

TORT REFORMS' WINNERS AND LOSERS:
THE COMPETING EFFECTS OF CARE AND ACTIVITY LEVELS

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This Article explores the relationship between medical malpractice tort reforms and death rates. Investigating this relationship is important both because of the frequent political conflict over such reforms and because medical malpractice causes tens of thousands of deaths each year. I first develop predictions from law and economics theory about medical malpractice tort reforms' care-level and activity-level impacts on death rates. I test the theoretical predictions using extensive data and sophisticated regressions. I find that the net effect varies by reform: Some reforms are associated with increases in death rates, while others are associated with decreases in death rates. These results confirm that the tort reforms' care-level effects and activity-level effects are both important. My results also suggest that the reforms may produce three unintended consequences. First, two of the reforms are associated with increases in death rates. Second, because doctors relocate to tort reform states, tort reforms in one state are associated with increases in deaths in neighboring nonreform states. Third, these reforms disproportionately harm women. They not only disproportionately reduce women's tort judgments, but they are also associated with increases in women's death rates. I conclude by proposing modifications to the reforms that would retain their benefits, but reduce their harms.

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INTRODUCTION

Tort reform has provoked political warfare for at least three decades. Medical malpractice tort reforms in particular have sparked battles at both the state and federal levels. In the states, hundreds of medical malpractice tort reforms have been enacted, although courts have struck a number

of them down.¹ The U.S. Congress has considered more than twenty bills that propose federal medical malpractice reforms.² The armies on both sides have been reinforced by powerful interest groups such as the American Trial Lawyers Association, the American Association of Health Plans, the American Medical Association, and the Pharmaceutical Research and Manufacturers of America. These groups spend hundreds of millions of dollars on the issue each year.³

Proponents of tort reform argue that the current medical liability system is in crisis. They assert that exorbitant damage awards have led to soaring insurance rates, a shortage of both doctors and life-saving procedures, and, in turn, worsening health outcomes. According to these proponents, the only cure is tort reform. A small but growing group of empirical studies is beginning to confirm some of these claims. Evidence now suggests that tort reforms reduce insurance premiums and increase the supply of doctors and procedures. A few studies have even shown that tort reforms produce some improvements in health outcomes such as infant mortality.

This Article studies the relationship between medical malpractice tort reforms and death rates. This is an especially important area of study because medical malpractice causes large numbers of injuries and deaths. Approximately one of every one hundred hospital admissions will become a victim of medical malpractice.⁴ Each year in the United States, at least

1. See generally Ronen Avraham, *Database of State Tort Law Reforms (DSTLR, 2nd)* (Nw. Univ. Sch. of Law, Law & Econ. Research Paper Series, No. 06-08, 2006), available at <http://ssrn.com/abstract=902711>.

2. Ronen Avraham lists sixteen of these bills in his paper, Ronen Avraham, *An Empirical Study of the Impact of Tort Reforms on Medical Malpractice Settlement Payments* 19 (Nw. Univ. Sch. of Law, Law & Econ Research Paper Series, No. 06-07, 2006), available at <http://www.ssrn.com/abstract=912922>. In addition, Congress recently considered H.R. 3509, 110th Cong. (2007); H.R. 2626, 110th Cong. (2007); S. 244, 110th Cong. (2007); H.R. 2580, 110th Cong. (2007); S. 243, 110th Cong. (2007). See also Nat'l Conference of State Legislatures, 2003-2004 Federal Medical Malpractice Action, <http://www.ncsl.org/standcomm/sclaw/0304medmalsumm.htm> (last visited Feb. 15, 2008); Nat'l Conference of State Legislatures, Medical Malpractice Tort Reform, <http://www.ncsl.org/standcomm/sclaw/medmaloverview.htm> (last visited Feb. 15, 2008).

3. See The Ctr. for Pub. Integrity, LobbyWatch: Top 100 Companies and Organizations, <http://www.publicintegrity.org/lobby/top.aspx?act=topcompanies> (last visited Feb. 15, 2008).

4. See David M. Studdert et al., *Beyond Dead Reckoning: Measures of Medical Injury Burden, Malpractice Litigation, and Alternative Compensation Models From Utah and Colorado*, 33 IND. L. REV. 1643, 1647-48 (2000) (providing data from 1976 to 1992).

25,000 of these victims die, and possibly as many as 120,000.⁵ In contrast, traffic crashes kill fewer than 45,000 people a year.⁶

I first develop predictions from law and economics theory about the relationship between medical malpractice tort reforms and death rates. In contrast to many types of tort liability, medical malpractice liability produces care-level effects and activity-level effects that have opposing impacts on death rates. On the one hand, increased liability should increase doctors' incentives to take care, decreasing deaths from medical malpractice; on the other hand, increased liability should reduce doctors' willingness to supply their services, increasing death rates. The opposite holds true for tort reform: Tort reform may reduce doctors' incentives to take care, but may increase doctors' incentives to supply their services. Thus, theoretical prediction of medical malpractice tort reforms' net impact on death rates is ambiguous. Throughout the Article, I further develop this theory to show that, in different situations, the conflicting care-level and activity-level effects should combine to produce different net impacts of tort reform.

To test the theoretical predictions, I use the most accurate, comprehensive state-level data from 1981–2000 on medical malpractice tort reforms and a host of other variables. I perform a series of multivariate regressions to measure the relationship between various tort reforms and non-motor-vehicle, accidental death rates. Although a more precise measure of medical malpractice deaths is not available for my sample period, these death rates include both deaths from medical malpractice and deaths that originate as accidental injuries but become deaths at the hospital, often from substandard care.⁷

The empirical analysis yields three main results. First, the impact on the death rates varies by reform: Some reforms are associated with increases in death rates, while others are associated with decreased death rates. The results suggest that for some tort reforms, the harms from the reduced incentives for doctors and hospitals to take care dominate the benefits from the increased supply of physicians and medical procedures. In contrast, for other reforms, the benefits from doctors' increased activity levels outweigh harms from reduced care levels.

5. See *id.* at 1660. The 25,000 figure is from a study of hospitalizations in Colorado and Utah. See *id.* at 1660, 1657. Studies in New York resulted in the higher national estimate of 120,000 annual deaths attributable to negligence. See *id.* at 1660, 1649 (providing data from the 1990s).

6. See Nat'l Highway Traffic Safety Admin., Fatality Analysis Reporting System Encyclopedia, <http://www-fars.nhtsa.dot.gov> (last visited Feb. 15, 2008).

7. See *infra* text accompanying notes 98–100 (discussing the data and their limitations).

Second, my results show that at least one reform—noneconomic damage caps—is associated with a statistically significant increase in deaths in neighboring nonreform states. This finding suggests that when doctors reduce their activity level in nonreform states by relocating to states with tort reform, the resulting harms to health outcomes are greater than any improvements in health outcomes resulting from relatively higher care levels in nonreform states. Moreover, the increase in the number of deaths in neighboring states without noneconomic damage caps is almost as large as the decrease in the number of deaths in the states with noneconomic damage caps. Thus, my results suggest that this medical malpractice reform produces little net benefit: The benefits in one state seem to be offset almost entirely by harms in another.

Third, my results suggest that these tort reforms are associated with decreases in the death rate for men, but increases in the death rate for women. This is not the only disproportionate harm that tort reforms have on women; scholars have long known that tort reforms such as noneconomic damage caps and punitive damage reforms disproportionately reduce the size of tort judgments to women.

My three main results confirm that medical malpractice tort reforms' care-level and activity-level effects are both important, and the relative importance of each varies by reform. Moreover, my results reveal several unintended consequences of these tort reforms: Some reforms increase death rates in the reforming states, some reforms increase death rates in neighboring nonreform states, and some reforms disproportionately harm women's health outcomes. The picture of tort reform that emerges is of a system that provides some benefits, but may also unexpectedly impose several harms. In my final Part, I propose several modifications to the reforms that attempt to realize the benefits while reducing the harms.

I. TORT LAW AND TORT REFORM

A primary argument of proponents of tort reform is that the tort system fails to achieve its stated objectives. So that we can understand tort reform and its impacts, I first briefly describe tort law's primary functions: compensation and deterrence. Next, I discuss how different types of damage awards achieve these functions. I then review the arguments that advocates of tort reform make to show that the current tort system fails to achieve these functions.

A. Functions of Tort Law

Tort scholars have long focused on two main functions of the tort system: compensation and deterrence.⁸ The function of compensation is to reimburse a victim for her losses from the tortious act, and to restore her to her condition before the act.⁹ For example, the tort system might seek to compel the surgeon who botches an operation to reimburse the victim for both the additional medical bills and the pain and suffering that resulted from the surgeon's mistakes.

Deterrence is the function of tort law by which the law creates incentives that induce people to avoid inappropriately dangerous activities.¹⁰ Deterrence theories advanced by legal and economic scholars assume that rational potential tortfeasors weigh the costs and benefits of their actions, and that they take only actions whose benefits exceed the costs.¹¹ This balancing is accomplished in two steps. People first weigh the costs and benefits of engaging in a dangerous activity at all. If they choose to participate, they then weigh the costs and benefits of taking additional precautions to reduce the risk of imposing harm.

8. See, e.g., John C.P. Goldberg, *Twentieth Century Tort Theory*, 91 GEO. L.J. 513, 514–37, 544–53 (2003). For a discussion of other proposed functions of tort law, such as enterprise liability and social justice, see Joseph H. King, Jr., *Pain and Suffering, Noneconomic Damages, and the Goals of Tort Law*, 57 S.M.U. L. REV. 163, 180–201 (2004).

9. See, e.g., DAN B. DOBBS, *THE LAW OF TORTS* § 10, at 17 (2000) (“Compensation of injured persons is one of the generally accepted aims of tort law. Payment of compensation to injured persons is desirable. If a person has been wronged by a defendant, it is just that the defendant make compensation. Compensation is also socially desirable, for otherwise the uncompensated injured persons will represent further costs and problems for society.”); Daniel W. Shuman, *The Psychology of Compensation in Tort Law*, 43 U. KAN. L. REV. 39, 45 (1994) (“The commonly understood goal of tort compensation is to restore the injured to their preaccident condition, to make them whole.”); Steven D. Smith, *The Critics and the “Crisis”: A Reassessment of Current Conceptions of Tort Law*, 72 CORNELL L. REV. 765, 769 (1987) (“[I]njured plaintiffs should receive an amount necessary to make them ‘whole,’ that is, to restore them to the position they would have occupied but for the defendant’s tortious conduct.”).

10. See, e.g., KENNETH S. ABRAHAM, *THE FORMS AND FUNCTIONS OF TORT LAW* 206 (2d ed. 2002); PETER CANE, *ATYIAH’S ACCIDENTS, COMPENSATION AND THE LAW* 361–62 (William Twining & Christopher McCrudden eds., 6th ed. 1999) (“[O]ne of the most important of the suggested functions of personal injuries compensation law is deterrence.”); Richard L. Abel, *A Critique of Torts*, 37 UCLA L. REV. 785, 808 (1990) (“At least since Learned Hand offered his famous formula . . . judges, lawyers, and legal scholars have argued that fear of liability will compel potential tortfeasors to engage in a cost-benefit analysis, taking just those safety precautions that cost less than the accidents they prevent.”); Daniel W. Shuman, *The Psychology of Deterrence in Tort Law*, 42 U. KAN. L. REV. 115, 131 (1993).

11. See Goldberg, *supra* note 8, at 545.

Thus, deterrence is composed of two components: effects on the level of activity and effects on the level of care.¹² Both activity and care levels affect the risk of accidents. Activity level refers to how much the potential tortfeasor engages in the activity. Care level includes any precautions a potential tortfeasor might take to reduce the risk of accidents in a given amount of activity. For example, for an automobile driver, activity level refers to how much the person drives. Care level refers to how cautiously the driver proceeds (driving slowly, using blinkers) each time he drives.

Changes in either activity level or care level can change the risks that the driver imposes on others. For example, a driver increases risk for others either by driving more often or by driving less carefully. Similarly, a surgeon who is deciding whether to perform a certain operation will consider, among other things, her potential liability if things go awry. If she decides to proceed with the operation (an activity-level behavior), potential liability will also cause her to choose carefully the precautions that she will take during the operation (care-level behaviors), such as the number of assistants present and the amount of expensive tests to which the patient is subjected beforehand.

If changes in the liability system increase potential liability, thereby increasing the costs of engaging in dangerous activities, some potential tortfeasors may completely cease their activity levels. For example, in response to increased liability, some OB/GYNs may reduce their number of high-risk deliveries, switch to a straight gynecology practice, or even leave the state. Even if the increase in potential liability does not cause the potential tortfeasor to reduce or even cease the activity, she may respond by increasing her care level, or taking more precautions to reduce risks. For example, she may more conscientiously keep abreast of the latest treatments or she may order more tests.

The interaction of activity-level effects and care-level effects determines the health risks associated with the potential tortfeasor's activity. Looking at care levels first, an increase in liability should cause care to increase, decreasing the number of accidents and improving health outcomes.¹³

12. See ROBERT COOTER & THOMAS ULEN, *LAW & ECONOMICS* 323–28 (4th ed. 2004).

13. The only situation in which increased care might lead to worse health outcomes would be where increased liability causes people to act more cautiously in a way that indirectly increases injuries. For example, high liability might cause drivers to reduce their driving speed. The direct effect will be to reduce injuries from auto accidents. However, the reduced speed may indirectly increase injuries if the drivers were husbands delivering wives in labor to hospitals or ambulance drivers delivering patients. However, I expect that these situations are rare, so the net effect of an increase in care should be to worsen health outcomes.

Turning to activity levels, although increased liability can be expected to reduce activity levels, this reduction's impact on health outcomes is theoretically indeterminate, depending on the type of activity and the relationship between potential tortfeasors and victims. For example, for an activity like driving, increased liability should give drivers the incentive to drive less, and therefore cause fewer accidents. However, for an activity like practicing medicine, increased liability might worsen health outcomes if increased liability causes doctors to leave the state or quit their practices.

Similarly, if potential victims consider purchasing goods and services from potential tortfeasors, increases in liability could worsen health outcomes. If increases in liability induce strong increases in care levels, market forces may transform the increased care into decreases in activity. The increased care will increase producers' costs, ultimately leading to increases in the prices that consumers pay. This in turn may lead some consumers to stop purchasing safe products and services. That is, producers' activity levels will decline. A consumer may make do with an old child's car seat, rather than purchase a new one. The husband of a pregnant woman may drive her to the hospital himself, rather than use an expensive ambulance. Or, a sick patient may no longer be able to afford an operation that would reduce her chance of death.

