* note 152, at 536, 567 (describing internal organizational barriers to technology identification and adopting in large firms).

235. That is not to say that the company will have the necessary technical know how or equipment in-house. It may be necessary for the company to hire additional personnel or retain third party consultants to collect the necessary information.

236. *See* Diane Liang Rulke et al., *Sources of Managers' Knowledge of Organizational Capabilities*, 82 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 134, 137-38 (2000) (describing sources of information available to firm managers, including relational learning channels consisting of personal relationships with external parties, and non-relational channels such as trade magazines and trade association reports).

237. JOSEPH F. BRADLEY, THE ROLE OF TRADE ASSOCIATIONS AND PROFESSIONAL BUSINESS SOCIETIES IN AMERICA 4 (1965).

the 1930s they had evolved into structured, autonomous institutions often fielding a professional staff and engaging in significant lobbying and policy development activities.[238] At present there are thousands of trade associations of varying size and sophistication in operation at the federal, regional, state, and local level across a broad range of industries.[239] These include well known groups such as the American Chemistry Council, American Petroleum Institute, and Semiconductor Industry Association,[240] as well as lower profile organizations such as the Pennsylvania and Delaware Cleaners Association, and the Door and Hardware Institute.[241]

Among a variety of other functions, trade associations facilitate information exchanges within their respective industry sectors, and with entities outside those sectors.[242] For example, some trade associations collect and aggregate individual company data on sales, production, or demand information from members, and subsequently disseminate the cumulative information to the membership and others.[243] Trade associations have also generated information regarding operating practices or technologies—including pollution control technologies—used by the industry. In some cases, such efforts also include technical

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238. LOUIS GALAMBOS, COMPETITION & COOPERATION: THE EMERGENCE OF A NATIONAL TRADE ASSOCIATION 291-92 (1966).

239. CHARLES S. MACK, LOBBYING AND GOVERNMENT RELATIONS 108 (1989).

240. Thomas A. Hemphill, *Self-Regulating Industry Behavior: Antitrust Limitations and Trade Association Codes of Conduct*, 11 J. BUS. ETHICS 915, 919 (1992); Alison J. Kirby, *Trade Associations as Information Exchange Mechanisms*, 19 RAND J. ECON. 138 (1988).

241. *See* Door and Hardware Institute, http://www.dhi.org/index.php (last visited Dec. 15, 2009)); Pa. and Del. Cleaner's Ass'n, http://www.pdcl ean.org/index.html (last visited Mar. 16, 2010).

242. *See* Kassinis, *supra* note 234, at 816-17 (intra and inter-sectorial exchange); Kirby, *supra* note 240, at 138 (intra-sectorial exchange); Marc Schneiberg & J. Rogers Hollingsworth, *Can Transaction Cost Economics Explain Trade Associations?*, *in* THE FIRM AS A NEXUS OF TREATIES 320, 323 (Masahiko Aoki et al. eds., 1990). The information sharing function of trade associations has raised collusion concerns among anti-trust regulators and scholars. *See* Kirby, *supra* note 240, at 138.

243. Kirby, *supra*, note 240, at 138; Xavier Vives, *Trade Association Disclosure Rules, Incentives to Share Information, and Welfare*, 21 RAND J. ECON. 409, 409 (1990).

assistance or training programs regarding emerging management practices or technologies.[244]

Generally speaking, trade associations are often in a better position than individual firms to collect and evaluate information regarding industry best practices. Associations enjoy an advantage over many individual firms in terms of access to other firms in the industry sector. While other firms may be perceived as competitors, the trade association and its staff are more likely to be viewed as resources and advocates.[245] Because the trade association typically will aggregate firm-level data before dissemination to its members, individual firms retain some level of anonymity in providing information regarding their practices. In addition, particularly with respect to industry sectors that include significant numbers of smaller firms, the trade association may have greater access than many of its member firms to the resources and technical expertise needed to collect and evaluate information regarding pollution management practices.[246]

Generally speaking, therefore, it appears that trade associations perform the information coordination function fairly well in the market context. But is the trade association better suited than the government to identify best pollution control practices for regulatory purposes? In that context, certain dynamics in the business environment raise meaningful concerns about the completeness and accuracy of the information ultimately developed. For example, while many firms may be willing to share operational information with the association, others will instead provide incomplete or even misleading information regarding pollution management. Their reticence may reflect a desire to retain a competitive advantage, or from the fear that disclosure will result in regulation mandating

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244. *See* Richard N. L. Andrews, *Environmental Regulation and Business 'Self-Regulation'*, 31 POL'Y SCI. 177, 183-84 (1998); Kassinis, *supra* note 234, at 817.

245. *See* LEONARD H. LYNN & TIMOTHY J. MCKEOWN, ORGANIZING BUSINESS: TRADE ASSOCIATIONS IN AMERICA AND JAPAN 2-3 (1988); MACK, *supra* note 239, at 108 ("[T]rade association participation can be a highly cost-effective means of achieving a company's public policy objectives.").

