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Measuring the Deterrent Effect of Punitive Damages

THEODORE EISENBERG*

Professor Viscusi's article¹ differs from the dominant mode of law and economics scholarship on punitive damages. The usual punitive damages article contains purely theoretical considerations about when punitive damages are appropriate and about their optimal level; no effort is made to ascertain whether the existing pattern of punitive awards corresponds with the theory. This is part of a larger problem: the dearth of empirical evidence in law and economics scholarship.² Viscusi, on the other hand, provides empirical tests of whether punitive damages accomplish their goals, and he makes creative use of publicly available data sources. For the goal of his project and his use of the data, he should be commended.

As executed, however, Viscusi's study is inappropriate as a basis for policy-making and unreliable as evidence about punitive damages. The study is based on questionable empirical premises about punitive damages, questionable understanding of applicable legal rules, and questionable statistical methodology. In addition, the study analyzes punitive damages' effects in areas of law in which one would least expect to find substantial effects.

I. QUESTIONABLE EMPIRICAL ASSUMPTIONS ABOUT PUNITIVE DAMAGES

Viscusi's starting premises are not supported by the available empirical data about punitive damages. His article begins: "Perhaps more than any other aspect of the judicial system, punitive damages have come to symbolize the problems of our nation's courts."³ He claims that punitive damages have inflicted "chaos and economic disruption."⁴ And his article closes by stating that "[p]unitive damages taint the integrity of our judicial system" reiterating the assertion that jury behavior is random.⁵ This suggests a crisis atmosphere.

* Henry Allen Mark Professor of Law, Cornell Law School. I would like to thank Jeffrey Rachlinski and Martin T. Wells for discussions about this comment.

1. W. Kip Viscusi, *The Social Costs of Punitive Damages Against Corporations in Environmental and Safety Torts*, 87 GEO. L.J. 285 (1998).

2. See William M. Landes, *The Art of Law and Economics: An Autobiographical Essay* 22 (Univ. of Chicago Law School, John M. Olin Program in Law and Economics, Working Paper No. 45, 2d series, 1997). Professor Landes surveyed all of the articles published during the previous five years in the *Journal of Legal Studies*, the leading law and economics journal, and found that only 20% had some empirical content. In contrast, 60% of the articles published in the previous year in the *Journal of Political Economy*, a leading economics journal, contained substantial empirical content. Accord Thomas S. Ulen, *Firmly Grounded: Economics in the Future of the Law*, 1997 WIS. L. REV. 433, 456.

3. Viscusi, *supra* note 1, at 285.

4. *Id.* at 287.

5. *Id.* at 336.

Scholarly inquiry should begin with testing whether such claims are true—especially because these claims to no small degree are attributable to massive advertising campaigns by business and insurance groups.⁶ The empirical evidence suggests that concerns about punitive damages are exaggerated.⁷ All credible sources suggest that punitive damage awards are rare, and that they are especially rare in the visible areas of products liability and medical malpractice.⁸ And when punitive damages are awarded, they tend to correlate strongly with the level of compensatory damages.⁹

II. QUESTIONABLE ACCURACY IN DESCRIBING LEGAL RULES

Viscusi's models depend on four—and only four—states that do not allow punitive damages. Of the four states, Michigan is the most important: it accounts for approximately one-half of all toxic chemical accidents in these four states.¹⁰ Viscusi weights his statistical tests based on state activity, so Michigan receives more weight in his analysis than the other three states. The correct characterization of Michigan's legal status is therefore critical to Viscusi's study.

Michigan is not a state that can be characterized clearly as prohibiting punitive damages. Michigan case law does declare that damages may not be awarded to punish the defendant.¹¹ But Michigan allows “exemplary” damages to compensate plaintiffs for their humiliation, outrage, and indignity resulting from defendants' willful, malicious, or wanton conduct.¹² In many states, such exemplary damages might well be labeled punitive damages.¹³

Michigan's exemplary damages can be substantial. For example, in *McPeak*

6. See STEPHEN DANIELS & JOANNE MARTIN, CIVIL JURIES AND THE POLITICS OF REFORM 29-59 (1995); Theodore Eisenberg & James A. Henderson, Jr., *Inside the Quiet Revolution in Products Liability*, 39 UCLA L. REV. 731, 793-94 (1992).