In the next Part, I develop much more fully how both the activity-level effects and care-level effects produced by tort reform interact to determine the relationship between reforms and death rates.

B. How Damages Achieve the Functions of Tort Law

Compensatory damages, as distinct from punitive damages, are meant to achieve both compensation and deterrence.¹⁴ Although they are called "compensatory," they can achieve both goals. First, they compensate the victim in order to return him to his condition before he was injured. Second, requiring the tortfeasor to pay the victim compensatory damages deters the tortfeasor from engaging in inappropriately dangerous activities. The expectation of paying compensatory damages forces a potential tortfeasor to internalize the costs of his dangerous activity. That is, because he expects to pay for the harm he imposes on others, he will consider the cost of that harm as he weighs the costs and benefits of engaging in the activity. The higher the compensatory damages he expects to pay,

14. See COOTER & ULEN, *supra* note 12, at 320–33.

the greater the cost of engaging in the dangerous activity, and the less likely he will engage in the activity without proper precautions.¹⁵

Other categories of damage awards may achieve one of the goals, but not the other. For example, punitive damages are awarded not to compensate victims, but to punish defendants for intentional and malicious conduct and to deter future conduct.¹⁶ They provide more to the victim than is necessary for full compensation.

The additional amounts beyond compensation may be necessary to achieve adequate deterrence of either especially egregious behavior or behaviors where the probability of detecting negligence is low.¹⁷ Suppose that in only a fraction of cases the victim discovers that her injuries were caused by tortious conduct and sues. For example, studies have shown that in only a small proportion of cases do victims of medical malpractice even discover that their doctors have erred, much less file a lawsuit.¹⁸ To achieve adequate deterrence, damages in the few suits that are filed must exceed the compensatory level. Otherwise, the potential tortfeasor may recognize that most of the time he pays nothing, and only rarely pays the compensatory amount; the average that he faces is much less than the compensatory amount. Because he is not internalizing the full costs of his actions on others, he will either engage in dangerous activities too frequently or take insufficient precautions when he does engage in them. By raising liability costs in the few suits that succeed, punitive damages can increase deterrence to the appropriate level.¹⁹

Likewise, although critics of noneconomic damages argue that recovery for pain and suffering serves no compensatory purpose,²⁰ damage awards that may not be necessary for compensation are still necessary for deterrence. The pain and suffering from disfigurement and emotional

15. For evidence of the tort system's deterrent effect, see Gary T. Schwartz, *Reality in the Economic Analysis of Tort Law: Does Tort Law Really Deter?*, 42 UCLA L. REV. 377, 381–87 (1994). Many other scholars doubt the effectiveness of the deterrent effect of tort liability. See King, *supra* note 8, at 188–92.

16. See, e.g., *BMW of N. Am., Inc. v. Gore*, 517 U.S. 559, 568 (1996) (“Punitive damages may properly be imposed to further a State’s legitimate interests in punishing unlawful conduct and deterring its repetition.”).

17. See COOTER & ULEN, *supra* note 12, at 371–76.

18. See, e.g., HARVARD MED. PRACTICE STUDY, PATIENTS, DOCTORS AND LAWYERS: MEDICAL INJURY, MALPRACTICE LITIGATION, AND PATIENT COMPENSATION IN NEW YORK 41 (1990); PAUL C. WEILER ET AL., A MEASURE OF MALPRACTICE: MEDICAL INJURY, MALPRACTICE LITIGATION, AND PATIENT COMPENSATION 61–76 (1993).

19. The appropriate level of deterrence, or the efficient level, should result when a potential tortfeasor weighs all of the costs and benefits of his actions. For a discussion of this basic theory of deterrence, see COOTER & ULEN, *supra* note 12, at 320–22.

20. See *infra* note 26 and accompanying text.

and physical trauma are not imaginary. Although they may not impose monetary costs on victims, they are real damages that impose real harms. In order to be induced to take adequate precautions, a potential tortfeasor should be compelled to consider the cost of the nonpecuniary harm he imposes on others when he is weighing costs and benefits and deciding whether to engage in a potentially dangerous activity. The only way to make a potential tortfeasor internalize the nonpecuniary harms he imposes on others is to make him pay for them with noneconomic damages. If he is not compelled to pay the damages, he will be underdeterred, because he will not consider all of the costs that his conduct imposes.²¹

As an extreme illustration of this point, consider a potentially dangerous activity that imposes only nonpecuniary harms: an obstetrical surgeon performing a procedure that could make a woman infertile. Because infertility resulting from negligence is typically considered a nonpecuniary harm that is compensated through noneconomic damages,²² it is essential that the surgeon expect to pay for these noneconomic damages in order to induce him to take appropriate precautions during the surgeries. If nonpecuniary harms were not compensable, then there would be little incentive for the surgeon to take measures to reduce the risk of infertility.

C. The Tort System's Purported Flaws and Tort Reform

Proponents of tort reform argue that the following aspects of the tort systems in many states hinder achievement of the goals of deterrence and compensation. As might be expected, opponents challenge these arguments, asserting instead that tort reform is a selfish attempt by groups that are frequently sued to evade their responsibilities to their victims.²³ They argue that it is unfair that the defendants—often large companies or rich doctors—would enrich themselves by escaping liability for legitimate, real injuries that their own mistakes and intentional conduct have imposed on the public.²⁴

21. See *Kwasny v. United States*, 823 F.2d 194, 197 (7th Cir. 1987) (“If [pain and suffering] were not recoverable in damages the cost of negligence would be less to the tortfeasors and there would be more negligence, more accidents, more pain and suffering, and hence higher social costs.”).

22. See Lucinda M. Finley, *The Hidden Victims of Tort Reform: Women, Children, and the Elderly*, 53 EMORY L.J. 1263, 1266 (2004).

23. See, e.g., Ralph Nader, *Double Talk on Tort Reform*, LEGAL TIMES, May 8, 1995, at 24, available at <http://www.lectlaw.com/files/civ03.htm>.

24. *Id.*

1. Noneconomic Damages

Perhaps the loudest criticisms of the current tort system are centered on the imposition of damages for noneconomic losses. Noneconomic damages, discussed briefly above, are damages for nonpecuniary losses such as pain and suffering, loss of consortium, emotional distress, and other intangible losses. In 2005, twenty-four states had caps on noneconomic damages.²⁵

One argument is that such damages should not be recoverable at all. Critics assert that these awards cannot compensate for nonpecuniary harms, which, by definition, result in no monetary loss. They claim that no amount of money can eliminate pain, and money cannot possibly return a victim to his position before the injury.²⁶

Critics also claim that a tort system that provides noneconomic damages is, in effect, requiring everyone in society to pay for insurance to cover such losses. Sellers who become liable for noneconomic damages will pass their costs on to all consumers through higher prices, so that everyone will end up paying for them. Critics argue that most people do not want this mandatory insurance for nonpecuniary losses, given that they do not purchase insurance coverage for other nonpecuniary harms, such as life insurance for the loss of a child.²⁷ In contrast, other scholars find indirect evidence that individuals would demand and pay for some level of insurance for nonpecuniary harm, if such insurance existed.²⁸

25. Avraham, *supra* note 1, at 8.

26. See, e.g., CANE, *supra* note 10, at 354 (“[W]hen all has been done to minimise the pain and suffering by medical means, any residual pain and suffering cannot be shifted: it remains with the victim, no matter what compensation is paid to that person by others.”); Abel, *supra* note 10, at 802 (arguing that the primary justification for tort damages “is hopelessly incoherent—money cannot restore victims to their status quo before the accident” and that “money is a poor equivalent for non-pecuniary loss”).

27. See, e.g., John E. Calfee & Paul H. Rubin, *Some Implications of Damages Payments for Nonpecuniary Losses*, 21 J. LEGAL STUD. 371 (1992); Robert Cooter, *Towards a Market in Unmatured Tort Claims*, 75 VA. L. REV. 383, 392 (1989) (“[A] rational person would insure only against that pain and suffering that curtailed earnings.”); Alan Schwartz, *Proposals for Product Liability Reform: A Theoretical Synthesis*, 97 YALE L.J. 353, 362–67 (1988).

28. See, e.g., Ronen Avraham, *Should Pain-and-Suffering Damages Be Abolished From Tort Law? More Experimental Evidence*, 55 U. TORONTO L.J. 941, 942–43, 977 (2005); Steven P. Croley & Jon D. Hanson, *The Nonpecuniary Costs of Accidents: Pain-and-Suffering Damages in Tort Law*, 108 HARV. L. REV. 1785 (1995) (using indirect evidence to conclude that consumers are likely to demand some level of pain-and-suffering insurance, and, therefore, tort law should provide pain-and-suffering damages); Patricia M. Danzon, *Tort Reform and the Role of Government in Private Insurance Markets*, 13 J. LEGAL STUD. 517, 522–33 (1984) (analyzing insurance markets to conclude that serious pain-and-suffering injuries should be awarded damages).

Another argument advanced by proponents of tort reform is that, because noneconomic damages are arbitrary and random, caps on these damages should be imposed to make them more predictable. Although research shows that noneconomic damage awards are not entirely random,²⁹ they do exhibit stunning variation and unpredictability. For example, one study suggests that the severity of harm explains only about 40 percent of the variation in damage awards in personal injury cases. This leaves enormous variation in awards that is random and unexplained. For example, awards for the most serious permanent injuries range in value from approximately \$147,000 to \$18,100,000.³⁰

Unpredictability creates at least four harms. First, unpredictability may make it more difficult to reach settlements. Because the uncertainty makes accurate prediction of jury awards impossible, it is difficult for lawyers to advise their clients on appropriate settlement amounts.³¹ Litigants may also forgo settlement in order to roll the dice on winning a high award.

Second, uncertainty can cause insurers to charge potential tortfeasors "ambiguity premiums" that increase insurance prices.³² This might cause potential tortfeasors to forgo activities in which they otherwise would engage if they could obtain lower-priced insurance.³³

Third, deterrence and compensation may both be inadequate if excessively high awards push tortfeasors into bankruptcy.³⁴ The tort system

29. See, e.g., Randall R. Bovbjerg et al., *Valuing Life and Limb in Tort: Scheduling "Pain and Suffering,"* 83 NW. U. L. REV. 908, 920–23 (1989) (showing empirically that pain-and-suffering awards are not entirely random); W. Kip Viscusi, *Pain and Suffering in Product Liability Cases: Systematic Compensation or Capricious Awards?*, 8 INT'L REV. L. & ECON. 203, 205–19 (1988) (showing empirically that there is a pattern to pain-and-suffering awards; more severe injuries result in higher pain-and-suffering damages).

30. Bovbjerg et al., *supra* note 29, at 922–23; see also Mark Geistfeld, *Placing a Price on Pain and Suffering: A Method for Helping Juries Determine Tort Damages for Nonmonetary Injuries*, 83 CAL. L. REV. 773, 777 (1995) (asserting that there is substantial variability in jury awards for pain and suffering for injuries of equal severity); David W. Leebron, *Final Moments: Damages for Pain and Suffering Prior to Death*, 64 N.Y.U. L. REV. 256, 288–325 (1989) (analyzing pain-and-suffering awards in 256 wrongful death cases and concluding that there is a lack of horizontal equity in awards).

31. See, e.g., COOTER & ULEN, *supra* note 12, at 406–08.

32. Howard Kunreuther & Robin M. Hogarth, *How Does Ambiguity Affect Insurance Decisions?*, in CONTRIBUTIONS TO INSURANCE ECONOMICS 307, 321 (Georges Dionne ed., 1992) ("A principal conclusion emerging from surveys of actuaries and underwriters is that they will add an ambiguity premium in pricing a given risk whenever there is uncertainty regarding either the probability or losses.")

33. See Common Sense Product Liability and Legal Reform Act of 1995, H.R. 956, 104th Cong. § 2(a)(5) (1995) ("[A]s a result of excessive, unpredictable, and often arbitrary damage awards . . . consumers have been adversely affected through the withdrawal of products, producers, services, and service providers from the national market.")

34. See, e.g., COOTER & ULEN, *supra* note 12, at 358–59.

cannot deter a judgment-proof defendant. Nor can such a defendant provide optimal compensation, or any compensation at all.

Fourth, the uncertainty may create excessive deterrence if potential defendants are risk averse. A risk-averse physician may leave a state or shift to another specialty because of the possibility, regardless how remote, of a damages award that will consume all his assets.³⁵

Against these arguments, opponents of tort reform respond that noneconomic damages represent real injuries and real suffering. Limiting or eliminating their recovery reduces both compensation and deterrence.³⁶

2. Punitive Damages

Opponents raise many of these same objections to punitive damages, and state legislatures have responded. As of 2005, forty-four states had adopted either caps on punitive damages or more stringent evidence requirements for awarding them.³⁷

Critics of punitive damage awards point to the recent U.S. Supreme Court decision in *State Farm Mutual Automobile Insurance Co. v. Campbell*.³⁸ The Court found that a punitive damage award of \$145 million was excessive and violated the Due Process Clause of the Fourteenth Amendment because compensatory damages were only \$1 million.³⁹ Critics also argue that the arbitrary and unpredictable imposition of awards has distorted the settlement process.⁴⁰ Moreover, as with noneconomic damages, punitive damage awards' unpredictability may undermine their deterrent function.⁴¹

35. See Daniel L. Rubinfeld, *On Determining the Optimal Magnitude and Length of Liability in Torts*, 13 J. LEGAL STUD. 551, 556–57 (1984).

36. See *supra* note 21 and accompanying text.

37. See Avraham, *supra* note 1.

38. 538 U.S. 408 (2003).

39. *Id.* at 412, 429 (“The punitive award of \$145 million, therefore, was neither reasonable nor proportionate to the wrong committed, and it was an irrational and arbitrary deprivation of the property of the defendant.”); see also *Pac. Mut. Life Ins. Co. v. Haslip*, 499 U.S. 1, 42 (1991) (O’Connor, J., dissenting) (“Punitive damages are a powerful weapon. Imposed wisely and with restraint, they have the potential to advance legitimate state interests. Imposed indiscriminately, however, they have a devastating potential for harm. Regrettably, common-law procedures for awarding punitive damages fall into the latter category.”).