246. *See* Andrews, *supra* note 244, at 184, 192; Andrea Revell & Robert Rutherfoord, *UK Environmental Policy and the Small Firm: Broadening the Focus*, 12 BUS. STRATEGY & ENV'T 26, 32 (2003) (discussing the role that trade association can play in providing technical assistance to small firms).

similar approaches at its other plants.[247] Whatever the reason, participation in trade association surveys typically is voluntary, thus firms can usually play coy without the fear of meaningful sanctions from the association. Moreover, the extent of the trade association's penetration into the industry can also affect the completeness of the information it collects. Nonmembers of the association may be even less likely to participate in the association's collection efforts, leaving gaps that prevent a full picture of industry practices.

Furthermore, even where member firms provide complete and accurate information to the trade association, the trade association may itself shade, manipulate, or even conceal information from the regulators.[248] For many industries, trade associations are, above all else, a mechanism for managing and minimizing government intrusion. In industries in which diffusion of best practices would be costly or otherwise disruptive, the trade association would have significant incentive to divert regulatory attention from such practices, perhaps by concealing or misstating their commercial utility. For example, during rulemaking in Southern California focusing on alternatives to perchloroethylene based dry cleaning, the dry cleaners trade associations aggressively attacked the efficacy and commercial viability of alternative clean technologies.[249] As in the dry cleaning case, such behavior is particularly likely where the firms having the most power within the association do not currently use the state of the art technology. Of course, the inverse also may occur. The trade association may attempt to cast technology

247. *See* Cary Coglianese, *Business Interests and Information in Environmental Rulemaking*, *in* BUSINESS AND ENVIRONMENTAL POLICY 185, 188 (Michael E. Kraft & Sheldon Kamieniecki eds., 2007) (stating that businesses may conceal information to avoid costly regulation).

248. In addition, even where the trade association acts in good faith, placement of the information collection and evaluation function with it raises legitimacy issues regarding its role in the rule-making process. *See* Benjamin Cashore, *Legitimacy and the Privatization of Environmental Governance: How Non-State Market-Driven (NSMD) Governance Systems Gain Rule-Making Authority*, 15 GOVERNANCE 503, 504-05 (2002).

249. *See* Peter Jay Sinsheimer, Fashioning a Greener Shade of Clean: Integrating Pollution Prevention into Public Policy—The Case of Professional Wet Cleaning (2009) (unpublished Ph.D. dissertation, University of California, Los Angeles).

used by the most powerful firms as the best practice, thereby affording those firms a competitive advantage should the regulatory agency mandate potentially expensive retrofitting of the other firms' plants.

Like the trade association, the government has substantially greater access than any individual firm to information regarding best practices within the relevant industry, as well as access to the financial and technical resources needed to process that information. In terms of access, the government has at least three noteworthy routes to information. First, the agency commonly leverages the capacities of the trade associations as part of the rulemaking process. In many cases, the trade association will collect information at the request of the agency—usually in the form of surveys—or provide technical assistance and consultation.[250] Beyond that, the agency generally has the legal authority to require submission of information from individual facilities, as well as the power to physically inspect their operations.[251] Unlike the ofttimes limited grasp of trade associations, this formal authority reaches all members of the relevant industry and recalcitrant or deceitful facilities face federal enforcement. Third, the public nature of the rulemaking process invites participation from a broad range of interested parties, each often offering their own data as well as evaluation of the data presented by the government and other participants.

A typical rule-making effort begins with informal workshops involving stakeholders such as industry associations, facility representatives, state and federal regulators, and environmental groups. Such workshops are commonly supplemented with written surveys of a large

250. For example, in the MACT rulemaking for the paper and pulp industry, EPA relied upon a voluntary survey conducted by the American Forest and Paper Association and the National Council of the Paper Industry for Air and Stream Improvement. Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards; Pulp, Paper, and Paperboard Category; National Emission Standards for Hazardous Air Pollutants for Source Category; Pulp and Paper Production, 58 Fed. Reg. 66,078, 66,137 (Dec. 17, 1993) (to be codified at 40 C.F.R. pts. 63, 430; *see also* Coglianese, *supra* note 247, at 197-98 (EPA often consults with trade association staff prior to interviewing facility personnel).