7. See BUREAU OF JUSTICE STATISTICS, 1992 SPECIAL REPORT: CIVIL JUSTICE SURVEY OF STATE COURTS: TORT CASES IN LARGE COUNTIES 6 (1995); DANIELS & MARTIN, *supra* note 6; ERIK MOLLER, TRENDS IN CIVIL JURY VERDICTS SINCE 1985 (Rand Inst. for Civil Justice 1996). See also Theodore Eisenberg et al., *The Predictability of Punitive Damages*, 26 J. LEGAL STUD. 623 (1997). This is not to deny that punitive damages rules, like most legal rules, can be improved or that isolated awards can be unjustified.

8. See DANIELS & MARTIN, *supra* note 6, at 214, 219-21; MOLLER, *supra* note 7, at 33-36; NEIL VIDMAR, MEDICAL MALPRACTICE AND THE AMERICAN JURY 254 (1995); Eisenberg et al., *supra* note 7, at 636-37.

9. See Eisenberg et al., *supra* note 7, at 637-39; Theodore Eisenberg & Martin T. Wells, *The Predictability of Punitive Damage Awards in Published Opinions, the Impact of BMW v. Gore on Punitive Damage Awards, and Forecasting Which Punitive Awards Will Be Reduced 1-2* (Aug. 26, 1998) (unpublished manuscript, on file with author).

10. See Viscusi, *supra* note 1, at 290 tbl.1.

11. See, e.g., *Association Research and Dev. Corp. v. CNA Fin. Corp.*, 333 N.W.2d 206, 210 (Mich. Ct. App. 1983).

12. See *Kewin v. Massachusetts Mut. Life Ins. Co.*, 295 N.W.2d 50, 54 (Mich. 1980); see also *Association Research*, 333 N.W.2d at 211.

13. In Louisiana, for example, before exemplary damages were outlawed, they looked much like punitive damages in other states. See Philip Ackerman, Comment, *Some Don't Like It Hot: Louisiana Eliminates Punitive Damages For Environmental Torts*, 72 TUL. L. REV. 327, 331 (1997).

v. *McPeak*,¹⁴ an insured's children from a previous marriage sued the insured's widow, alleging that the insured lacked mental capacity and was unduly influenced when he substituted the widow for the children as the beneficiary of his life insurance policy. The jury awarded \$250,000 in actual damages and \$500,000 in exemplary damages to each of two plaintiffs. The exemplary damages were based on a jury finding that the defendant's actions were "malicious and so willful and wanton as to demonstrate a reckless disregard of Plaintiffs' rights"¹⁵ These damages sound much like what other states might call punitive damages. Understandably, the American Tort Reform Association does not list Michigan as a state lacking punitive damages. It lists Michigan as a state in which punitive damages can be awarded to compensate for humiliation or outrage, but not simply to deter.¹⁶

In addition, Viscusi's decision to categorize Louisiana as a state allowing punitive damages is incorrect with respect to some of his measures of the impact of punitive damages. Until recently, Louisiana did allow punitive damages in some environmental cases.¹⁷ But Louisiana does not allow punitive damages in the areas of medical malpractice and products liability.¹⁸ Yet Viscusi treats Louisiana as if it does allow punitive damages in these fields.¹⁹

III. QUESTIONABLE STATISTICAL METHODOLOGY

Viscusi's models suffer from severe problems of exclusion of relevant variables. But even if all relevant variables were included, his results would be questionable. Viscusi's analysis could not reasonably be expected to detect differences between states with and without punitive damages—even if such differences existed.

A. MUCH ADO ABOUT NOTHING

Viscusi's study finds no significant difference between states with and without punitive damages, based on various measures of harmful behavior. But the study's sample size and methodology raise doubts about whether any significant difference could be detected. Though Viscusi cannot be faulted for the inadequate sample size—we have only fifty states plus the District of Columbia—he can be faulted for discussing the results as if he has proven that punitive damages have no deterrent effect. He has not done so.

To understand why, it is necessary to understand what is called the "power" of a statistical test. The power of a test is the likelihood of detecting an effect of

14. 577 N.W.2d 670 (Mich. 1998) (per curiam).

15. *Id.* at 671.