40. See, e.g., Am. Tort Reform Ass’n, *Punitive Damages Reform*, <http://www.atra.org/issues/index.php?issue=7343> (last visited Feb. 16, 2008) (“The difficulty of predicting whether punitive damages will be awarded by a jury in any particular case, and the marked trend toward astronomically large amounts when they are awarded, have seriously distorted settlement and litigation processes and have led to wildly inconsistent outcomes in similar cases.”).

41. See Rubinfeld, *supra* note 35, 556–57.

Supporters respond that punitive damage awards are very infrequent⁴² (although others suggest that they have increased in frequency and size in recent years⁴³). Moreover, as already discussed, punitive damages may be necessary to create sufficient deterrence.⁴⁴

3. Total Damages

The belief exists in some states that not only are noneconomic damages and punitive damages excessive, but that compensatory damages are also too large. According to this view, overly generous juries ignore facts and law and award excessive compensatory judgments.⁴⁵ The result is excessive deterrence and an unfair redistribution of wealth to plaintiffs. As of 2005, six states had capped total damage awards, but only in medical malpractice cases.⁴⁶

Opponents of tort reform argue that caps on total damages are an unprincipled attempt by corporations, doctors, and other groups that are frequently sued to escape liability for the injuries that they cause.⁴⁷ Such caps leave deserving plaintiffs who have been horrifically injured without compensation not only for noneconomic damages, but also for some of their medical bills and other out-of-pocket costs.

4. Collateral Source Rule

Other critics of the current tort system argue that damage awards sometimes exceed the value of the harm to victims, and thus place victims

42. See, e.g., Michael Rustad & Thomas Koenig, *Reconceptualizing Punitive Damages in Medical Malpractice: Targeting Amoral Corporations, Not "Moral Monsters,"* 47 RUTGERS L. REV. 975, 1006 (1995) (finding that, in 1988, the most active year for medical malpractice punitive damage awards in their study, there were only thirty-three of these verdicts nationwide).

43. See, e.g., Am. Tort Reform Ass'n, *supra* note 40 ("While punitive damages awards are infrequent, their frequency and size have grown greatly in recent years. More importantly, they are routinely asked for today in civil lawsuits."). *But cf.* Michael L. Rustad, *Nationalizing Tort Law: The Republican Attack on Women, Blue Collar Workers, and Consumers*, 48 RUTGERS L. REV. 673, 758–59 (1996) (concluding that punitive damages are not out of control).

44. See *supra* notes 16–19 and accompanying text.

45. See, Ctr. for Progressive Reform, Tort Reform, <http://www.progressiveregulation.org/perspectives/tortReform.cfm> (last visited Mar. 9, 2008) (noting that "Americans are warned of a 'litigation explosion' in which increasing numbers of plaintiffs are seeking to win the 'lawsuit lottery' by receiving an 'out of control jury verdict'" but that "studies . . . suggest that the awards of juries are not 'out of control'").

46. Avraham, *supra* note 1, at 8.

47. See, e.g., Erick Fajardo, *Debunking the Benefits of Tort Reform*, THE DAILY TEXAN, Aug. 29, 2003, available at <http://media.www.dailytexanonline.com/media/storage/paper410/news/2003/08/29/Opinion/Debunking.The.Benefits.Of.Tort.Reform-454553.shtml>.

in a position that is better than their preaccident position. For example, they argue that the collateral source rule, which common law courts developed in the nineteenth century when insurance became more popular, promotes double recovery by victims. The traditional collateral source rule prevents the admission of evidence at trial that shows that a plaintiff's losses have been compensated by other sources, such as insurance or workers' compensation. The rationale is that a defendant should not benefit merely because the plaintiff had the foresight to purchase insurance. Although the rule efficiently promotes deterrence by requiring a tortfeasor to pay damages even when a victim has received payments from a source other than the tortfeasor, a plaintiff's award may exceed the value of the harm he suffered.⁴⁸

Reforms to collateral source rules include allowing evidence of collateral source payments or completely offsetting awards by the amount of collateral source payments.⁴⁹ In 2005, thirty-three states had collateral source reforms in place.⁵⁰

Opponents argue that this is yet another unprincipled attempt by corporations and doctors to avoid their liability. It is not fair that a plaintiff who has carefully paid premiums for years and fully insured himself should receive no damages from a negligent defendant, while an irresponsible plaintiff who has not insured himself should receive full damages.

5. Joint and Several Liability

Critics also argue that in torts involving multiple defendants, traditional joint and several liability can distribute the burden of the damages unfairly among the defendants. Under traditional joint and several liability rules, a plaintiff can recover the full cost of her injury from any party who is partially responsible for the injury, no matter how small the party's responsibility. This allows plaintiffs to collect all of their damages from a deep-pocket defendant, even if that defendant contributed only modestly to causing the damages. The deep-pocket defendant can sue the other tortfeasors for contribution to seek reimbursement of

48. See Am. Tort Reform Ass'n, Collateral Source Rule Reform, <http://www.atra.org/issues/index.php?issue=7344> (last visited Feb. 16, 2008) ("The collateral source rule keeps important information relevant to the determination of damages from reaching the jury. It allows plaintiffs to be compensated twice for the same injury.").

49. See Avraham, *supra* note 1.

50. *Id.* at 8.

the other tortfeasors' share of the damages. But such cross-claims are often fruitless because the other tortfeasors often lack resources.

Critics argue that these rules are unfair because they fail to distribute liability equitably among defendants. In addition, they preclude optimal deterrence. The deep-pocket defendant is deterred excessively; the large damages that he must pay may cause him to pay for excessive precautions, or to cease offering the good or services completely. The other tortfeasors are deterred inadequately; because the deep-pocket defendant pays for the damages that the others cause, the other tortfeasors do not pay for the full costs that their conduct imposes.⁵¹

By 2005, forty states had reforms to joint and several liability.⁵² Most reforms to the standard joint and several liability rule impose proportionate liability that limits liability for defendants who contributed only modestly to causing the injury.

Opponents of reform respond that joint and several liability is the only way to ensure that the victim receives full compensation. Suppose that three tortfeasors have contributed equally to a victim's injuries, but that only one of them has assets sufficient to compensate the victim; the others have nothing. Under the reforms, the victim, who may be horribly injured, receives compensation for only one-third of her injuries, but the deep-pocket defendant does not have to pay more than his share. In contrast, without the reform, the victim is fully compensated, but the deep-pocket defendant pays more than his share. Opponents argue that fairness demands the traditional rule because, in a situation in which either the plaintiff or the deep-pocket defendant must suffer excessively, the blameworthy defendant should suffer, not the blame-free plaintiff.

6. Periodic Payments

Normally, the legal system requires a defendant to pay a victorious plaintiff a lump sum that includes an estimate of the costs that the plaintiff expects to incur in the future because of the defendant's conduct. However, these estimates are often wrong, and the plaintiff's costs may end up differing from the lump-sum payment that the plaintiff receives at the end of trial. For example, a plaintiff who dies

51. See Am. Tort Reform Ass'n, Joint and Several Liability Rule Reform, <http://www.atra.org/issues/index.php?issue=7345> (last visited Feb. 16, 2008).

52. Avraham, *supra* note 1, at 8.

shortly after he receives a damage award that assumes a long lifetime of medical expenses will have been overpaid.

As of 2005, thirty-one states had adopted reforms that permit defendants to pay damage awards over time, rather than in one immediate payment.⁵³ Typically, the reforms permit the defendant to cease the payments if the plaintiff dies.⁵⁴

II. THE RELATIONSHIP BETWEEN MEDICAL MALPRACTICE TORT REFORMS AND DEATH RATES

In addition to the previous arguments that apply to the entire liability system, proponents of tort reform argue that reform is especially needed for the medical malpractice system. They contend that excessive damage awards have forced medical malpractice insurance companies to raise premiums to cover their expected liability costs. The higher premiums have, in turn, caused physicians either to relocate to lower-liability states or to abandon high-risk procedures.⁵⁵ Although advocates argue that this reduction in access to care has adverse impacts on health outcomes,⁵⁶ the relationship between tort reform and death rates is not so clear. Theoretically, medical malpractice tort reforms produce some behaviors that should worsen health outcomes, and other behaviors that should improve health outcomes.

In this Part, I develop the predictions from law and economics theory about the relationship between medical malpractice tort reforms and death rates. I discuss how medical malpractice tort reforms produce care-level effects and activity-level effects that should have opposing impacts. Then, I test the theoretical predictions using the most accurate, comprehensive state-level data from 1981–2000 on both medical malpractice tort reforms and a host of other variables. My results show that both the care-level effects and activity-level effects of tort reforms are important, and the relative importance of each varies by reform.

53. Avraham, *supra* note 1, at 8.

54. Avraham, *supra* note 2, at 19.

55. See Am. Tort Reform Ass'n, Medical Liability Reform, <http://www.atra.org/issues/index.php?issue=7338> (last visited Feb. 17, 2008) ("In state civil justice systems that lack reasonable limits on liability, multi-million dollar jury awards and settlements in medical liability cases have forced many insurance companies to either leave the market or substantially raise costs. Increasingly, physicians in these states are choosing to stop practicing medicine, abandon high-risk parts of their practices, or move their practices to other states.").

56. See *infra* notes 92–96 and accompanying text.

A. The Theoretical Relationship

The literature on the law and economics of tort law focuses on two types of behavior that affect the risk of accidents: care-level behaviors and activity-level behaviors. As discussed above,⁵⁷ care-level behaviors include any precautions a potential tortfeasor might take to reduce the risk of accidents in a given amount of activity. Activity-level behaviors refer to how much the potential tortfeasor engages in the activity. After discussing the theory underlying care-level effects and activity-level effects, I review current evidence suggesting that the effects exist.

1. Care-Level Effects

According to the law and economics theory, tort reforms that reduce expected liability costs reduce the incentives to take care. If people respond to these incentives, then some people will take less care after the imposition of such a tort reform. Reductions in care should increase the risk of accidents, worsening health outcomes.

Similarly, because medical malpractice tort reforms lower liability costs, they reduce the incentives for doctors and hospitals to take care in the procedures that they are already conducting. Indeed, the largest responses to changes in tort law may come not from physicians, but from hospital administrators. Hospitals are keenly sensitive to changes in tort law because, in medical malpractice suits, plaintiffs routinely name as defendants both physicians and their hospitals. Moreover, in contrast to physicians' malpractice premiums that generally are not experience-rated, malpractice premiums for hospitals are experience-rated.⁵⁸ Thus, a hospital that makes more medical errors can expect to have more claims brought against it, and, in turn, have its medical malpractice premiums increase. Therefore, in order to avoid paying higher premiums, hospitals have incentives to improve quality and safety to reduce the number of medical injuries.

Although physicians' malpractice premiums are generally not experience-rated, they do suffer psychological and reputational costs,⁵⁹ as

57. See *supra* Part I.A.

58. See Michelle M. Mello & Troyen A. Brennan, *Deterrence of Medical Errors: Theory and Evidence for Malpractice Reform*, 80 TEX. L. REV. 1595, 1597–98 (2002).

59. Peter A. Bell, *Legislative Intrusions Into the Common Law of Medical Malpractice: Thoughts About the Deterrent Effect of Tort Liability*, 35 SYRACUSE L. REV. 939, 949–65, 973–90 (1984); see also Daniel P. Kessler & Mark B. McClellan, *The Effects of Malpractice Pressure and Liability Reforms on Physicians' Perceptions of Medical Care*, LAW & CONTEMP. PROBS., Winter 1997, at 81, 82.

well as monetary costs due to the time and effort required to respond to litigation. For example, one study found that physicians being sued spent approximately six working days on the litigation, forgoing an estimated \$7000 in income per claim.⁶⁰ Moreover, insurers may cancel the policies of doctors who are sued frequently.

Despite the theoretical predictions that higher liability should increase care, and tort reforms should decrease care, studies examining the relationship between medical malpractice liability and care levels have produced mixed results. For example, several studies have explored the link between liability and defensive medicine.⁶¹ Defensive medicine is defined as "care provided solely . . . to reduce the probability of litigation."⁶² If increases in liability cause doctors to increase the number of expensive tests and diagnostic procedures for which they charge their patients, even though the tests and procedures do not improve outcomes for their patients, then this suggests doctors are taking more precautions only to avoid the increased liability.

As evidence of defensive medicine, some studies have found that malpractice risk slightly increases the probability of delivery by cesarean section, which tends to have fewer complications than a vaginal birth.⁶³ Yet, other studies have found no relationship between malpractice risk and cesarean sections.⁶⁴ One study concluded that tort reforms lead to reductions in medical expenditures with no resulting impact on health outcomes, suggesting that, before the reforms, the medical expenditures were for defensive medicine purposes.⁶⁵

If liability increases defensive medicine with no resulting improvements in health outcomes, then, conversely, tort reforms may eliminate useless precautions with no resulting harms to health outcomes. In contrast, if reforms reduce important precautions, then the result may be more medical errors and worse health outcomes. The results of several

60. WEILER ET AL., *supra* note 18, at 126.

61. For reviews of defensive medicine studies, see OFFICE OF TECH. ASSESSMENT, DEFENSIVE MEDICINE AND MEDICAL MALPRACTICE 43–74 (1994); Randall R. Bovbjerg et al., *Defensive Medicine and Tort Reform: New Evidence in an Old Bottle*, 21 J. HEALTH POL. POL'Y & L. 267, 269–80 (1996); Mello & Brennan, *supra* note 58, at 1606–07.

62. Mello & Brennan, *supra* note 58, at 1606–07.

63. See Lisa Dubay et al., *The Impact of Malpractice Fears on Cesarean Section Rates*, 18 J. HEALTH ECON. 491, 508–14 (1999); A. Russell Localio et al., *Relationship Between Malpractice Claims and Cesarean Delivery*, 269 J. AM. MED. ASS'N 366, 371 (1993).

64. Laura-Mae Baldwin et al., *Defensive Medicine and Obstetrics*, 274 J. AM. MED. ASS'N 1606, 1609 (1995).

65. See Daniel Kessler & Mark McClellan, *Do Doctors Practice Defensive Medicine?*, 111 Q. J. OF ECON. 353, 388 (1996).

recent papers suggest that tort reforms' care-level effects may be harming health outcomes. There are few studies that examine the direct link between malpractice liability and medical errors. However, a recent study found that caps on noneconomic damages increase the complications from labor births and cesarean sections.⁶⁶ This result suggests that caps reduce doctors' incentives to take care, thereby increasing the risk of complications. An earlier study I conducted with Paul Rubin analyzed the relationship between accidental death rates and general tort reforms that apply to all tort cases over the period 1980–2000.⁶⁷ We found that reforms to the collateral source rule were associated with increased deaths.⁶⁸ Although this result suggests that the reductions in care after these tort reforms increased deaths, the study dealt with tort reforms that applied to all lawsuits, not to the many reforms that apply only to medical malpractice.