251. *See* Clean Air Act, 42 U.S.C § 7414(a) (2006) (information submission and inspection authorities); Resource Conservation and Recovery Act, 42 U.S.C. § 6927(a) (2006).

number of facilities, followed by more targeted, in-depth data requests using the formal statutory information collection authority. EPA staff or contractors also will conduct a series of site visits at various facilities to observe operations first-hand.[252] Moreover, the agency receives industry sector and facility-specific information through formal comments submitted in response to proposed rules.[253] The process is not linear, however, and stakeholder meetings, conference calls and other interactions often continue throughout the process.[254]

All that said, one should not overstate the government's competencies in this area. Identifying best practices for the astoundingly wide range of industries and processes covered by the NESHAP and NSPS programs was an intensely challenging task.[255] Despite the broad set of formal and

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252. For example, in developing the MACT standards for surface coating (i.e., painting) operations, the EPA began with a workshop, followed by a "screening survey" sent to approximately 3000 facilities, and a subsequent "detailed questionnaire" issued to 312 facilities. U.S. ENVTL. PROT. AGENCY, NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP) FOR SOURCE CATEGORY: MISCELLANEOUS METAL PARTS AND PRODUCTS SURFACE COATING OPERATIONS—TECHNICAL SUPPORT DOCUMENT 2-2, 8-4-8-9, (2002) [hereinafter EPA, COATING OPERATIONS]; Standards of Performance for New Stationary Sources; Asphalt Processing and Asphalt Roofing Manufacture, 45 Fed. Reg. 76,404 (Nov. 18, 1980) (to be codified at 40 C.F.R. pt. 60) ("A survey of asphalt roofing manufacturers and State, regional, and local agencies was conducted to find well-controlled asphalt roofing plants. As a result of this survey, 27 asphalt roofing plants were visited to select the best plants for emissions testing."); National Emissions Standards for Hazardous Air Pollutants; Printing, Coating, and Dyeing of Fabrics and Other Textiles, 67 Fed. Reg. 46,028, 46,029-30 (July 11, 2002) (to be codified at 40 C.F.R. pt. 63) (establishing subcategories for Printing, Coating, and Dyeing of Fabrics MACT rulemaking based upon survey responses from the industry, facility site visit reports, and stakeholder meetings).

253. *See* Standards of Performance for New Stationary Sources; Volatile Organic Compound (VOC) Emissions from the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations, 55 Fed. Reg. 26,931, 26,940 (June 29, 1990) (to be codified at 40 C.F.R. pt. 60) (EPA revising proposal regarding batch distillation operations based on new technical data submitted in response to formally promulgated rule proposal).

254. EPA, COATING OPERATIONS, *supra* note 252, at 2-3. In some circumstances, industry may be quite proactive.

255. Coglianese, *supra* note 247, at 196 ("[EPA] had to learn the about industrial practices in over 150 different industries. EPA regulators needed vast

informal tools available to the agency, some information will escape the net, whether due to recalcitrant respondents or bureaucratic blunders. Additionally, the EPA faces the same organizational and operational barriers that plague businesses in terms of information management and operational efficiencies. Nor can one discount the role that agency capture may play. Nonetheless, these factors do not undermine the basic point that the agency's authorities, capacities and resources render it the better candidate for identifying industry-wide best practices than either individual firms relying primarily upon local knowledge or trade associations.

CONCLUSION

My basic point is that the bulk of the discourse about regulatory reform in the environmental area is driven by conventional socially constructed views of regulation, regulators, and the regulated. That conventional construction has limited empirical support, and largely ignores an alternative construction with stronger empirical underpinnings. This section makes two additional points. First, the choice between the two constructions matters: the selection of one over the other can lead to significant differences in the nature of the reform advanced. Second, the ubiquitous reach of the conventional construction is traceable to the nature of legal scholarship itself. It concludes with strategies for dealing with competing constructions in this and other areas.

It is fair to say the proponents of the conventional construction tend to be strong advocates of market-based regulation. This flows from reliance on the firm's adaptive, market-driven nature coupled with avoidance of government involvement in substantive environmental management. As I have noted elsewhere, the government's role is essentially limited to setting up the right incentives, and getting out of the way.[256] The alternative construction is less optimistic about the innovative capacities of businesses, placing more confidence in the role of government in facilitating identification and diffusion environmental

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amounts of information about manufacturing equipment and industrial operations in each sector—and in each of their numerous subcategories.").

256. Malloy, *supra* note 152, at 535.

management strategies. These disparate perspectives on the relative capacities of business and government will typically lead to differing regulatory approaches.

Take the case of dynamic efficiency—the capacity of a regulatory regime to spur the development and adoption of innovative technologies or management strategies. Virtually all scholars agree that dynamic efficiency is critically important, yet the conventional and alternative constructions offer starkly different prescriptions for achieving it. Proponents of the conventional construction view regulation and regulators as substantial barriers to innovation, and offer market-based reforms such as emissions trading, taxes, and subsidy programs as the solution. These reforms assume that businesses actively will seek cost-effective innovations so as to take advantages of the incentives offered by the regulations. In the alternative construction's view, traditional regulation already provides opportunities for innovation by businesses, opportunities that appear to be largely foregone. Reform proposals thus focus on battling impediments to innovation that lie within the market and its constituent businesses, relying upon strategies such as direct intervention into the firm's decision-making processes[257] or proactive engagement in the commercialization and diffusion of innovative technologies.[258]

Two examples from California are illustrative of the strategies that the alternative construction might utilize. In Northern California, Contra Costa County's Industrial Safety Ordinance requires refineries to periodically evaluate their operations using the precepts of inherently safer