16. See AMERICAN TORT REFORM ASSOCIATION, 1986-1995 LEGISLATIVE REFORM OF PUNITIVE DAMAGES 3, 7 (as of June 30, 1996) (on file with the author); accord Ackerman, *supra* note 13, at 331-32 (Michigan not included on list of states without punitive damages).

17. See LA. CIV. CODE ANN. art. 2315.3 (West 1994) (repealed 1996).

18. See Ackerman, *supra* note 13, at 339-40.

19. See Viscusi, *supra* note 1, at 296-97 tbl.4.

a specified size at a specified significance level. If a test is insufficiently powerful, the likelihood of detecting the effect is small. Perfectly executed studies may fail to reveal socially important differences “simply because the sample sizes are too small to give the procedure enough power to detect the effect.”²⁰ Although few investigators report the power of the tests they use, it is especially important to do so when one attempts, as Viscusi does, to derive policy prescriptions from a null result—that is, from the absence of a statistically significant difference. The power of the statistical test used by Viscusi is small. Yet all he reports is a null result.²¹

To provide an intuitive feel for what Viscusi has done, consider a medical researcher’s effort to test a cancer drug. The efficacy of the drug can be measured by the proportion of some substance—call it gamma—in the patient’s blood. Assume that one accepts the efficacy of the drug if gamma in a group of patients treated with the drug is ten percent lower than gamma in the group not treated with the drug. Assume further that the mean of the gamma in the untreated population is ten and that the researcher regards the drug as successful if the mean of the gamma in the treated population is nine. The researcher would like to be able to reject, at the .05 level of statistical significance, the hypothesis that the treated and untreated group have the same level of gamma. The researcher treats forty-seven patients with the drug being tested, and four patients are held out as a control group for comparison purposes. The hoped-for effect is not observed at a statistically significant level.

What policy prescriptions can we derive from the failure to observe the hoped-for effect? Though forty-seven patients may be a reasonable number to subject to treatment with gamma, a control group of four patients is small. It likely would be premature to conclude that the drug has no effect. The experiment’s sample size allows an effect on gamma to go undetected even if it existed. This experiment would not be a persuasive test of the drug’s efficacy.

The cancer experiment is analogous to what Viscusi has done. He has forty-six states plus the District of Columbia “treated” with punitive damages and four states not so treated. He finds no effect from the treatment. His policy prescription is to throw out the treatment (*i.e.*, punitive damages). But given Viscusi’s sample size, the experiment was unlikely to detect a difference.

20. STANTON A. GLANTZ, *PRIMER OF BIOSTATISTICS* 178 (4th ed. 1997).

21. Viscusi’s regression results, reported in an appendix, are also questionable. Many of Viscusi’s models rely on count-based data. For example, Table 1A reports regression results for toxic chemical accidents. These models include, as variables, the number of accidents and the numbers of injuries and accidental deaths. But from what he reports, it is unlikely that he used appropriate methods for count-based data. He seems to have used weighted least squares regression, which is inappropriate for count-based data. Poisson regression is preferable for count-based data. And real-world count-based data often call for negative binomial regression. *See, e.g.*, Theodore Eisenberg et al., *Larger Board Size and Decreasing Firm Value in Small Firms*, 48 *J. FIN. ECON.* 35, 48-50 (1998). The failure to detect a result could be attributable to the failure to use appropriate statistical models but I suspect that other weaknesses in the study preclude detecting significant effects even using techniques appropriate for count-based data.

To illustrate why, let us apply a power calculation to Viscusi's Table 1. It reports that states without punitive damages have 1738 toxic chemical accidents among a population of 17,283,000,—for an accident rate of 10.06 per hundred thousand people. States with punitive damages have 32,162 accidents in a population of 237,727,000—for an accident rate of 13.53 per hundred thousand people. Viscusi's sample consists of forty-seven jurisdictions with punitive damages and four jurisdictions without punitive damages. We must compute the sample size needed to have a good chance of detecting, in a statistically significant manner, a reasonable reduction in toxic chemical accidents. To compute the sample size, we need to specify a desired level of statistical significance and the desired probability of detecting the effect, if one exists.