2. Activity-Level Effects

Tort reforms should also increase activity levels of potential tortfeasors because the reforms reduce the incentive to refrain from activities that could potentially result in tort liability. Similarly, medical malpractice tort reforms should increase the activity levels of doctors and hospitals, resulting in more doctors in tort reform states and inducing doctors and hospitals to perform more procedures.

The more medical services a hospital provides, the more likely they are to be sued. Because hospitals' malpractice premiums are experience-rated, or based on their future malpractice risk, laws that impose high liability will create an incentive for hospitals to restrict the services they provide, lowering their liability risk and, in turn, their malpractice premiums. In contrast, tort reforms that decrease the future liability of hospitals should reduce their malpractice premiums and induce them to offer more profitable services.

Although doctors generally are insured and their premiums are not experience-rated, they also have an incentive to reduce their activity levels in response to high liability, if doing so would avoid the psychological,

66. See Janet Currie & W. Bentley MacLeod, *First Do No Harm? Tort Reform and Birth Outcomes* 36 (Nat'l Bureau of Econ. Research, Working Paper No. 12478, 2006), available at <http://ssrn.com/abstract=926057>. In contrast, reforms to joint and several liability rules decrease the complications from these procedures. *Id.* at 35.

67. See Paul H. Rubin & Joanna M. Shepherd, *Tort Reform and Accidental Death Rates*, 50 J.L. & ECON. 221 (2007).

68. *Id.* at 230.

reputational, and opportunity costs of responding to litigations.⁶⁹ Furthermore, insurers sometimes cancel the policies of doctors who are sued frequently. Moreover, even if doctors cannot reduce their premiums by taking more care, they can reduce their premiums by restricting the procedures they perform. Thus, an OB/GYN may give up her obstetrics practice in order to reduce the high premiums required to insure obstetrics procedures.

Doctors can also reduce their premiums by relocating to a state with lower premiums. Several studies have found that the reductions in damage awards in tort reform states have allowed insurance companies to reduce the malpractice insurance premiums that doctors and hospitals pay in those states.⁷⁰ Specifically, several studies show that states with caps on noneconomic damages experienced 6 to 8 percent lower growth in malpractice premiums than states that had no such caps.⁷¹

Likewise, some studies indicate that tort reforms reduce not just the growth rate of insurance premiums, but also their levels. In states with caps on noneconomic damages or total damages, malpractice premiums were 17.1 percent lower than in states with no limits on damages.⁷² Similarly, caps on total liability, not just on noneconomic damages, reduced the malpractice premiums for surgeons by 13 percent in the first year after the tort reform's adoption, and reduced premiums by 34

69. See *supra* notes 59–60 and accompanying text.

70. For a review of several of the empirical studies, see MICHELLE M. MELLO, *MEDICAL MALPRACTICE: IMPACT OF THE CRISIS AND EFFECT OF STATE TORT REFORMS* (2006), available at http://www.rwjf.org/pr/synthesis/reports_and_briefs/pdf/no10_researchreport.pdf.

71. See Patricia H. Born & W. Kip Viscusi, *The Distribution of the Insurance Market Effects of Tort Liability Reforms*, 1998 BROOKINGS PAPERS ON ECONOMIC ACTIVITY: MICROECONOMICS 55, 83 (finding 5.8–8.4 percent lower growth); cf. W. Kip Viscusi & Patricia H. Born, *Damages Caps, Insurability, and the Performance of Medical Malpractice Insurance*, 72 J. RISK & INS. 23, 38 (2005) (noting that noneconomic damages caps are associated with lower premiums). Another study compared states that had adopted direct tort reforms, such as noneconomic or total damage caps, abolition of punitive damages, or reforms to collateral source rules, with states that had no such reforms. See Kessler & McClellan, *supra* note 59. Researchers found that within three years of adopting the tort reforms, the tort reform states experienced growth in medical malpractice premiums that was 8.4 percent lower than in the states without reforms. *Id.* at 98. A final study examined the growth in medical malpractice premiums in states with and without noneconomic damage caps. See Patricia M. Danzon et al., *The "Crisis" in Medical Malpractice Insurance*, 2004 BROOKINGS-WHARTON PAPERS ON FINANCIAL SERVICES 55. The paper found that states with caps of \$500,000 or lower experienced a 6 percent lower growth in premiums compared to states without caps. *Id.* at 82.

72. Kenneth E. Thorpe, *The Medical Malpractice 'Crisis': Recent Trends and the Impact of State Tort Reforms*, W4 HEALTH AFF. W4-20, W4-20 (Jan. 21, 2004), <http://content.healthaffairs.org/cgi/reprint/hlthaff.w4.20v1.pdf>.

percent in the longer term.⁷³ Based on these studies, lower premiums in tort reform states should have significant activity-level effects; they give the doctors the incentive to eliminate their activity in one state and to relocate their activity to another state.

Increases in some types of activities should increase the number of injuries and deaths. For example, the more hours someone spends driving, the more likely they are to be involved in a car accident. In contrast, increases in the activity levels of doctors and hospitals should improve health outcomes. Thus, if tort reforms increase the supply of competent physicians and induce physicians to perform more beneficial procedures, victim outcomes should improve and death rates should decrease.⁷⁴

I now review the substantial body of empirical evidence that indicates that tort reforms increase both the supply of physicians and medical procedures in the reforming states. I then discuss several findings that suggest that increases in doctors' activity levels do improve health outcomes.

A growing body of literature suggests that premiums do affect physicians' decisions regarding where to locate. One study found that states with above-average medical malpractice insurance premiums had significantly fewer physicians per capita.⁷⁵ Another found that many physicians, including emergency room doctors, decided not to locate in a jurisdiction (in this case, Pennsylvania) because of high malpractice premiums.⁷⁶ Malpractice costs were listed as the primary reason that physicians left Pennsylvania; this reason was listed three times more than any other factor.⁷⁷ Another study found that during a period of high liability costs in Pennsylvania, physicians were choosing to retire early or to relocate

73. Stephen Zuckerman et al., *Effects of Tort Reforms and Other Factors on Medical Malpractice Insurance Premiums*, 27 *INQUIRY* 167, 175 (1990). In contrast, Stephen Zuckerman, Randall Bovbjerg, and Frank Sloan found that noneconomic damage caps had no significant effect on premiums. *Id.* at 176. Two other studies found no significant relationship between damage caps and medical malpractice insurance premiums. See Frank A. Sloan, *State Responses to the Malpractice Insurance "Crisis" of the 1970s: An Empirical Assessment*, 9 *J. HEALTH POL. POL'Y & L.* 629 (1985); W. Kip Viscusi et al., *The Effect of 1980s Tort Reform Legislation on General Liability and Medical Malpractice Insurance*, 6 *J. RISK & UNCERTAINTY* 165, 179–80 (1993).

74. In contrast, outcomes presumably would worsen if the state's new doctors are incompetent, or if the new procedures are ones for which health risks exceed benefits.

75. See M.P. Gius, *An Examination of the Determinants of Physician Supply at the State Level*, 6 *J. BUS. & ECON. STUD.* 73 (2000).

76. See Michelle M. Mello & Carly N. Kelly, *Effects of a Professional Liability Crisis on Residents' Practice Decisions*, 105 *OBSTETRICS & GYNECOLOGY* 1287, 1290 (2005).

77. *Id.*

across state lines.⁷⁸ However, a third study found no significant relationship between premiums and the number of physicians in a state.⁷⁹

In turn, evidence suggests that tort reforms that lower malpractice premiums increase the supply of physicians in a state. For example, one study concluded that caps on noneconomic damages lead to increased numbers of physicians in a state, although reforms to joint and several liability and the collateral source rule had no effect.⁸⁰ Another found that direct tort reforms, such as noneconomic or total damage caps, abolition of punitive damages, or reforms to collateral source rules, are associated with 3 percent higher growth in the number of physicians locating in a state. The effect is even larger for emergency medicine physicians: Direct tort reforms increase the number of such physicians in a state by approximately 12 percent.⁸¹ Another study found that states with total damage caps have 12 percent more physicians per capita than states without damage caps.⁸² The finding in another study was that damage caps increased the supply of physicians in extremely rural areas by 3–5 percent from 1970 to 2000.⁸³ However, the study found no statistically significant relationship between caps and overall physician supply in a state.⁸⁴

High malpractice premiums appear to have reduced doctors' willingness to undertake high-risk procedures. One study concluded that physicians who do not leave states with high malpractice premiums are less likely to practice high-risk specialties, including trauma care.⁸⁵ According to

78. See Michelle M. Mello et al., *Hospitals' Behavior in a Tort Crisis: Observations From Pennsylvania*, 22 HEALTH AFF. 225, 227 (2003).

79. See Katherine Baicker & Amitabh Chandra, *The Effect of Malpractice Liability on the Delivery of Health Care*, 8 F. FOR HEALTH ECON. & POL'Y, art. 4, 17–19 (2005), available at <http://www.bepress.com/cgi/viewcontent.cgi?article=1010&context=fhep>.

80. See Jonathan Klick & Thomas Stratmann, *Does Medical Malpractice Reform Help States Retain Physicians and Does It Matter?* 2–3 (Working Paper Series, 2005), available at <http://ssrn.com/abstract=870492>.

81. See Daniel P. Kessler et al., *Impact of Malpractice Reforms on the Supply of Physician Services*, 293 J. AM. MED. ASS'N 2618, 2622 (2005).

82. See FRED J. HELLINGER & WILLIAM E. ENCINOSA, U.S. DEP'T OF HEALTH & HUMAN SERVS., *THE IMPACT OF STATE LAWS LIMITING MALPRACTICE AWARDS ON THE GEOGRAPHIC DISTRIBUTION OF PHYSICIANS* (2003), <http://www.ahrq.gov/research/tortcaps/tortcaps.pdf>. In another county-level study, William Encinosa and Fred Hellinger found that counties subject to damage caps had 2 percent more physicians per capita than counties without damage caps. See William E. Encinosa & Fred J. Hellinger, *Have State Caps on Malpractice Awards Increased the Supply of Physicians?*, W5 HEALTH AFF. W5-251, W5-255 (2005), available at <http://content.healthaffairs.org/cgi/reprint/hlthaff.w5.250v1.pdf>.

83. See David Matsa, *Does Malpractice Liability Keep the Doctor Away? Evidence From Tort Reform Damage Caps* 16 (Working Paper Series, 2006), available at http://ssrn.com/abstract_id=920846.

84. *Id.*

85. See Mello & Kelly, *supra* note 76, at 1292–93.

another, high malpractice premiums have driven neurosurgeons to perform fewer brain surgeries.⁸⁶ Similarly, decreasing malpractice liability costs have been found to increase doctors' willingness to provide care to pregnant women, thereby improving access to prenatal care, with the largest effects for African American women.⁸⁷

Similarly, because of high medical malpractice premiums, 52 percent of rural Florida physicians have decreased or eliminated hospital-based surgical procedures, 45 percent of physicians have reduced emergency department coverage, and 41 percent of physicians have reduced endoscopic procedures.⁸⁸ Over 78 percent of general surgeons claimed to have decreased or eliminated services they provide, and 74 percent of surgical specialists decreased or eliminated procedures.⁸⁹ Avoiding high medical malpractice premiums was listed as an important factor for doctors that eliminated services.⁹⁰

Although the predicted activity-level effects on health outcome are ambiguous,⁹¹ evidence suggests that, in general, more doctors and more procedures should improve health outcomes. Tort reforms that increase the amount of available trauma care and prenatal care⁹² clearly should improve health outcomes. Likewise, several previous empirical articles suggested that patients recovering from hospital procedures have better outcomes the more contact that they have with doctors and nurses.⁹³

Another study found that damage caps increase the supply of physicians and decrease the mortality rates among African American infants.⁹⁴

86. See David Dranove & Anne Gron, *Effects of the Malpractice Crisis on Access to and Incidence of High-Risk Procedures: Evidence From Florida*, 24 HEALTH AFF. 802, 802–06, 808 (2005).

87. See Lisa Dubay et al., *Medical Malpractice Liability and Its Effect on Prenatal Care Utilization and Infant Health*, 20 J. HEALTH ECON. 591, 605–06 (2001).

88. See Robert G. Brooks et al., *Impact of the Medical Professional Liability Insurance Crisis on Access to Care in Florida*, 164 ARCHIVES INTERNAL MED. 2217, 2219 (2004).

89. *Id.* at 2220.

90. See *id.* at 2219.

91. See *supra* note 74 and accompanying text.

92. See, e.g., Dubay et al., *supra* note 87, at 605–07; Mello & Kelly, *supra* note 76.

93. See, e.g., Linda H. Aiken et al., *Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction*, 288 J. AM. MED. ASS'N 1987, 1991–92 (2002) (finding that a higher nurse-to-patient ratio greatly reduces mortality rates in postsurgical patients); Christine Kovner et al., *Nurse Staffing and Postsurgical Adverse Events: An Analysis of Administrative Data From a Sample of U.S. Hospitals, 1990–1996*, 37 HEALTH SERVICES RES. 611, 619 (2002) (finding that increased access to nurses reduces the risk of adverse events, like pneumonia, in hospital patients); Peter J. Pronovost et al., *Organizational Characteristics of Intensive Care Units Related to Outcomes of Abdominal Aortic Surgery*, 281 J. AM. MED. ASS'N 1310, 1313–15 (1999) (finding that more contact with both physicians and nurses greatly improves outcomes in postsurgery patients).

94. See Klick & Stratmann, *supra* note 80, at 2, 17 (finding that the collateral source rule increases African American infant mortality rates).

It concluded that in marginalized communities that lack ready access to care, increases in physician supply allow many pregnant mothers to receive prenatal care to which they would not otherwise have had access.⁹⁵

Moreover, my previous study of the relationship between accidental death rates and general tort reforms that apply to all tort cases found that caps on noneconomic damages, reforms to punitive damages, product liability reform, and prejudgment-interest reform were all associated with fewer accidental deaths.⁹⁶ Although this evidence is consistent with tort reforms increasing activity levels and, in turn, improving health outcomes, this study dealt with tort reforms that applied to all lawsuits, not to the many reforms that apply only to medical malpractice.