257. *See* Nicholas A. Ashford, *An Innovation-Based Strategy for a Sustainable Environment*, *in* INNOVATION-ORIENTED ENVIRONMENTAL REGULATION: THEORETICAL APPROACH AND EMPIRICAL ANALYSIS (J. Hemmelskamp et al. eds., 2000) (discussing mandatory Technology Options Analysis); Malloy, *supra* note 152, at 600-03 (calling for "tailored regulation" which takes into account features of the internal environment of the regulated firm). Such intervention has been termed "management-based regulation" and in one form or another is widely used in environmental regulation. *See* Cary Coglianese & David Lazer, *Management-Based Regulation: Prescribing Private Management to Achieve Public Goals*, 37 LAW & SOC'Y REV. 691 (2003); *see also* EPA, DEVELOPING YOUR STORMWATER POLLUTION PREVENTION PLAN: A GUIDE FOR CONSTRUCTION SITES, 833R-06-044 (May 2007); EPA, FACILITY RESPONSE PLANNING COMPLIANCE ASSISTANCE GUIDE.

258. *See* Malloy & Sinsheimer, *supra* note 48, at 183.

design.[259] "Inherently safer design" seeks to integrate safety into industrial processes through the systematic review of those processes and evaluation of safer alternative processes and chemicals.[260] This is not simply a planning requirement; the ordinance mandates adoption of identified alternatives to the greatest extent feasible.[261] In Southern California, the South Coast Air Quality Management District (AQMD) took a different tack in dealing perchloroethylene, a probable human carcinogen used extensively in the dry cleaning industry. Recognizing the need for alternative cleaning systems, AQMD worked with academia and industry to support the development and commercialization of environmentally-benign alternative "wet-cleaning" systems. The agency funded technical studies to evaluate the commercial viability of the innovative alternative, and supported demonstration sites throughout the region. Satisfied that alternatives were commercially viable, and apparently convinced that market dynamics would not produce diffusion of the alternatives, AQMD ultimately implemented a phase-out of those perchloroethylene systems.[262]

The California examples are more the exception than the rule in terms of the direction of reform; the conventional construction and its associated reforms still dominate in the literature. How is it that the conventional construction has gained such traction despite its astonishing lack of empirical support? One explanation focuses on three aspects of legal scholarship itself: its normative nature, its

259. CONTRA COSTA COUNTY CAL., INDUSTRIAL SAFETY ORDINANCE 98-48 (Dec. 4, 1998) [hereinafter ISO Ordinance]; CONTRA COSTA HEALTH SERVICES HAZARDOUS MATERIALS PROGRAM, INDUSTRIAL SAFETY ORDINANCE ANNUAL PERFORMANCE REVIEW AND EVALUATION REPORT 3 (2004).

260. Timothy F. Malloy, *Of Natmats, Terrorists, and Toxics: Regulatory Adaptation in a Changing World*, 26 UCLA J. ENVTL. L. & POL. 93, 97 (2008).

261. ISO Ordinance, *supra* note 259, at § 450-8.016(D)(3). "Feasible" is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." ISO Ordinance, *supra* note 259, at § 450-8.014(c).

262. Sinsheimer, *supra* note 249, at 198-230; Malloy & Sinsheimer, *supra* note 48, at 230.

corresponding reliance on soft empiricism, and the instrumental character of legal training.[263]

Modern legal scholarship unabashedly is normative.[264] Few law review articles engage in purely descriptive analysis of law and regulation. Instead, the typical article identifies a flaw in existing law or legal theory and proffers a solution.[265] Thus law reform is the currency of legal scholarship, and young scholars pursuing tenure are well advised to identify and, if possible, "solve" a significant problem in existing law or legal theory.[266] But focusing on the normative is surely no crime in itself. Indeed, on a regular basis colleagues in one scientific discipline or another have expressed to me their frustrated desire to engage normative issues in their own work. Concerns arise not so much from the normative focus of legal scholarship as from two associated aspects of its execution: the use (or lack of use) of empirical evidence and the pursuit of persuasive force.

Regarding the first, there is little doubt that most legal scholars are engaged in an empirical enterprise.[267] Virtually

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263. I acknowledge that I am engaging in my own construction activities regarding the dynamics of legal scholarship.

264. Rubin, *supra* note 16, at 1847-48; *see also* Elizabeth Chambliss, *When Do Facts Persuade? Some Thoughts on the Market for "Empirical Legal Studies"* 71 LAW & CONTEMP. PROB. 17, 27 n.74 (2008); Richard O. Lempert, *Empirical Results for Public Policy: With Examples from Family Law* 5 J. EMPIRICAL LEGAL STUD. 907, 907-08 (2008).