Suppose we accept the efficacy of punitive damages if we detect a ten percent reduction in toxic chemical accidents in states with punitive damages compared to states without punitive damages. That is, given an observed level of about ten toxic accidents per hundred thousand people,²² in states without punitive damages, we would accept the efficacy of punitive damages if the observed level of toxic chemical accidents in states with punitive damages were 9.0 or lower. Given all the other influences on toxic chemical accidents, a ten percent reduction seems large. On the other hand, accepting punitive damages' efficacy for a lower level of reduction would only further undermine Viscusi's point. Suppose that we deem a reduction to be statistically significant if it would occur by chance less than one time in twenty ($p=.05$).

Because Viscusi is proposing a rather severe policy prescription—abolishing punitive damages—based largely on his findings, it is reasonable to insist on a fairly high level of certainty about detecting the specified reduction in toxic chemical accidents, if it exists. That is, we would not want to accept the policy prescription unless we were reasonably sure that the experiment could successfully detect the effect desired—the reduction in toxic chemical accidents. So let us specify that we desire an eighty percent chance of detecting a statistically significant difference, if one exists.

To compute the necessary sample size, we also need to know the standard deviation of the toxic chemical accident rates for jurisdictions with and without punitive damages. Viscusi reports the rate for each state without punitive damages, and based on this data I compute the standard deviation for these four states to be .947. He does not report the toxic accident rate for each jurisdiction with punitive damages, so I have to guess at its level. Let us initially assume that the standard deviation for the forty-seven punitive damages jurisdictions is 4.0.

Using these assumptions (an accident rate of ten in jurisdictions without punitive damages and nine in other jurisdictions, a desired significance level of

22. The mean of the four individual states' rates is 10.25. The mean of the four states, treated as a single entity, is the 10.06 rate reported in text, but I will use 10 for the sake of simplicity.

.05, a likelihood of detecting a difference of .80, and the assumed standard deviations), I compute that for an effective study one needs approximately eighteen jurisdictions without punitive damages and 212 jurisdictions with punitive damages. Thus, Viscusi's sample is less than one-quarter of the necessary size.

In the hope of shoring up Viscusi's study, let us relax some assumptions. Suppose we are willing to accept a significance level of .1 instead of .05; we are willing to tolerate only a seventy-five percent chance of detecting the effect instead of an eighty percent chance; and we assume that the standard deviation for the punitive damages jurisdictions is three instead of four. We would then need a sample size of approximately nine jurisdictions without punitive damages and 106 with punitive damages. Viscusi's sample would then be only about one-half of what is needed. Reducing the standard deviation for the punitive damages jurisdictions to two would require approximately seven jurisdictions without punitive damages and eighty-three jurisdictions with punitive damages. Reducing this standard deviation to .947, the same as that for the states without punitive damages, would require six states without punitive damages and seventy-one jurisdictions with punitive damages.²³

It is unlikely that Viscusi's experiment could detect socially relevant reductions in toxic chemical accidents, even if they existed.

IV. EXCLUDED VARIABLES

Before a court can award punitive damages there must be a finding of liability and, in the vast majority of cases, an award of compensatory damages. This suggests that interstate variation in liability and damages rules should be accounted for in exploring interstate variation in punitive damage rules' effects.

If fear of large punitive damages awards drives behavior, then caps on punitive awards supply substantial relief from corporations' worst fears about punitive damages. Viscusi himself claims that "damages caps have been the most effective liability reforms."²⁴ And damages caps are fairly widespread. The American Tort Reform Association reports that, as of June 30, 1996, forty-three states allowed punitive damages awards²⁵ and fourteen imposed some form of cap.²⁶ With fourteen states imposing caps, at least some of the states that Viscusi effectively treats as having unlimited punitive awards do not have such awards.

23. In addition to not reporting state-level data for states with punitive damages, Viscusi weights his data in an unspecified manner. Therefore I could not replicate his results.

24. Viscusi, *supra* note 1, at 332. Two studies show a negative correlation between the presence of caps and the level of punitive awards. See Eisenberg & Wells, *supra* note 9, at 9 n.33; Alexander Tabarok & Eric Helland, *The Effect of Electoral Institutions on Tort Awards 20* (1998) (unpublished manuscript, on file with author).