Thus, whether tort reform is beneficial or harmful is ultimately an empirical issue, which the next Subpart tests comprehensively.

B. Empirical Analysis

I now empirically examine the relationship between medical malpractice tort reforms and accidental death rates. My results suggest which of the two possible conflicting effects of tort reforms on health outcomes dominates: improvements in health from doctors' increased activity levels, or worsening of health as doctors' level of care declines. I test the theoretical predictions using the most accurate, comprehensive state-level data from 1981–2000 on both medical malpractice tort reforms and a host of other variables. I also explore the specific relationship between death rates and each of the tort reforms. My results show that both the care-level effects and activity-level effects of the tort reforms are important, and that the relative size and importance of each vary by reform.

Ideally, I could directly test the relationship between medical malpractice tort reforms and malpractice using nationwide data on incidents of medical malpractice. Unfortunately, such systematic aggregate data are unavailable. Most incidents of medical malpractice are not identified as such even by the victim, and public records are rarely available for those that are. Indeed, in only a small fraction of incidents of medical malpractice does the patient even learn that the physician has erred. Moreover, the fraction of incidents in which the patient asks for compensation,

95. *Id.* at 19.

96. See Rubin & Shepherd, *supra* note 67.

much less sues, is even smaller. In fact, it is estimated that only 2 percent of victims of medical malpractice ever file a claim.⁹⁷

Instead, I test the relationship using accidental, non-motor-vehicle death data, which have been collected annually for every state by the Center for Disease Control since 1981.⁹⁸ These deaths include deaths from medical malpractice—specifically, death resulting from adverse effects to medical care or drugs.⁹⁹ Moreover, many of the other deaths that are included originate as accidental injuries, but become deaths at the hospital. The likelihood of these injuries' becoming deaths should be affected by tort reforms, given that less-careful doctors would cause some injuries to become deaths. But greater access to quality care and procedures might prevent injuries from becoming deaths.

These death rates also include other deaths that are not directly related to medical malpractice, and therefore should not be affected by tort reforms. Although this introduces some noise in my dependent variable, the existing death rate data cannot be disaggregated any further. However, with adequate control variables, my empirical analysis should still capture any changes in death rates associated with tort reforms, even if the changes occur in only part of the population measured by the death rate data.

Figure 1 presents the average accidental, non-motor-vehicle, death rates for the United States from 1980 to 2002.¹⁰⁰

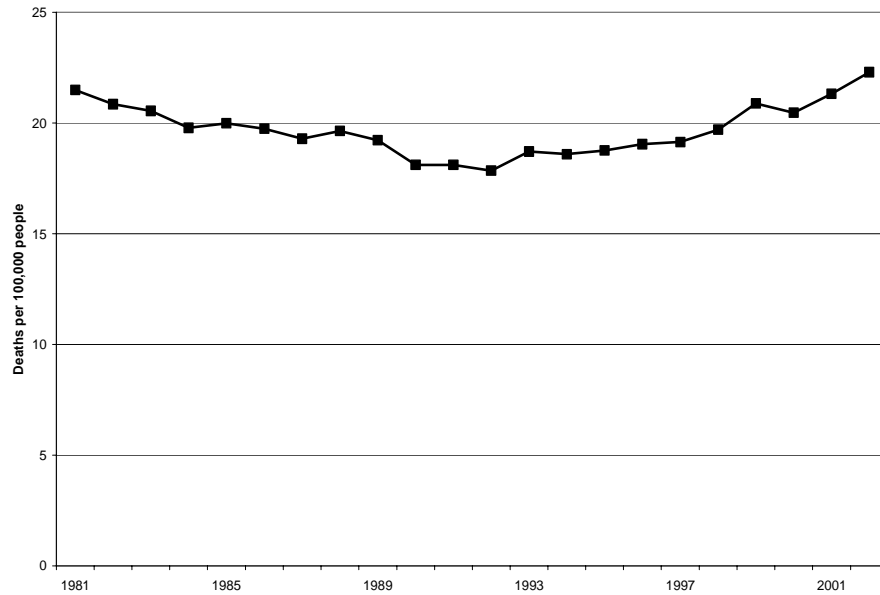
97. WEILER ET AL., *supra* note 18, at 73.

98. See Nat'l Ctr. for Injury Prevention & Control, Web-based Injury Statistics Query and Reporting System (WISQARS), <http://webappa.cdc.gov/sasweb/ncipc/mortrate.html> (last visited Feb. 18, 2008) [hereinafter WISQARS, Mortality]. I do not include motor vehicle death rates for several reasons. These death rates are about one-half of all accidental deaths. *Id.* But they are affected by many statutory changes in addition to tort reforms, such as no-fault insurance laws and changes in speed limits. See Alma Cohen & Rajeev Dehejia, *The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities*, 47 J.L. & ECON. 357 (2004) (discussing the effect of compulsory insurance and liability regulations on traffic fatalities). Moreover, most tort reforms would have only an indirect influence on motor vehicle tort law. Nonetheless, the results are robust to estimations that include all accidental death rates (including motor vehicle) as the dependent variable. See Rubin & Shepherd, *supra* note 67, at 227, for a similar discussion.

99. Nat'l Ctr. for Injury Prevention & Control, Definitions for WISQARS Fatal, <http://www.cdc.gov/ncipc/wisqars/fatal/help/definitions.htm#lcd> (last visited Feb. 18, 2008).

100. See WISQARS, Mortality, *supra* note 98.

FIGURE 1: ACCIDENTAL, NON-MOTOR-VEHICLE DEATH RATE:
UNITED STATES, 1981–2002



Although the figure shows the trend in accidental death rates, it reveals nothing about the relationship between tort reforms and death rates. Thus, to test the competing theories of the previous Subpart, I use state-level data from all U.S. states for the period 1981–2000¹⁰¹; that is, the data include information on each of the fifty states for each year of this period. The various combinations of reforms enacted among the states and the differing dates of enactment provide an excellent opportunity to measure the relationship between tort reforms and death rates.

To test the relationship between tort reforms and death rates, I estimate an equation that measures how death rates respond both to the tort reforms and to other economic and demographic factors.

1. The Model's Technical Structure

I first introduce the model in symbols, and I provide a brief outline of the variables. In the next Subpart, I explain the model more fully. For this primary model, I use the following equation:

101. Some of the variables are not available after 2000.

(1)

$$DEATHRATE_{i,t} = \alpha + \beta_1 REFORM_{i,t} + \beta_2 ECON_{i,t} + \beta_3 DEMO_{i,t} + \beta_4 s_i + \beta_5 y_t + \varepsilon_{i,t}$$

where

DEATHRATE Dependent variable is the accidental, non-motor-vehicle death rate.

REFORM Includes six variables indicating whether a state has the relevant medical malpractice tort reform in effect that year:

caps on noneconomic damages;
 reforms to punitive damages;
 caps on total damages;
 reforms to the collateral source rule;
 reforms to joint and several liability rules;
 periodic payments reforms.

ECON Includes two economic variables:
 per capita personal income;
 unemployment rates.

DEMO Includes seven demographic variables:
 percent of the state's population that is African American;
 percent of the state's population that belongs to another minority racial group;
 percent of the state's population that is age 4 or under;
 percent of the state's population that is age 65 or over;
 percent of the state's population that is male between the ages of 15 and 24;
 per capita alcohol consumption;
 number of hospital beds per capita.

s and *y* Represent state and year dummy variables.

2. Details of the Model

Equation 1 measures the relationship between accidental death rates and tort reforms, while controlling for many other factors that also affect death rates. My estimation of this equation separates the influence of each

factor that is included, allowing me to distinguish a tort reform's influence on death rates from other influences. Thus, to determine whether a change in death rates is really due to a tort reform, it is necessary to control for as many other factors as possible to ensure that the results are not caused by something other than a tort reform.¹⁰² Ideally, we could quantify and include any factor that was related to death rates. In practice, researchers include as many variables as is technically possible given data constraints.

The six tort reforms include tort reforms that apply to medical malpractice cases.¹⁰³ Further, they include the medical malpractice reforms that states have enacted most frequently. In addition, most of these reforms appear in federal malpractice bills recently debated in Congress.¹⁰⁴

The first reform I consider is caps on noneconomic damages. These caps may have a substantial impact on health outcomes because of the frequency of noneconomic damage awards in medical malpractice cases. One recent study found that noneconomic damage caps of \$250,000 in California would reduce awards in over 50 percent of medical malpractice cases.¹⁰⁵ Moreover, the magnitude of the reduction is substantial; the same study found that the California caps reduce total awards by an average of 34 percent.¹⁰⁶

I also include punitive damage reforms. In most states, reforms to punitive damages have taken one of two forms: either caps on punitive damages or higher evidence requirements before punitive damages can be awarded. In my empirical analysis, I combine these into one tort reform variable, with a state being deemed to have reformed punitive damages if it has made either of these changes.

102. If a third, omitted variable has significant influence on death rates, and that omitted variable is strongly correlated with a tort reform, my analysis may erroneously attribute to the reform variable the relationship between death rates and the omitted variable.

103. They include both reforms that apply only to cases of medical malpractice and, in the few situations in which there are no such reforms, general reforms that also cover medical malpractice. See *supra* Part I.C.1–6 (discussing the six tort reforms).

104. The most recent federal bills, H.R. 2580, 110th Cong. (2007), and S. 243, 110th Cong. (2007) both included a statute of limitations on filing medical malpractice lawsuits, a \$250,000 cap on noneconomic damages, abolition of joint and several liability, a contingent fee limitation, abolition of the collateral source rule, a clear and convincing evidence standard for punitive damages, a cap on punitive damages of \$250,000 or on punitive damages that are two times compensatory damages, periodic payments for future damages exceeding \$50,000, and drug manufacturer immunity for FDA-approved drugs. See H.R. 2580; S. 243.

105. See David M. Studdert et al., *Are Damages Caps Regressive? A Study of Malpractice Jury Verdicts in California*, 23 HEALTH AFF. 54, 57 (2007).

106. *Id.* at 58.

Although punitive damage awards in medical malpractice cases are not common,¹⁰⁷ these reforms may have a substantial impact on health outcomes because of their magnitude when they are awarded. For example, a recent study of punitive damage awards in state courts found that over one-fourth of the medical malpractice cases in which punitive damages were awarded, the damages exceeded \$1 million, and in some cases, they exceeded \$10 million.¹⁰⁸

Next, I consider caps on total damage awards. Although these reforms are adopted less frequently than the others, they potentially could have the greatest impact on health outcomes. This is because they cap all damages, including the compensatory, noneconomic, and punitive portions of the damages. Typical cap amounts on total damages range from \$500,000 to \$1.25 million.¹⁰⁹

I also include reforms to collateral source rules. The reforms include allowing evidence of collateral source payments, or completely offsetting awards by the amount of such payments. These reforms may be especially relevant to health outcomes because they could reduce damage awards substantially: They might prevent a victim from recovering any damages from doctors or hospitals, if the victim has already collected benefits from her own health insurer.¹¹⁰

I then consider reforms to joint and several liability. Most reforms to the standard joint and several liability rules involve imposition of some sort of proportionate liability that limits exposure for defendants who played only a small part in causing the injury. These reforms could especially benefit medical malpractice defendants like emergency room (ER) doctors. Medical malpractice by an ER doctor often follows negligence by some other person, such as a car driver, which originally caused the victim to require medical care. Before the reforms, ER doctors and hospitals often would be

107. See Rustad & Koenig, *supra* note 42, at 1082–83.

108. See THOMAS H. COHEN, BUREAU OF JUSTICE STATISTICS, PUNITIVE DAMAGE AWARDS IN LARGE COUNTIES, 2001, at 4 tbl.2 (2005).

109. See Avraham, *supra* note 1.

110. Some reforms give the source of collateral payments (a health insurance company, for example) a right of subrogation. This allows the collateral source to collect from the tortfeasors, so that there is no double compensation to victims, but tortfeasors are still held liable for the total harm. However, other collateral source reforms do not give collateral sources a right of subrogation, so defendants pay only the portion of the total harm that is not paid for by the collateral source. In California, for example, collateral sources have no right of subrogation. Ronen Avraham, *Database of State Tort Law Reforms (1st Draft)* 134 (unpublished manuscript, on file with author). (“No provider of collateral benefits . . . shall recover any amount against the plaintiff as reimbursement for such benefits nor shall such provider be subrogated to the rights of the plaintiff.”).

required to pay damages for all of the victim's injuries, including the injuries sustained before the victim arrived at the ER. After the reforms, the ER doctors and hospitals would be responsible only for the injuries that they had caused.

Finally, I include reforms that allow periodic payments of medical malpractice damage awards. Without these reforms, a defendant must pay as a single lump sum a large award that includes estimates of the plaintiff's future costs. These reforms permit the defendant instead to pay the award in periodic installments over time. Usually, only future damage awards above some threshold (often \$200,000) are allowed to be paid in periodic installments.¹¹¹ These reforms benefit medical malpractice defendants who can purchase an annuity that will generate the periodic payments. Moreover, if the plaintiff dies before all of the periodic payments have been made, as many victims of serious medical negligence do, the defendant is typically relieved from making the rest of the payments.

Table 1 presents the number of states with each tort reform during the years of my analysis. Note that the number of states with a certain reform can decline, not just grow. This can happen either if a state's legislature eliminates a reform or if the state's courts reject the reform.

111. See Avraham, *supra* note 2 ("The reform allows or requires courts to award future damages that are above some threshold, usually \$200,000, in periodic installments.").

TABLE 1: NUMBER OF STATES WITH TORT REFORMS¹¹²

Year	Reform					
	Noneconomic Damage Caps	Punitive Damage Reforms	Total Damage Caps	Collateral Source Reforms	J&S ¹¹³ Liability Reform	Periodic Payments Reform
81	3	9	6	15	4	9
82	3	9	6	15	5	9
83	3	9	6	15	5	9
84	3	10	6	15	6	9
85	3	14	6	16	6	11
86	8	18	7	18	14	15
87	17	27	9	25	22	22
88	19	39	6	30	30	28
89	19	44	7	31	31	31
90	17	44	7	33	33	31
91	16	44	7	32	33	31
92	14	45	7	32	35	31
93	14	46	7	31	35	31
94	14	47	7	31	35	31
95	15	50	7	31	36	29
96	18	55	6	31	36	29
97	19	57	6	30	37	29
98	17	55	6	29	36	29
99	17	55	6	29	36	29
00	17	58	6	29	36	29

112. See Avraham, *supra* note 1, at 8.

113. "Joint and several" is abbreviated as "J&S" here and in Tables 2, 5, 6, 7, 8, and 9.