265. *See, e.g.*, Tracey E. George, *An Empirical Study of Empirical Legal Scholarship: The Top Law Schools*, 81 IND. L.J. 141, 146 (2006); Rubin, *supra* note 16, at 1847-48; Peter H. Schuck, *Why Don't Law Professors Do More Empirical Research?*, 39 J. LEGAL EDUC. 323, 329 (1989); *cf.* Lee Epstein & Gary King, *The Rules of Inference*, 69 U. CHI. L. REV. 1, 18 (2002) (characterizing virtually all modern legal scholarship as empirical, albeit flawed).

266. *See* Lempert, *supra* note 264, at 908 (discussing the pitfalls of empirical research as compared to traditional normative work for the untenured law faculty).

267. Of course, this statement itself makes an empirical claim, the accuracy of which depends, in part, on the definition one uses for "empirical evidence." Some authors limit their use of the term to formal statistical or quantitative analysis. *See* Michael Heise, *The Past, Present, and Future of Empirical Legal Scholarship: Judicial Decision Making and the New Empiricism*, 2002 U. ILL. L. REV. 819, 824-26. I use the term more broadly to include any data generated from observation, measurement or experimentation. *See* Epstein & King, *supra*

all policy-oriented legal scholarship makes claims about the law, its real world effects, and the likely outcomes of legal reform.[268] In the past, however, legal scholarship has not typically employed rigorous empirical methods, relying instead upon "soft" empiricism (such as informal surveying or case studies) or mining the empirical work of other disciplines.[269] Recent debates over empiricism in law provide numerous examples of a variety of deficiencies with such informal empiricism,[270] although these problems are hardly limited to the legal literature.[271] And while drawing out the policy implications of others' empirical studies is a legitimate scholarly exercise, the danger there is the misuse of the empirical evidence—including misunderstanding the scope or outcome of the study, over-claiming, and ignoring contradictory studies or evidence.[272]

And yet, while strong empirical analysis clearly is desirable, standing alone its absence does not render the conventional construction irrelevant to academic discourse or policy formulation. Information about the world will always be incomplete and the effects of regulation on behavior uncertain.[273] As the economics literature

note 265, at 2-3; Gregory Mitchell, *Empirical Legal Scholarship as Scientific Dialogue*, 83 N.C. L. REV. 167, 198 (2004).

268. George, *supra* note 265, at 146.

269. *See* Stewart Macaulay, *Contracts, New Legal Realism, and Improving the Navigation of* The Yellow Submarine, 80 TUL. L. REV. 1161, 1185-86 (2006) (discussing use of empirical studies by legal scholars).

270. *See* Epstein & King, *supra* note 265; Lempert, *supra* note 264.

271. See Lempert, *supra* note 264, at 915-22 (detailing issues associated with two policy-oriented empirical studies by sociologists). *Compare* Episten & King, *supra* note 256 (discussing how the rules of inference used in social sciences should be adapted into legal scholarship), *with* Frank Cross et al., *Above the Rules: A Response to Epstein and King*, 69 U. CHI. L. REV. 135, 135 (2002) (arguing that Epstein and King "violate[] many of their own rules of inference" during their assault of legal scholarship).

272. *See* Stewart Macaulay, *Contracts, New Legal Realism, and Improving the Navigation of the Yellow Submarine*, 80 TUL. L. REV. 1161, 1186 (2006) (discussing the pitfalls of such mining operations, and citing Jacqueline Macaulay, Some Barriers to Drawing Conclusions from Social Science Research (Jan. 1979) (unpublished manuscript, on file with the University of Wisconsin Law School, *available at* www.law.wisc.edu/facstaff/macaulay/papers/barriers.pdf) (discussing ten common problems to drawing conclusions).

273. *See* Russell Korobkin, *Possibility and Plausibility in Law and Economics*, 32 FLA. ST. U. L. REV. 781, 786 (2005).

demonstrates, theoretical frameworks based on largely unproven empirical assumptions can be useful in developing and evaluating policy options, so long as the author and those relying upon their work keep in mind the empirical limitations.[274] It is perhaps here that we can draw the most useful lessons from the case of the conventional construction by considering the historically "persuasion mode" in which legal scholarship has operated.[275]

Numerous commentators have observed that legal scholarship is largely instrumental in nature; we are in the business of trying to convince our audience—be they judges, legislators, or regulators—to adopt, or modify or reject a particular policy.[276] As lawyers we are well versed in the power of the narrative, trained to craft persuasive stories from constructed facts.[277] In the adversarial context of litigation, such stories compete before the judge or jury. Within the community of scholars, narratives likewise vie

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274. As Clint Eastwood rightly observed, "A man's got to know his limitations." MAGNUM FORCE (The Malpaso Campany 1973). Thus, for example, economists and consumers of their work are vulnerable to criticism when they treat central assumptions of microeconomic theory such as rationality and complete information as fact. *See* MARY ZEY, RATIONAL CHOICE THEORY AND ORGANIZATIONAL THEORY 87-113 (1998); *see also* DAVID M. KREPS, A COURSE IN MICROECONOMIC THEORY 724-29 (1990).