25. I have not tried to reconcile this number with Viscusi's.

26. See AMERICAN TORT REFORM ASSOCIATION, *supra* note 16, at 5. The preferred capping method, relied on by 11 states, is to employ a simple multiple of the compensatory award. Capping multiples range from 1-5.

Viscusi's models ignore this important reform movement. Nowhere in his article does he account for the possible impact of damages caps. The existence of caps on punitive damage awards should be included in Viscusi's study because of the reduction in deterrence that ought to accompany such caps. His model is thus seriously incomplete, even in its consideration of its core characteristic, the legal rules of punitive damages. Furthermore, his model ignores other material differences among state punitive damages regimes, including evidentiary standards and whether portions of punitive damages recoveries must be surrendered to the state.²⁷

Nor does Viscusi's study account for the subtleties of state liability law. The major threat to defendants is not punitive damages, but rather more traditional damages. So long as unlimited traditional damages exist, potential defendants cannot be sure that they will not be struck with huge liability. For over twenty years, business groups have engaged in substantial tort reform lobbying efforts. Many of these efforts resulted in state tort reform legislation. Reform statutes addressed many issues, including limits on recoveries for pain and suffering, modification of joint and several liability, limits on punitive damages, standards governing the award of punitive damages, standards governing liability, and procedural changes. And evidence exists that these tort reform efforts mattered, at least in the sense of affecting case outcomes.²⁸

V. WHERE TO LOOK FOR THE EFFECTS OF PUNITIVE DAMAGES

Punitive damages are most frequently awarded in business/contract cases and intentional tort cases.²⁹ Viscusi's focus on environmental and safety torts³⁰ and medical malpractice and liability cases³¹ may be looking for the effects of punitive damages in the wrong places. Given the state of environmental law in the United States, and the limited role that punitive damages have actually played in medical malpractice and products liability cases, these are especially unlikely places to detect interstate variation in the effects of punitive damages laws.

A. ENVIRONMENTAL LAW

Viscusi's analysis depends on state punitive damage laws providing substantial additional deterrence against polluters. Furthermore, there must be reason to believe that this deterrence varies from state to state. But pollution incidents of the kind Viscusi studies are unlikely candidates for substantial interstate effects. This is because federal law provides a level of baseline deterrence in the

27. *See id.* at 3.

28. *See Eisenberg & Henderson, supra* note 6, at 778. *See also Tabarrok & Helland, supra* note 24, at 20 (accounting for interstate variation in laws).

29. *See Eisenberg et al., supra* note 7, at 635-36.

30. *See Viscusi, supra* note 1, at 290, 292-93 tbls.1 & 2.

31. *See id.*

environmental arena that exceeds what state law could be expected to provide. Viscusi's deterrence model neglects the dominant role of federal law in the area of pollution and toxic wastes.

Consider the range of federal sanctions a potential polluter faces. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA),³² also known as the "Superfund" law, makes all persons who contribute to the release of hazardous substances at a site liable for the costs of cleanup.³³ Potentially liable persons include owners, operators, former owners, generators of substances, and transporters of substances.³⁴ Defenses are extremely limited.³⁵ Liability can be imposed through public or private enforcement.³⁶

A leading hornbook on CERCLA suggests its broad reach: Professor Rodgers describes CERCLA as imposing "a liability regime that is without parallel in U.S. domestic law."³⁷

[T]he Superfund law is best known for a strict and unforgiving liability imposed upon many powerful (and quite surprised entities)—banks that have taken over properties to protect a security interest, corporations with subsidiaries that own polluted properties, unlucky buyers of commercial real estate, chemical and aerospace companies whose wastes were shipped to a dump site years ago, and cities and municipalities who are owners and operators of the local landfill. . . . In one fashion or another, hundreds of billions of dollars of hazardous waste cleanup liabilities are now rotating through the U.S. legal system.³⁸

The Oil Pollution Act of 1990³⁹ imposes penalties on oil pollution that resemble CERCLA.⁴⁰ Damages recoverable under this Act include damages to natural resources, real or personal property, subsistence uses, revenues, profits and earning capacity, and public services such as fire, safety, and health costs.⁴¹ Civil penalties include fines "in an amount of \$25,000 per day of violation or an amount of up to \$1,000 per barrel of oil. . . ."⁴² Gross negligence or willful misconduct increases the penalty ceilings to \$100,000 per day and \$3000 per barrel.⁴³

32. 42 U.S.C. §§ 9601-9675 (1994).