My tort reform data are from the *Database of State Tort Law Reforms*, the most current, comprehensive dataset available on state-level tort reforms.¹¹⁴ This dataset avoids the problems that infect other tort reform datasets, such as missing reforms, erroneously coded effective dates of reforms, and missing dates on unconstitutionality rulings.¹¹⁵

The economic variables in *ECON* are used as proxies for earning opportunities. An increase in earning opportunities increases the opportunity cost of engaging in risky behavior, and should result in a decrease in the accidental death rate. For example, as more high-paying jobs become available, some people may stop engaging in risky behaviors like drug use, alcohol consumption, or reckless physical activities, all of which can lead to accidental deaths.

The economic variables that I use are real per capita personal income and the unemployment rate. Both measure individuals' earning opportunities. The income variable measures the possible earning opportunities available in the labor market. The unemployment variable is a proxy for overall labor market conditions and the availability of jobs.

The demographic variables in *DEMO* include the percent of the state population that is African American, the percent of the state population that belongs to another minority racial group, the percent of the state population that is age four or under, the percent of the state population that is age sixty-five or over, the percent of the state population that is male between the ages of fifteen and twenty-four, the per capita alcohol consumption, and the number of hospital beds per capita.

The age, gender, and race variables represent differences in risk preferences, differences in earning opportunities, and differences in the likelihood of suffering certain injuries across genders, races, and ages. For example, an increase in death rates could be due to an aging population that is more likely to suffer injuries and deaths from falls, adverse medical treatment, and other accidents. The per capita alcohol consumption variable measures risky behavior that may contribute to death rates. The hospital beds per capita variable measures the availability of medical services, which may influence whether an injury becomes a death.

As is standard and appropriate in such analysis,¹¹⁶ the equation also includes a set of year indicator variables that capture national trends and influences that affect all states but vary over time. The variables correct

114. See Avraham, *supra* note 1.

115. See *id.* at 2.

116. See WILLIAM H. GREENE, *ECONOMETRIC ANALYSIS* 116–18 (5th ed. 2003).

for the possibility that a change in death rates may be due not to tort reform, but to factors that affect all states, such as the passage of federal legislation, changes in medical technology, or trends in risky behavior.

In addition, state indicator variables are included to control for unobservable variables that differ among states, such as cultural differences, attitudes toward risky behavior, or geographic features that contribute to accidents. Two states may continually have different death rates, not because of differences in tort reform, but because of other unobservable differences between the two states. The state indicator variables capture any factors that I have not otherwise included that are constant for a state over time.

Now some technical issues. I estimate Equation 1 using a least squares regression. This is a standard difference-in-difference estimation that isolates the effect of tort reforms on death rates because it exploits both differences across reform and nonreform states and differences pre- and post-tort reform. I also control for possible heteroskedasticity and nonnormality of regression errors that result from variation in states' sizes.¹¹⁷ Because the dependent variable and most control variables are in per capita rates, I use the square root of the state population as the weight in the generalized least squares estimation. In addition, I use robust standard errors to correct for any residual heteroskedasticity of unknown form or nonnormal error distributions. These corrections yield consistent estimates of the variance of the estimated coefficients, causing the estimation to be efficient.

3. Empirical Results

The results show that in states that have adopted the tort reforms, two of the reforms are associated with reductions in accidental deaths, two are associated with increases in deaths, and two have no significant relationship. The results suggest that the net effect for all the reforms is that medical malpractice tort reforms decrease deaths in the adopting state. However, the next Part suggests that they are associated with increases in death rates in neighboring nonreform states.

The full results for all variables are reported in Table 7 in Appendix 1.¹¹⁸ Table 7 indicates the relationship between accidental death rates, on one hand, and the tort reforms and control variables, on the other. In the column labeled "Coefficient (T-statistic)," the number on the left is

117. See *id.* at 358.

118. See *infra* app. 1.

the regression coefficient, which indicates the magnitude and direction of the relationship with death rates of each variable. A negative coefficient indicates that a variable has an inverse relationship with death rates. For example, a negative coefficient on a tort reform variable would indicate that enactment of that tort reform is associated with a decrease in death rates. In contrast, a positive coefficient indicates that a variable has a positive relationship with death rates.

In addition, Table 7 reports the t-statistic for each coefficient. In the "Coefficient" column, it is the number on the right in parentheses. Coefficients with t-statistics equal to or greater than 1.645 are considered statistically significant at the 10 percent level, meaning that there is 90 percent certainty that the coefficient is different from zero. T-statistics equal to or greater than 1.96 indicate statistical significance at the more certain 5 percent level, and t-statistics equal to or greater than 2.576 indicate statistical significance at the most certain 1 percent level. Empiricists typically require t-statistics of at least 1.645 to conclude that one variable affects another in the direction indicated by the coefficient.¹¹⁹ In the table, *, +, and ^a indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 2 reproduces from Appendix 1 the coefficients and t-statistics for the tort reform variables. The results are striking. The coefficients for noneconomic damage caps and reforms to punitive damages are negative and statistically significant at the 5 percent level. In contrast, the coefficients for total damage caps and collateral source reforms are positive and statistically significant at the 5 percent level. These results indicate that caps on noneconomic damages and punitive damage reforms are associated with decreases in accidental death rates. The results suggest that for these reforms, the beneficial effects of additional doctors and more procedures dominate any harms from reduced levels of care.

Total damage caps and collateral source reforms have the opposite relationship: They are associated with increases in the accidental death rate. The results suggest that for these reforms, harms dominate benefits.

119. For each regression, Table 7 also reports R-squared statistics. In contrast to the t-statistics, which measure the reliability of each individual coefficient, the R-squared measures the regression's overall goodness of fit. GREENE, *supra* note 116, at 33–34. That is, the R-squared measures how much of the overall variation in the dependent variable—here, the accidental death rate—is explained by the explanatory variables. *Id.* Thus, the R-squared of a regression will vary between 0 and 1. *Id.* An R-squared of 0 means that the explanatory variables explain none of the dependent variable's variation. *Id.* An R-squared of 1 means that the explanatory variables explain all of the variation. *Id.* The closer the R-squared is to 1, the better the regression explains the data. *Id.*

TABLE 2: RESULTS OF THE PRIMARY MODEL¹²⁰

Tort Reform Variable	Coefficient (T-statistic)
Noneconomic Damage Caps	-0.925 (4.14)*
Punitive Damage Reform	-0.525 (2.37)+
Total Damage Caps	1.61 (5.07)*
Collateral Source Reform	0.876 (3.93)*
J&S Liability Reform	0.058 (0.25)
Periodic Payments	-0.109 (0.42)

In Table 3, I use the results from Table 2 to estimate the real-world magnitudes of the changes in death rates associated with the various reforms. First, I show the average percentage change in deaths in each state that had a specific reform. As Table 3 shows, the percentage changes in accidental deaths range between 2 percent and 7 percent, depending on the tort reform. Then, I extrapolate from the state-level results to estimate the changes in the number of deaths associated with each tort reform each year, across the nation. Thus, even a tort reform that is associated with only a small percentage change in the deaths in each state could be associated with a large change in the absolute number of deaths if many states had adopted this reform.

For a state that has adopted all of the reforms that have a statistically significant impact, medical malpractice tort reforms are associated with a net decrease in deaths. Averaged across all states that had implemented these four tort reforms by 2000, the tort reforms are associated with approximately 165 fewer deaths in the year 2000.¹²¹

120. Estimated coefficients and the absolute values of t-statistics are in parentheses; * represents significance at the 1 percent level, and + represents significance at the 5 percent level.

121. The 95 percent confidence interval for the increase or decrease in deaths associated with each tort reform in 2000 is: noneconomic damage caps (420–1175 fewer deaths); punitive damage reforms (221–2343 fewer deaths); total damage caps (255–577 more deaths); and collateral source reforms (751–2246 more deaths).

TABLE 3: REAL-WORLD MAGNITUDES OF THE RELATIONSHIP BETWEEN TORT REFORMS AND DEATH RATES¹²²

Tort Reform	Average Change in Annual Death Rates	Average Change in the Number of Deaths in 2000
Noneconomic Damage Cap	-5.1%	797 fewer deaths
Punitive Damage Reform	-2.5%	1282 fewer deaths
Total Damage Cap	+7.7%	416 more deaths
Collateral Source Reform	+4.9%	1498 more deaths
Net Effect		165 fewer deaths

I now discuss briefly why total damage caps and collateral source reforms may be associated with increases in deaths, rather than decreases as for the other reforms. Total damage caps are a severe tort reform because they cap all damages. This contrasts with caps on noneconomic damages and reforms of punitive damages, which limit only one part of a plaintiff's recovery. My results support the argument that the severity of total damage caps creates a dramatic reduction in care levels that overwhelms any beneficial increase in physicians' activity levels—increases in the number of either physicians or medical procedures.

Similarly, collateral source reform may reduce care levels substantially and thereby harm health outcomes, because it is also a relatively severe reform, perhaps more severe even than total damage caps. It often may eliminate most, or even all, of the liability costs for defendant hospitals and physicians. Because collateral source reforms in several states do not give to collateral sources, such as insurers, a right of subrogation, defendants in these states pay only the portion of the total harm that is not paid by the collateral source.¹²³ Thus, if health insurance, disability insurance, or workers' compensation insurance has already paid the costs incurred by a victim of medical malpractice, then, even if a hospital or

122. The coefficients in Table 2 are the partial derivatives of deaths per 100,000 population with respect to the enactment of each tort reform. Thus, the number of deaths associated with each tort reform is given by $\beta_1 \cdot (\text{population in tort reform states}/100,000)$. In 2000, there were 14,864 deaths in states with caps on noneconomic damages, 49,547 deaths in states with punitive damage reform, 5832 deaths in states with total damage caps, and 32,341 deaths in states with collateral source reforms.

123. See Avraham, *supra* note 110. For example, the California law states, "No source of collateral benefits introduced pursuant to subdivision (a) shall recover any amount against the plaintiff nor shall it be subrogated to the rights of the plaintiff against a defendant." CAL. CIV. CODE § 3333.1 (West 2007); see also *supra* note 110.

doctor is found liable for the malpractice, neither the victim nor the insurers can collect from the defendants. Because so many victims of medical malpractice receive collateral source payments from their insurers, this reform may result in many tortfeasors paying no, or greatly reduced, damage awards.¹²⁴

To test the sensitivity of my results, I estimated eight other variations of the model that are common robustness checks in empirical analyses. Appendix 2 describes the alternative specifications, and it shows that the results are generally robust to these alternative specifications.¹²⁵ As in the primary model, the coefficients for noneconomic damage caps and reforms to punitive damages in these other specifications are generally negative and statistically significant, and the coefficients for total damage caps and collateral source reforms are generally positive and statistically significant.

However, it is still important to note that my estimations have revealed only a strong association between the death rates and the tort reforms. Although my control variables, estimation technique, and robustness checks have attempted to eliminate confounding variables, simultaneity, and other forms of bias that could be driving my results, it is impossible ever to prove conclusively true causation.

III. THE DOCTOR DRAIN: THE IMPACT OF THE TORT REFORMS ON NEIGHBORING STATES

My results have suggested that two tort reforms in particular, and the tort reforms as a whole (with the effects of all tort reforms combined), may improve health outcomes in the reforming state. However, I now present evidence suggesting that these benefits may cast a dark shadow: The decreases in deaths in the states with tort reforms may come at the expense of increases in deaths in neighboring states without tort reforms.

Previous studies have shown that tort reforms, and especially noneconomic damage caps, increase the number of physicians in a state.¹²⁶ This supply effect is especially strong for ER physicians and

124. The results for the collateral source reforms are consistent with previous empirical findings. Jonathan Klick and Thomas Stratmann have found that collateral source reform leads to higher infant mortality. Klick & Stratmann, *supra* note 80. Paul Rubin and I have found that collateral source reforms that cover all tort cases lead to increases in accidental deaths. Rubin & Shepherd, *supra* note 67.

125. See *infra* app. 2.

126. See *supra* notes 80–83 and accompanying text.

specialty care physicians. There is evidence that the increase in supply results both from relocations¹²⁷ and from new residents and physicians choosing to start their careers in tort reform states instead of in states without reforms.¹²⁸ Regardless of the reason, the increases in physician supply in reform states decrease the number of physicians in other states.

Theoretically, this occurs because the same care-level effects and activity-level effects that are operating in reform states are also operating in neighboring nonreform states. When a neighboring state enacts a tort reform, a doctor in a nonreform state has more incentive to relocate to the reform state. Although incentives to take care should be higher in nonreform states, all else being equal, these higher care levels could be offset by lower activity levels in nonreform states.

Just as the brain drain of smart people moving to the United States hurts the foreign countries that they leave, this doctor drain may worsen outcomes in the nonreform states. Thus, states without tort reforms may experience increases in deaths when tort reforms lure to nearby states both the state's existing doctors and doctors who otherwise would have settled in the nonreform state.

To test whether tort reforms in one state cost lives in other states, I measure the interstate effects of tort reforms. To do this, I reestimate Equation 1 with one change. The *REFORM* variable no longer represents a tort reform in a particular state. Instead, it now represents a tort reform in a neighboring state. That is, the equation no longer measures the relationship between a California tort reform and California death rates. It now measures the relationship between a Nevada tort reform (or a reform in any other neighboring state) and California death rates.

I limit my analysis to a comparison of only two situations. I compare cases in which neither a state nor its neighbor has a tort reform to cases in which only a neighbor has a tort reform. By eliminating observations where both a state and its neighbor have a tort reform, I isolate the relationship between a state's death rates and a neighboring state's tort reform.¹²⁹ This approach is a well-established methodology used to measure the impact of legal changes or practices in one area on a nearby area.¹³⁰

127. See Mello & Kelly, *supra* note 76, at 1290.

128. See Kessler et al., *supra* note 81, at 2622.

129. Thus, I estimated Equation 1 separately for each reform that was significant in the primary results in order to isolate the effect of the neighboring state's reform.

130. See, e.g., Rubin & Shepherd, *supra* note 67; Joanna M. Shepherd, *Fear of the First Strike: The Full Deterrent Effect of California's Two- and Three-Strikes Legislation*, 31 J. LEGAL STUD. 159 (2002).