275. *See generally* Richard K. Neumann, Jr. & Stefan H. Krieger, *Empirical Inquiry Twenty-Five Years After* The Lawyering Process, 10 CLINICAL L. REV. 349, 355 (2003) (explaining how lawyers take a persuasion mode to their work compared to scientists who attempt to learn as much as possible).

276. *See* Chambliss, *supra* note 264, at 26-28 (discussing the use of student edited articles as a ground to have articles published, regardless of relevance or credibility); Epstein & King, *supra* note 265, at 9-11 (discussing lawyer's responsibility to produce work that is reliable, not just one-sided); Korobkin, *supra* note 273, at 785 ("Legal scholarship seeks to provide policy guidance to lawmakers . . . ."). *But see* Neumann & Krieger, *supra* note 275, at 385 ("What generates prestige in the legal academy is the doctrinal or theoretical article that causes other academics to say "Wow!" even if no judge, legislator, or other policy maker would care about it or even understand it.").

277. *See* David Luban, *Difference Made Legal: The Court and Dr. King*, 87 MICH. L. REV. 2152, 2154 (1989) ("Holmes was therefore wrong: The life of the law is neither logic nor experience, but narrative and the only partially civilized struggle for the power it conveys."); Austin Sarat, *Narrative Strategy and Death Penalty Advocacy*, 31 HARV. C.R.-C.L. L. REV. 353, 357 (1996); *see, e.g.*, Timothy A. Canova, *Banking and Financial Reform at the Crossroads of the Neoliberal Contagion*, 14 AM. U. INT'L L. REV. 1571, 1592-94 (1999) (discussing use of legal reform narratives in the context of international monetary policies).

for dominance, attempting to persuade their audience of other scholars, policy-makers and judges to adopt their respective recommendations.[278] Some critics argue that legal training, with its focus on adversarial interactions in the litigation setting, leads legal scholars to avoid or ignore evidence or competing theories that contradict or undermine their favored theories.[279]

I suspect that legal training in advocacy has some role to play here, although the most vocal critics likely overstate it a bit. While it is true that the lawyer as an advocate is bound to present the best case for his or her client, the sophisticated practitioner recognizes that ignoring or hiding substantial counterarguments or injurious facts will often undermine a case. Rather, effective strategic lawyering involves aggressive identification and evaluation of a case's vulnerabilities and anticipation of the adversary's likely counterarguments. Even in presenting one's case to the judge or other decision maker, lawyers will often address weaknesses or counterarguments directly. Indeed, the rules of professional conduct even go so far as to require disclosure of contrary authority or material facts in certain circumstances.[280] Moreover, when acting as counselor rather than advocate, a lawyer risks malpractice should he or she fail to discuss the full range of options—warts and all—with the client.

That said, it is plausible that given the persuasive nature of legal scholarship, our shared experience of legal training tends to encourage legal scholars to strategically present contrary arguments and facts in the light most favorable to their proffered recommendations. Two other factors related to the pursuit of persuasiveness may also be at play, one motivational and the other cognitive. First, the incentive structure for legal scholars places great emphasis on originality—either identifying new policy problems or crafting innovative solutions to problems. Where a problem has already been articulated by others, many scholars may see less value in expending substantial analytic resources evaluating the underlying problem definition itself.

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278. Rubin, *supra* note 16, at 1892-94.

279. Epstein & King, *supra* note 265, at 9-10; Lempert, *supra* note 264, at 922.

280. MODEL RULES OF PROF'L CONDUCT R. 1.6 (2009).

Second, the desire to make a persuasive case, to win the competition, could affect a legal scholar's reasoning at the preconscious level. In a variety of circumstances, psychologists have demonstrated that where decision makers have a preferred outcome, they are apt to evaluate confirming and disconfirming information so as to support that outcome.[281] This tendency has been observed among individuals engaged in a range of higher level thinking, including such activities as evaluating scientific research, making investment decisions, and analyzing tax issues.[282] This is not to say that preconscious biases run completely roughshod over critical thinking; there are limits to its influence. Nonetheless, such cognitive biases may play some role in the willingness of scholars to embrace the conventional construction despite its thin empirical support.

Clearly, the pervasive lack of empirical support for the conventional construction suggests legal scholars in this area should give greater attention to the careful development and evaluation of empirical data.[283] At a minimum, the quality of the debate would be much improved if scholars tempered their narratives with open, self-critical identification and evaluation of their essential underlying assumptions. That is not to say that legal scholarship on environmental regulatory policy is devoid of such self-reflection, but only that more of it would be

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281. *See* Jürgen Beckmann & Julius Kuhl, *Altering Information to Gain Action Control: Functional Aspects of Human Information Processing in Decision Making*, 18 J. RES. PERSONALITY 224, 226-27 (1984) (affecting the search for information and skewing the evaluation of the collected information); Ziva Kunda, *The Case for Motivated Reasoning*, 108 PSYCHOL. BULL. 480 (1990) (surveying the literature); Henry Montgomery, *Towards a Perspective Theory of Decision Making and Judgment*, 87 ACTA PSYCHOLOGICA 155, 168-69 (1994) (suggesting that individuals adjust the evaluation process so that the favored alternative appears superior to other alternatives on at least one attribute and at least equal to them on other attributes). Researchers have identified this tendency in various related phenomena such as motivated reasoning, biased pre-decision processing, and bidirectional processing. *See* Timothy F. Malloy, *Disclosure Stories*, 32 FLA. ST. U. L. REV. 617, 651-52 (2005).