33. See 42 U.S.C.A. § 107(a); CERCLA § 107, 42 U.S.C. § 9607 (1994).

34. See 42 U.S.C. § 107(a).

35. See WILLIAM H. RODGERS, JR., ENVIRONMENTAL LAW 58 (1994).

36. See CERCLA § 107, 42 U.S.C. § 9607; CERCLA § 113(f), 42 U.S.C. § 9613(f).

37. RODGERS, *supra* note 35, at 58.

38. *Id.* at 58-59 (footnotes omitted). "The strict-liability approach of Superfund has shaken the incentive structure of the private business world in ways unimagined by traditional command-and-control regulation." *Id.* at 59.

39. Pub. L. No. 101-380, 104 Stat. 484 (1990).

40. See RODGERS, *supra* note 35, at 382.

41. See *id.*

42. 33 U.S.C. § 1321(b)(7)(A) (1996).

43. See *id.* § 1321(b)(7)(D).

Federal air quality laws also impose penalties and define crimes.⁴⁴ The Clean Air Act authorizes penalties of up to \$25,000 per day for each violation,⁴⁵ makes false reporting or certification criminal,⁴⁶ makes many violations felonies subject to criminal fines and imprisonment,⁴⁷ and establishes crimes based merely on negligent release of hazardous air pollutants.⁴⁸ The knowing release of hazardous air pollutants is punishable by up to fifteen years imprisonment and fines of \$1,000,000 per violation.⁴⁹

The Clean Water Act leaves a bit more room for state-law sanctions to influence behavior,⁵⁰ but it also preempts some traditional state law remedies. Operating under a federal permit system has provided polluters with immunity from state nuisance law reaching across borders.⁵¹ But the Clean Water Act, like other environmental laws, provides powerful federal incentives not to pollute.

Criminal fines for each negligent violation range from \$2500 to \$25,000 per day; the Clean Water Act also authorizes one year imprisonment.⁵² Knowing violations increase fines to between \$5000 and \$50,000 per day of violation, and increase prison terms to a maximum of three years.⁵³ Subsequent offenses can double the penalties.⁵⁴ Companies convicted of Clean Water Act crimes are ineligible for government contracts.⁵⁵ If a Clean Water Act crime involves "knowing endangerment," individuals are subject to fines of up to \$250,000 and fifteen years' imprisonment.⁵⁶ Companies may be fined up to \$1,000,000—with double penalties for subsequent violations.⁵⁷ Merely failing to notify a federal agency of a discharge of oil or other hazardous substances may result in a \$10,000 fine and a five-year prison term.⁵⁸

The Resource Conservation and Recovery Act of 1976, as amended, which deals with hazardous waste,⁵⁹ imposes civil and criminal penalties for its

44. *See, e.g.*, 1990 Clean Air Act Amendments § 701 (codified at 42 U.S.C. § 7413(c)(4)-(5)).

45. *See id.* § 701 (codified at 42 U.S.C. § 7413(b), (d)(1994)).

46. *See id.* § 701, § 113(c) (codified at 42 U.S.C. § 7413(c)(2)(1994)).

47. *See id.* (codified at 42 U.S.C. § 7413(c)(1994)).

48. *See id.* (codified at 42 U.S.C. § 7413(c)(4)(1994)).

49. *See id.* (codified at 42 U.S.C. §§ 7413(c)(5)(A)(1994)).

50. *See* RODGERS, *supra* note 35, at 248 ("The Water Act also ignores largely nonpoint sources of pollution, such as runoff from agricultural and construction sites and groundwater quality, leaving both of these important issues to the common law and state and local regulation.") (footnotes omitted).

51. *See* International Paper Co. v. Ouellette, 479 U.S. 481 (1987).

52. 33 U.S.C. § 1319(c)(1) (1994).

53. *See id.* § 1319(c)(2).

54. *See id.* § 1319(c)(1)-(2).

55. *See id.* § 1368.

56. *Id.* § 1319(c)(3)(A).

57. *See id.* § 1319(c)(3)(A), (c)(4).