The statistically significant results are reported in Table 4. They show that only noneconomic damage caps have a statistically significant relationship with death rates in neighboring states. The positive coefficient reveals that noneconomic damage caps are associated with increases in neighboring states' death rates. The coefficient indicates that adoption of noneconomic damage caps in a neighboring state is associated with an increase in the nonreform states' death rates by an average of 2.8 percent. Averaged across all nonreform states, this translates into approximately 726 more deaths in 2000.¹³¹

The coefficients for the other reforms are also in the expected, positive direction. However, the coefficients for these other reforms are statistically insignificant. This could be due to there being no significant relationship, or it could be due to the small number of relevant observations in my dataset. For example, in comparison to the situation with noneconomic damage caps where the number of data are sufficient, punitive damage reforms are so common that there are substantially fewer instances in which a state with no punitive damage reform borders a state that has such a reform.

TABLE 4: IMPACT OF TORT REFORMS IN NEIGHBORING STATES¹³²

Neighboring State's Tort Reform	Coefficient (T-statistic)	Average Change in Annual Death Rates Associated With a Tort Reform in a Neighboring State	Average Change in the Number of Deaths in 2000 Associated With a Tort Reform in a Neighboring State
Noneconomic Damage Caps	0.598 (2.42)*	2.8%	726 more deaths

To summarize, this evidence suggests that having a neighboring state reform its noneconomic damages law may harm the health of the nonreform state's citizens. Thus, at least for this reform, the harms from reduced activity levels in nonreform states dominate the benefits from higher care levels. This may also be the case for the other reforms, but there are not enough data to prove this statistically.

131. The 95 percent confidence interval for the increase in deaths associated with noneconomic damage caps in neighboring states in the year 2000 is 138–1313 more deaths.

132. The coefficients in Table 3 are the partial derivatives of deaths per 100,000 population with respect to the enactment of each tort reform in a neighboring state. Thus, the number of deaths associated with each tort reform is given by β_i^* (population in a state with neighboring reform states/100,000). In 2000, there were 26,227 deaths in states that had neighboring states with noneconomic damage caps.

This increase in deaths in neighboring nonreform states almost completely offsets the decrease in deaths associated with noneconomic damage caps in reform states: This tort reform is associated with approximately 790 fewer deaths in reform states, but with an additional 726 deaths in the neighboring nonreform states. This evidence is consistent with tort reform draining doctors away from nonreform states and into reform states. If this doctor drain is indeed occurring, then most of the benefits from a state adopting noneconomic damage caps represent a transfer, not a true benefit.

Unfortunately, as we see in the next Part, increased death rates may not be the only unintended consequences of many medical malpractice tort reforms. Several reforms also disproportionately burden a group that has traditionally received disproportionately bad treatment by both the medical profession and the tort system: women.

IV. TORT REFORMS' DISPROPORTIONATE IMPACTS ON WOMEN

Tort reforms' care-level and activity-level effects may also produce different health outcomes for men and women. In order to explain the possible disproportionate effects on death rates, I begin with a discussion of the growing literature that shows that tort reforms reduce tort judgments much more severely for women than for men, and how the reforms disproportionately limits women's access to legal representation and the courts. In Subpart B, I use theory and empirical analysis to show that the tort reforms are associated with decreases in men's deaths, but increases in women's deaths.

A. Disproportionate Impact on Damage Awards

Certain tort reforms' limits disproportionately apply to the categories of damages that women tend to receive. Thus, these types of tort reform would disproportionately reduce women's recoveries. This is most evident in reforms that cap noneconomic damages and punitive damages, both of which women tend to receive. At the other extreme, caps on total damages would be expected to reduce compensation to male plaintiffs more than females. Other reforms' impacts would be expected to fall somewhere between these two extremes.

1. Noneconomic Damage Caps

As of 2005, twenty-four states had caps on noneconomic damages in medical malpractice cases, but only six states capped both economic and noneconomic damages in such cases. By limiting noneconomic damages relative to economic damages, states may disproportionately reduce damage payments to women. This is because women are the main recipients of noneconomic damages.

Noneconomic damages are relatively more important for women than men for three reasons. First, women, on average, have lower incomes than men.¹³³ Because women have correspondingly less economic loss and relatively more noneconomic loss,¹³⁴ caps on noneconomic damages will disproportionately reduce their compensation.

For example, suppose that a man and a woman sustained similar injuries in a state with a \$250,000 cap on noneconomic damages. The injuries will prevent them from working for many years. Suppose that the man earns a higher salary than the woman, but they are otherwise similarly situated. Suppose then that the injuries cause the man to incur \$4 million in economic damages and \$500,000 in noneconomic damages. The woman incurs the same \$500,000 in noneconomic damages, but only \$400,000 in economic damages; her economic damages are lower because her lower salary means that she sacrifices less income when she cannot work. After juries award both people damages that fully compensate their harm, the cap on noneconomic damages is applied to these awards. Application of the cap would reduce the male victim's damage award only 5.5 percent below his actual harm. In contrast, the woman would receive a damage award that was 28 percent less than her actual harm.

As this example demonstrates, caps on noneconomic damages act as a regressive tax on recoveries. They are regressive because they reduce the recoveries of lower-income plaintiffs by a higher fraction than they reduce the recoveries of higher-income plaintiffs.

133. As of 2005, women's salaries were only 77 percent of men's salaries. Although the gap is narrowing, there is still a discernible difference in wages between the genders. See CARMEN DENAVAS-WALT ET AL., U.S. CENSUS BUREAU, INCOME, POVERTY, AND HEALTH INSURANCE COVERAGE IN THE UNITED STATES: 2005 (2006), <http://www.census.gov/prod/2006pubs/p60-231.pdf>.

134. See Thomas Koenig & Michael Rustad, *His and Her Tort Reform: Gender Injustice in Disguise*, 70 WASH. L. REV. 1, 78-79 (1995) (noting that women typically receive smaller economic awards for similar injuries because women have lower incomes and spend fewer years in the labor force than men on average).

Second, many of the injuries that women suffer in medical malpractice cases are compensated almost exclusively through noneconomic damages.¹³⁵ Harm to reproductive systems, miscarriages, infertility, disfigurement from cosmetic surgeries, and pregnancy loss are suffered almost exclusively by women.¹³⁶ Moreover, the harm from many of these injuries is primarily emotional suffering and loss of self esteem, rather than reductions in or loss of economic wages; most do not prevent the victim from working.

Third, in practice, women more frequently bring claims for noneconomic losses and receive larger awards for these losses.¹³⁷ A recent study of medical malpractice awards found that medical malpractice awards to women were almost three times more likely to include a pain-and-suffering component than awards to men. Moreover, pain-and-suffering awards to women were twice as large as pain-and-suffering awards to men.¹³⁸ Another early study of fright-based negligence claims discovered that the ratio of women to men bringing such claims was five to one.¹³⁹

The disproportionate number and size of noneconomic awards to female plaintiffs has several possible causes: women suffering more emotional harm than men; arbitrary legal classifications of some physical harms as emotional; traditional views that the suffering of emotional harm is not masculine;¹⁴⁰ or juries inflating noneconomic awards to counteract the lack of economic losses for many female plaintiffs, such as housewives or elderly women in nursing homes.¹⁴¹ Regardless of the cause, because women are more likely to bring claims for emotional injury, caps on noneconomic damages have a disproportionately harsh impact on female plaintiffs.

2. Punitive Damage Reforms

Similarly, caps on punitive damages in medical malpractice cases will disproportionately reduce damage awards to women, for two reasons. First,

135. See Finley, *supra* note 22, at 1266.

136. See generally Lucinda M. Finley, *Female Trouble: The Implications of Tort Reform for Women*, 64 TENN. L. REV. 847 (1997).

137. See Leebron, *supra* note 30, at 306 & n.202 (finding that empirical analysis showed that women are more likely to receive pain-and-suffering awards); cf. Martha Chamallas & Linda K. Kerber, *Women, Mothers, and the Law of Fright: A History*, 88 MICH. L. REV. 814, 846-47 (1990).

138. See Koenig & Rustad, *supra* note 134, at 83, 85.

139. See Hubert W. Smith, *Relation of Emotions to Injury and Disease: Legal Liability for Psychic Stimuli*, 30 VA. L. REV. 193, 280 (1944) (finding 248 plaintiffs were female out of the 301 cases studied).

140. See Lisa M. Ruda, Note, *Caps on Noneconomic Damages and the Female Plaintiff: Heeding the Warning Signs*, 44 CASE W. RES. L. REV. 197, 216-19 (1993).

141. See Koenig & Rustad, *supra* note 134, at 85.

female plaintiffs are twice as likely to receive punitive damages in medical malpractice cases as male plaintiffs.¹⁴² In these cases, punitive damages typically have been awarded for injuries suffered almost exclusively by women. As described by Lucinda Finley, “[p]unitive damage awards have clustered around contraceptive and cosmetic products, including: IUDs; breast implants; sexual assault by health care providers; unnecessary reproductive surgery, such as hysterectomies, performed on women without their consent; grossly deficient cosmetic surgery; and abuse or neglect of elderly women in nursing homes.”¹⁴³ Because women are punitive damages’ primary recipients, caps will disproportionately reduce women’s compensation.

Second, punitive damage caps will disproportionately reduce punitive damage awards to women because caps are often tied to compensatory damages, which are higher for men.¹⁴⁴ Most punitive damage reforms cap punitive damages at the greater of (1) some absolute dollar amount, or (2) some multiplier of compensatory damages.¹⁴⁵ But, as noted above,¹⁴⁶ women tend to have lower wages than men. Because women’s compensatory damages therefore are, on average, substantially lower than men’s compensatory damages, the punitive damage cap will act as a greater constraint on punitive damages to women.

Consider an example. Suppose that, because a man has a more lucrative job than a woman, the man has compensatory damages of \$1 million, while the woman’s compensatory damages are \$250,000. Consider a reform that caps punitive damages at the greater of \$1 million or three times compensatory damages. The jury awards punitive damages of \$5 million to both the man and the woman. The tort reform would limit the man’s punitive damages to \$3 million, or three times his compensatory damages. The woman’s punitive damages would be capped at \$1 million. Thus, the punitive damage cap will disproportionately reduce punitive damages to female plaintiffs.

In effect, this tort reform reinforces the wage disparities that women suffer in the labor market. Instead of counteracting the disparities, this tort

142. *Id.* at 1 (“Two out of three plaintiffs receiving punitive damages awards in medical malpractice litigation are women.”).

143. Finley, *supra* note 136, at 866.

144. See Michael L. Rustad, *Nationalizing Tort Law: The Republican Attack on Women, Blue Collar Workers and Consumers*, 48 RUTGERS L. REV. 673 (1996); Christian E. Schlegel, Note, *Is a Federal Cap on Punitive Damages in Our Best Interest?: A Consideration of H.R. 956 in Light of Tennessee’s Experience*, 69 TENN. L. REV. 677 (2002).

145. See Avraham, *supra* note 1.

146. See *supra* note 133.

reform requires courts to magnify the inequalities: to wield women's unequal incomes as a basis for denying women equal punitive damage awards.

3. Caps on Total Damages

In contrast, caps on total damages, including both compensatory damages and punitive damages, may disproportionately reduce awards to men. Total damage awards are typically larger for male plaintiffs than female plaintiffs. For example, a study of medical malpractice jury verdicts in California found that the total award to male plaintiffs averaged \$2,341,996 before tort reform, while the total for female plaintiffs averaged only \$1,227,411.¹⁴⁷ Typical cap amounts on total damages range from \$500,000 to \$1.25 million.¹⁴⁸ Thus, because male plaintiffs receive larger total damage awards, caps on total damages act as a greater constraint on the amount that men recover.

However, this reform and its discriminatory impacts will cover fewer plaintiffs than will the previous two reforms. In 2005, only six states had adopted caps on total damages in medical malpractice cases, compared to the many more states that have adopted the reforms that reduce women's compensation: In 2005, twenty-four states had caps on noneconomic damages, and forty-one states had adopted punitive damage reforms.

4. Empirical Confirmation

The facts confirm what the theory suggests: Tort reforms reduce total compensation substantially more for women than for men. In addition, tort reforms disproportionately limit women's access to lawyers and the courts.

For example, a recent study found that California's \$250,000 cap on noneconomic damages resulted in a 58 percent reduction in the median award to women in medical malpractice cases, but only a 31 percent reduction in the median award to men. Moreover, even before the state adopted the tort reforms, women's awards were much smaller than men's: Women received, on average, only 52 percent of the male plaintiffs' average award. The caps on noneconomic damages exacerbated this disparity. After the reform, the average woman recovered 45 percent of the average man's award.¹⁴⁹ Likewise, another study found that California's caps on noneconomic damages reduced total damages to female plaintiffs by 34 percent,

147. Finley, *supra* note 22, at 1284–85.

148. See Avraham, *supra* note 1.

149. See Finley, *supra* note 22, at 1285–86.

compared to a 25 percent reduction for men.¹⁵⁰ In Indiana, damage caps in medical malpractice cases caused female plaintiffs to recover, on average, only 75 percent of the male award. Men received an average of \$105,909, but women received only \$78,887.¹⁵¹

Tort reforms not only disproportionately reduce women's compensation, they also disproportionately limit women's access to the legal system, further limiting their ability to obtain compensation. Before tort reforms, women had less access to the legal system and were less likely than men to file lawsuits.¹⁵² However, several tort reforms exacerbate this problem. Because the costs of trying cases remain the same as before the reforms, but the contingency lawyer's expected recovery declines, fewer cases will make economic sense for the lawyer to take. The tort reforms that disproportionately reduce women's expected recoveries disproportionately reduce the expected contingency fee that lawyers recover from female clients. Thus, these reforms disproportionately reduce contingency lawyers' willingness to represent women.¹⁵³

One experienced medical malpractice trial lawyer explained how caps on noneconomic damages would restrict many plaintiffs', and especially women's, access to legal representation: "Trying a case typically involves hiring half a dozen expert witnesses and costs about \$100,000 Under the state's new pain-and-suffering cap, that essentially eliminates any case where the victim had no income or no continuing medical expenses."¹⁵⁴ Such cases disproportionately involve female plaintiffs. As one Texas attorney noted, caps on noneconomic damages have

150. NICHOLAS M. PACE ET AL., CAPPING NON-ECONOMIC AWARDS IN MEDICAL MALPRACTICE TRIALS: CALIFORNIA JURY VERDICTS UNDER MICRA 32-33 (2004).