282. *See, e.g.*, MODEL RULES OF PROF'L CONDUCT R. 3.3(a)(2) (2009) (requiring advocates to disclose to the court "legal authority in the controlling jurisdiction known to the lawyer to be directly adverse to the position of the client and not disclosed by opposing counsel").

283. *See* Rubin, *supra* note 16, at 1896 (suggesting that legal scholars "make more extensive, but more controlled use of empirical data").

helpful.[284] Clear and open articulation of underlying assumptions and empirical vulnerabilities could engender more robust dialogue across competing constructions.

However, acknowledging and engaging plausible competing constructions comes at a price. Even with more attention to real-world empirical information and self-conscious deliberation, it is unlikely that one construction of the regulatory system—broadly defined to include the regulated and regulators—will conclusively win the day. Granted we may be able to reach a consensus on whether the statutes expressly require the use of specific technology or not—even in the post-modern era. But once we move beyond that fairly straightforward issue to questions of how regulators and the regulated act and interact, and what their relative capacities are, empirical judgments will often be more tentative, contingent and time-consuming. Consider the functional form of the rigidity proposition: do firms adopt reference technologies because of bureaucratic pressure, because they mimic other firms, or because the reference technologies are the best fit? My guess is that it is a mix of these factors with their relative weights varying in different contexts. Quantifying that mix through empirical studies will likely be exceedingly difficult and resource-intensive and in many cases could even be inconclusive.

That is not to suggest that empirical approaches should be rejected, only that as a practical matter they may often be unable to resolve conflicts between constructions decisively. For example, in some instances, the results will not be conclusive while in others the cost of such studies may be unreasonably high. Policymaking marches on, however, and legal scholarship bent on influencing the direction of that policy requires timely resolution of

284. For example, in his classic article on administrative law, Professor Stewart expressly acknowledged that common assumptions about the efficiency of firms may be overstated, but then dismissed that point with minimal discussion. *See* Stewart, *supra* note 5, at 1281 n.76 ("Because large firms 'satisfice' and do not engage in ruthless and continuing cost minimization, regulatory controls may trigger 'search' efforts that tap neglected opportunities. But such effects are presumably random, and their magnitude quite uncertain."); *see also* Neil Gunningham & Darren Sinclair, *Regulatory Pluralism: Designing Policy Mixes for Environmental Protection*, 21 LAW & POL'Y 49, 60 (1999) (stating that increased self regulation can "stimulate innovative activity").

conflicting constructions. For such cases I offer two possible strategies for consideration here; no doubt there are more.

First, competing constructions could be evaluated in terms of relative plausibility, what Russell Korobkin called the "plausibility competition."[285] Scholars would evaluate each construction's essential assumptions against the existing relevant data, including formal quantitative and qualitative research, as well as anecdotal and other informal information. In making policy recommendations, scholars should rely upon the construction that appears most plausible against the available empirical backdrop.[286] Clearly this is not the scientific method, nor is it immune to cognitive, social and other influences that can bias decision making.[287] Nonetheless, a similar "relative plausibility" concept has been adopted in policymaking under conditions of uncertainty in fisheries management.[288] And it has the noteworthy virtue of focusing attention squarely on the available evidence regarding the law in action, with explicit acknowledgement of the limitations of that evidence.

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285. Korobkin, *supra* note 273, at 791.

286. Professor Korobkin did not define "plausibility" or provide criteria for its measurement. For examples of such criteria, see HARMON R. HOLCOMB, SOCIOBIOLOGY, SEX, AND SCIENCE 98-101 (David Edward Shane ed., 1993) (describing five criteria for plausibility). Holcomb views plausibility as a threshold hurdle to be overcome before an explanatory story is worthy of more rigorous hypothesis testing. *See* Rebecca A. Rademeyer et al., *Tips and Tricks in Designing Management Procedures*, 64 ICES J. MARINE SCI. 618, 625 (2007) ("[Plausibility is] the likelihood of a *scenario* considered in *simulation trials* representing reality relative to other *scenarios* also under consideration . . . .").

287. *See* Jonathan Klick & Gregory Mitchell, *Government Regulation of Irrationality: Moral and Cognitive Hazards*, 90 MINN. L. REV. 1620, 1660-61 (2006).