58. *See id.* § 1321(b)(5).

59. Hazardous waste is defined in Environmental Protection Agency regulation as:

[A]ny waste or combination of wastes which pose a substantial present or potential hazard to human health or living organisms because such wastes are nondegradable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects.

violation.⁶⁰ These include civil penalties of \$25,000 per day per violation,⁶¹ criminal penalties for unlawful treatment of hazardous wastes that can be up to \$50,000 per day per violation and imprisonment of up to two years,⁶² and criminal penalties for knowing endangerment that include fines of up to \$1,000,000 and prison terms of up to fifteen years.⁶³

The system of federal environmental laws does not leave much room for added deterrence in the areas so central to Viscusi's study.

B. PRODUCTS LIABILITY AND MEDICAL MALPRACTICE

Viscusi's search for punitive damages' deterrent effect in medical malpractice and products liability data is also an uphill struggle. In this case, it is not because federal law dominates in these areas; the vast majority of medical malpractice cases are brought under state law in state court⁶⁴ and most products liability cases are filed in state court.⁶⁵ The problem is instead studies have not shown that punitive damages play a major role in either area.

Neil Vidmar reports that only two cases in a sample of about 1300 North Carolina medical malpractice cases led to punitive damages awards.⁶⁶ Several other studies, including one in which I participated, found punitive awards in medical malpractice cases to be quite rare.⁶⁷

CONCLUSION: THE NEED FOR A MORE FINELY TUNED NATURAL EXPERIMENT

Viscusi argues that interstate variation in the availability of punitive damages provides a natural experiment. He has not made a persuasive case that such an experiment exists. A natural experiment occurs when all relevant variables, other than the variable under study, are accounted for by the "natural" state of affairs—there is thus no need for experimental manipulation. For example, random assignment of cases to federal judges assures that, given a large enough

40 C.F.R. § 240.101(m) (1997).

60. See 42 U.S.C. § 6928 (1986).

61. See *id.* § 6928(a)(3), (c), (g).

62. See *id.* § 6928(d).

63. See *id.* § 6928(e).

64. See Theodore Eisenberg, et al., *Litigation Outcomes in State and Federal Courts: A Statistical Portrait*, 19 SEATTLE U. L. REV. 433, 441 tbl.3 (1996).

65. See *id.*

66. See VIDMAR, *supra* note 8, at 254.

67. See Eisenberg et al., *supra* note 7, at 633-37 (summarizing studies and reporting the results of a study that included one year of state court data from 45 of the nation's 75 most populous counties). The infrequency of punitive damages awards may lead one to wonder: can punitive damages serve a useful function in areas in which they are rarely awarded? Thomas Koenig and Michael Rustad find them to be both rare and justified in the individual opinions they inspected. See Thomas Koenig & Michael Rustad, *His and Her Tort Reform: Gender Injustice in Disguise*, 70 WASH. L. REV. 1 (1995). The story with respect to products liability is not much different. See Eisenberg et al., *supra* note 7, at 647, 655. So punitive damages may well serve the function of punishing culpable wrongdoing in these areas even though macro-level deterrent effects may be hard to detect.

number of cases in the same federal district, differences in case outcomes can fairly be attributed to differences among judges.⁶⁸ The random assignment method, combined with a single set of governing laws, thus provides a true natural experiment through which to study differences in case outcomes.

Interstate variation with respect to punitive damages does not, standing alone, provide such a natural experiment. Viscusi acknowledges as much in his Appendix when he controls for interstate variation in manufacturing density, income, industry employees, and political attitudes.⁶⁹ But he does not account for interstate variation in relevant tort and punitive damages rules.

Even if Viscusi had controlled for all relevant factors and avoided the erroneous characterization of punitive damages rules, his sample is too small to detect meaningful effects. Therefore, his failure to detect an effect provides little useful guidance for policymakers.

68. See Orley Ashenfelter et al., *Politics and the Judiciary: The Influence of Judicial Background on Case Outcomes*, 24 J. LEGAL STUD. 257-81 (1995); Richard L. Revesz, *Environmental Regulation, Ideology, and the D.C. Circuit*, 83 VA. L. REV. 1717 (1997).

69. See Viscusi, *supra* note 1, at 336-45.