288. *See* D. Kolody et al., *Salvaged Pearls: Lessons Learned from a Floundering Attempt to Develop a Management Procedure for Southern Bluefin Tuna*, 94 FISHERIES RES. 339, 346 (2008) (discussing process by which competing management assumption were given weights based on relative plausibility); COMM. ON ECOSYSTEM EFFECTS OF FISHING, OCEAN STUDIES BD., DYNAMIC CHANGES IN MARINE ECOSYSTEMS: FISHING, FOOD WEBS, AND FUTURE OPTIONS 78-79 (2006) ("The goal of the analytical exercise is not to build models that are able to predict what will happen, but to build a series of models and hypotheses of what *may* happen and to assign relative plausibilities to them so that tradeoffs between conflicting management objectives will be explicit when decisions are made.").

As one might expect, I believe that the alternative construction is significantly more plausible than the conventional construction. Regarding the rigidity proposition, there is essentially no support for the notion that the statute or regulations mandate particular technologies. There is uncertainty as to the functional form of the rigidity proposition; I previously acknowledged that the conventional and alternative constructions both present plausible stories.[289] The conventional literature provides little support for the homogeneity proposition, while the alternative construction's notion of variegated standards finds strong corroboration in actual rulemaking proceedings. To be sure, the standards are not precisely molded to each facility's specific circumstances, but neither are they the "one-size-fits-all" portrayed by the conventional construction.[290] In terms of the relative capacities, here again the discussion in Part IV demonstrates that the alternative construction makes the more plausible case. The conventional construction offers nothing more than intuition and rhetoric. The alternative construction is grounded in available research regarding individual organizational practices, trade associations, and government information collection authorities and practices.[291]

Rather than choosing between competing constructions through the relative plausibility approach, scholars or policymakers may adopt a hedging strategy. Here one assumes that both constructions have some validity, and attempts to identify policies that result in the best overall outcome under either construction. In some cases, the hedging approach may be akin to the dominant strategy in game theory;[292] that is, the chosen policy would result in the optimum outcome regardless of which construction is more "accurate." In other instances, a trade-off may be necessary in which the policymaker would incur some cost in exchange for covering both constructions.

Emissions taxes offer a useful example here. Under the conventional construction, emission taxes set at the proper

289. *See supra* Part III(B) and text accompanying notes 167-71.

290. *See supra* Part IV.

291. *See id.*

292. DOUGLAS G. BAIRD ET AL., GAME THEORY AND THE LAW 11 (1994).

level should lead to efficient pollution reductions.[293] Taking advantage of local knowledge regarding its operations and market information concerning available technological options, the firm will seek out the most efficient pollution management strategy. The alternative construction, with its markedly less heroic view of business adaptability, would anticipate substantial internal and market barriers to the identification and diffusion of innovative technologies. For example, barriers could include organizational inertia resulting from entrenched standard operating procedures or distorted information in the market regarding emerging technologies.[294] A hedging approach would adopt the environmental tax, but supplement it with measures intended to overcome that inertia. Such measures could include some form of mandatory technology options analysis forcing the firm to engage in a systematic search for alternatives, or government-supported demonstration projects or technical assistance.[295]

Even as policymakers strive to resolve the classic concerns of environmental law regarding toxic and conventional air emissions, water pollution and the like, they face new and emerging issues of global proportion. Climate change mitigation and adaptation cast a long shadow over virtually every human activity and are spawning regulatory responses at every level of government. Likewise, a broad range of policymakers and stakeholders are beginning to address chemical policy reform and the proliferation of nanotechnology and nanomaterials in commerce. Legal scholarship has played a

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293. Thomas A. Barthold, *Issues in the Design of Environmental Excise Taxes*, 8 J. ECON. PERSP. 133, 135 (1994). Such Pigouvian taxes would be set so as to impose the social cost of the activity on the polluter. Malloy & Sinsheimer, *supra* note 48, at 219.

294. *See supra* text accompanying footnotes 204-06; Richard P. Rumelt, *Inertia and Transformation* 6-15 (INSEAD Working Paper No. 94/62/SM, 1994) (discussing a range of causes of organizational inertia), abstract *available at*, http://www.insead.edu/facultyresearch/research/details_papers.cfm?id=12853; *see also* Stephen J. DeCanio, *The Efficiency Paradox: Bureaucratic and Organizational Barriers to Profitable Energy-Saving Investments*, 26 ENERGY POL'Y 441 (1998) (discussing the "efficiency paradox," in which firms reject profitable energy-saving investments due to organizational factors).

295. *See* Ashford, *supra* note 257, at 97-98 (discussing technology options analysis); Malloy & Sinsheimer, *supra* note 48, at 217-18 (describing the nature and purpose of demonstration projects).

significant role in policy debates in these and other areas, and no doubt will continue to do so. Self-reflective attention to the constructions adopted in these areas—constructions regarding the nature and causes of concern as well as the behavior and capacities of regulated and regulators—could enhance those debates and ultimately improve the efficacy of the resulting policies.