151. Eleanor D. Kinney et al., *Indiana's Medical Malpractice Act: Results of a Three-Year Study*, 24 IND. L. REV. 1275, 1288-89 (1991).

152. See Jenny Rivera, *The Violence Against Women Act and the Construction of Multiple Consciousness in the Civil Rights and Feminist Movements*, 4 J.L. & POL'Y 463, 498 (1996) (finding that minority women have a more difficult time gaining access to the American legal system); Schlegel, *supra* note 144, at 698.

153. Catherine M. Sharkey, *Unintended Consequences of Medical Malpractice Damages Caps*, 80 N.Y.U. L. REV. 391, 490 (2005) (showing that awards for overall damages have stayed the same while economic damages have increased, possibly because plaintiffs' lawyers have screened out women, minorities, and children who are less likely to receive high economic damages); Schlegel, *supra* note 144, at 698; Rachel Zimmerman & Joseph T. Hallinan, *As Malpractice Caps Spread, Lawyers Turn Away Some Cases*, WALL ST. J., Oct. 8, 2004, at A1 ("[C]aps on damages for pain and suffering . . . [are] turning out to have the unpublicized effect of creating two tiers of malpractice victims . . . [L]awyers are turning away cases involving victims that don't represent big economic losses—most notably retired people, children and housewives . . .").

154. Zimmerman & Hallinan, *supra* note 153, at A13 (citing Paula Sweeney, a Dallas trial lawyer who has handled medical malpractice cases for twenty-three years).

“essentially closed the courthouse door to the negligence that would kill a child, a housewife or an elderly person. [The reason is that] there are no medical expenses, no loss of earning capacity.”¹⁵⁵

To make matters worse, often only the prospect of punitive damages induces lawyers to take the cases of low-income plaintiffs such as women; their expected compensatory awards would not cover the lawyer's costs.¹⁵⁶ Caps on punitive damages thus result in attorneys disproportionately refusing to represent women and other low-income plaintiffs.

B. Disproportionate Impact on Death Rates

The harms from the disproportionate reduction in the amount of awards to women could perhaps be mitigated if tort reforms disproportionately benefited women in some other way. Unfortunately, I demonstrate in this Subpart that the opposite happens. I provide evidence that suggests that the reduced awards may also lead to disproportionate harms to women's health. I show that tort reforms are associated with reductions in deaths for men, but increases in deaths for women.¹⁵⁷

I first discuss how tort reforms might have disproportionate impacts on male and female death rates. I then use an empirical model and an extensive dataset to examine the relationship between tort reforms and men's and women's death rates.

1. A Theory of Disproportionate Impact

We have seen that tort reforms' impacts on health outcomes depend on the relative sizes of two conflicting forces: harms from doctors' reduced level of care and benefits from their increased activity levels. The results in Part II for the population as a whole showed that two reforms that imposed only modest reductions in liability were associated with improved health outcomes, while two more severe reforms were associated with worse

155. Stephen Daniels & Joanne Martin, *The Texas Two-Step: Evidence on the Link Between Damage Caps and Access to the Civil Justice System*, 55 DEPAUL L. REV. 635, 661 (2006) (quoting from an interview with a personal injury lawyer in Texas).

156. See Troy L. Cady, Note, *Disadvantaging the Disadvantaged: The Discriminatory Effects of Punitive Damage Caps*, 25 HOFSTRA L. REV. 1005, 1033 (1997) (“Lawyers will become increasingly unwilling to represent plaintiffs in lawsuits that have little or no prospect of yielding adequate compensation for the large amount of time and money invested . . .”).

157. A related discussion explaining the theoretical impact of noneconomic damage caps on health outcomes for African Americans, children, the elderly, and women can be found in Paul H. Rubin & Joanna M. Shepherd, *The Demographics of Tort Reform: Winners and Losers*, REV. L. & ECON. (forthcoming 2008), available at <http://law.bepress.com/alea/17th/art68>.

health outcomes. It appears then that the more that a reform decreases liability, the more that harms from the reduced level of care dominate benefits from the increased activity level.

Likewise, because reforms to noneconomic damages and punitive damages disproportionately reduce physicians' and hospitals' liability to women, adoption of these reforms should cause women's health outcomes to worsen disproportionately. In contrast, caps on total damages and reforms to the collateral source rule should have a disproportionately positive effect on women's health.

I now describe further why certain tort reforms might be expected to affect doctors' care levels and activity levels differently for men than for women, harming women's health outcomes.

a. Effects on Care Levels

Different reforms should have different relative impacts on the amount of care that physicians take when treating male and female patients. Noneconomic damage caps and punitive damage reforms would be expected to cause relative care levels to improve for men and worsen for women. Because these reforms reduce damages and limit legal access more for women, potential tortfeasors may shift their accident-reducing efforts to accidents suffered by men. Men would then have higher expected damages, greater access to lawyers, and so a greater tendency to sue. That is, because these tort reforms' reduction in compensation to women is proportionately larger than their reduction in compensation to men, the reduction in care levels toward potential female victims may also be larger.

The reason for the disproportionate reduction in care levels for women is an application of the fundamental economic principle of diminishing marginal returns.¹⁵⁸ Consider our earlier hypothetical example in which women's total damages declined 28 percent after a cap on noneconomic damages, but men experienced only a 5.5 percent decline.¹⁵⁹ Although each group experienced the same \$250,000 decrease in damages because of the cap (from \$4.5 million to \$4.25 million for men, and from \$900,000 to \$650,000 for women), the percentage reduction will cause care levels to decline more for the woman than for the man. For both the man and the woman, potential tortfeasors will have an incentive to reduce their spending on lowering risk by the same amount. For the man,

158. See COOTER & ULEN, *supra* note 12, at 320–22.

159. See *supra* notes 134–135 and accompanying text.

the reduction in spending will not cause risk to increase much. The potential tortfeasor has an incentive to eliminate the least productive precaution first. Even with the reduction, the potential tortfeasor is still investing in many other more productive safety precautions.

In contrast, for the woman, the same reduction in spending will cause a much greater decline in safety. As the potential tortfeasor's spending on safety declines toward zero, the safety precautions that are eliminated become ever more important.

For example, the \$250,000 reduction in liability toward the man might induce a reduction in the number of nurses from four to three. The \$250,000 reduction for the woman might induce a reduction in the number of nurses from one to none. As both intuition and the fundamental principle of diminishing marginal returns predict, the contribution of the single nurse to improving health outcomes far exceeds the fourth nurse's contribution.

Numerous studies have shown that gender disparities already exist in the treatment of many medical conditions. The American Medical Association's Counsel on Ethical and Judicial Affairs has documented evidence of gender disparities in treatment in a number of areas, including kidney transplantation, cardiac catheterization, and the diagnosis of lung cancer.¹⁶⁰ Other studies have found that women receive worse care for heart conditions,¹⁶¹ brain injury treatment,¹⁶² STD testing,¹⁶³ cancer treatment,¹⁶⁴

160. See generally AM. MED. ASS'N COUNCIL ON ETHICAL AND JUDICIAL AFFAIRS, GENDER DISPARITIES IN CLINICAL DECISION-MAKING (1990).

161. See, e.g., Christopher S. Hollenbeak et al., *Gender Disparities in Percutaneous Coronary Interventions for Acute Myocardial Infarction in Pennsylvania*, 44 MED. CARE 24 (2006); Paula A. Johnson et al., *Gender Differences in the Management of Acute Chest Pain*, 11 J. OF GEN. INTERNAL MED. 209 (1996); Thomas H. Lee, Editorial, *Gaps in Quality of Cardiovascular Care Transcend Social Bias*, 102 CIRCULATION 943 (2000); Mark Petticrew et al., *Coronary Artery Surgery: Are Women Discriminated Against?*, 306 BRITISH MED. J. 1164 (1993); Viola Vaccarino et al., *Sex and Racial Differences in the Management of Acute Myocardial Infarction, 1994 through 2002*, 353 NEW ENG. J. MED. 671 (2005).

162. See, e.g., Jeffrey J. Bazarian et al., *Ethnic and Racial Disparities in Emergency Department Care for Mild Traumatic Brain Injury*, 10 ACAD. EMERGENCY MED. 1209 (2003).

163. See, e.g., Michael Garfinkel & Howard Blumstein, *Gender Differences in Testing for Syphilis in Emergency Department Patients Diagnosed With Sexually Transmitted Diseases*, 17 J. EMERGENCY MED. 937 (1999).

164. See, e.g., John H. Austin et al., *Missed Bronchogenic Carcinoma: Radiographic Findings in 27 Patients With a Potentially Resectable Lesion Evident in Retrospect*, 182 RADIOLOGY 115 (1992); Daniel D. Lydiatt, *Medical Malpractice and Cancer of the Larynx*, 112 LARYNGOSCOPE 445 (2002); Michael J. McFarlane et al., *Necropsy Evidence of Detection Bias in the Diagnosis of Lung Cancer*, 146 ARCHIVES INTERNAL MED. 1695 (1986).

treatment for renal disease,¹⁶⁵ and HIV treatment.¹⁶⁶ Several studies have found unequal treatment in ERs.¹⁶⁷ One reason for this is that, even without tort reforms, expected damages payments for women are lower than for men.

Noneconomic damage caps and punitive damage reforms could widen these differences. If differences in medical care already exist, it is plausible that these tort reforms' reduction in expected damages for women could exacerbate the differences; the tort reforms may further reduce the incentives of doctors and hospitals to take care when treating female patients, worsening women's health outcomes.

In contrast, caps on total damages and collateral source reforms would be expected to have the opposite relative effect on levels of care. Because male victims have traditionally received larger damage awards,¹⁶⁸ caps on total damages will disproportionately reduce tortfeasors' liability to male victims. Thus, this reform may also disproportionately reduce the quality of care for men.

Similarly, although collateral source reform may not disproportionately reduce the recovery that plaintiffs receive,¹⁶⁹ it will often disproportionately reduce the liability that tortfeasors pay. As previously discussed,¹⁷⁰ if a plaintiff's own health and disability insurance and her employer's workers' compensation insurance have compensated her for all of her economic damages, then collateral source reforms may completely eliminate the defendant's liability.¹⁷¹ Because men tend to have greater economic damages than women due to men's larger average earnings, collateral source

165. See, e.g., G. Caleb Alexander & Ashwini R. Sehgal, *Barriers to Cadaveric Renal Transplantation Among Blacks, Women, and the Poor*, 280 J. AM. MED. ASS'N 1148 (1998); C.M. Kjellstrand & George M. Logan, Editorial, *Racial, Sexual and Age Inequalities in Chronic Dialysis*, 45 NEPHRON 257 (1987).

166. See, e.g., Kelly A. Gebo et al., *Racial and Gender Disparities in Receipt of Highly Active Antiretroviral Therapy Persist in a Multistate Sample of HIV Patients in 2001*, 38 J. ACQUIRED IMMUNE DEFICIENCY SYNDROMES 96 (2005).

167. See, e.g., Bazarian et al., *supra* note 162; Rita K. Cydulka et al., *Gender Differences in Emergency Department Patients With Chronic Obstructive Pulmonary Disease Exacerbation*, 12 ACAD. EMERGENCY MED. 1173 (2005); Garfinkel & Blumstein, *supra* note 163; Liliana E. Pezzin et al., *Disparities in the Emergency Department Evaluation of Chest Pain Patients*, 14 ACAD. EMERGENCY MED. 149 (2007).

168. See Finley, *supra* note 22, at 1266.

169. For example, assume that both a man and a woman are victims of medical negligence. For each of them, health insurance covers additional medical costs, and disability insurance covers lost income. Collateral source reforms would result in each of them receiving 50 percent lower recovery than they would have before the reform: Before the reform, they recovered twice—once from insurance and once from the doctor or hospital; now they recover only once.

170. See *supra* Part I.C.4.

171. The plaintiff's insurer will also be unable to recover from the defendant if, as in some states, the state prohibits subrogation of the plaintiff's claim against the defendant.

reform will tend to reduce men's awards more than women's awards. As with total damage caps, care levels for men might decline more than for women, producing more deaths for men.

b. Effects on Activity Levels

Increases in activity levels from tort reforms also tend to have disproportionate effects on men's and women's health outcomes. Studies suggest that tort reforms generally have the greatest impact on the activity levels of ER physicians and specialty care physicians; these physicians are more likely to leave states without tort reforms or to limit the procedures they offer.¹⁷²

Tort reforms' health impacts would be expected to focus on the patients served by both the new doctors and additional procedures. They are the patients who benefit if the new doctors are careful, or who suffer if the new doctors are careless. The primary patients are men. Women between the ages of eighteen and forty-four are only about half as likely as men to visit the ER because of an injury.¹⁷³ Similarly, women visit specialty care physicians much less than men.¹⁷⁴

Because tort reforms have the greatest impact on the activity levels of physicians whose clients are primarily male, the health outcomes of these groups should be more affected by tort reforms' activity-level effects. Thus, for severe reforms that have been found to worsen health outcomes because the harms of reduced care levels dominate the benefits of increased activity levels, such as total damage caps and collateral source reforms, we would expect the harms to be greatest for men. Similarly, for more modest reforms like noneconomic damage caps and punitive damage reforms that have been found to improve health outcomes, we would expect the improvements to be the greatest for men.¹⁷⁵

c. Predicted Net Effects

Thus, theories about care-level effects and activity-level effects both predict the same disproportionate impact on health outcomes. The

172. See *supra* notes 75–90 and accompanying text.

173. See NAT'L CTR. FOR HEALTH STATISTICS, HEALTH, UNITED STATES, 2005, at 312–13 tbl.89 (2005), <http://www.cdc.gov/nchs/data/hus/hus05.pdf>.

174. See *id.* at 315 tbl.90.

175. However, women may also disproportionately benefit from tort reforms that increase their access to OB/GYNs. See Rubin & Shepherd, *supra* note 157.

care-level predictions are based on a tort reform's disproportionate reduction in compensation. The activity-level predictions are based on both information about the primary clients of doctors affected by tort reforms and findings about the impact of the individual tort reforms on overall accident rates.

For noneconomic damage caps and punitive damage reforms, both the care-level effects and activity-level effects should have disproportionate increasing effects (increase death rates by more or reduce death rates by less) on women's death rates. That is, under these reforms, doctors should take less care treating women patients, and men should be the primary beneficiaries of increases in physician supply resulting from these reforms.

In contrast, for total damage caps and collateral source reforms, both the care-level effects and activity-level effects should have disproportionate increasing effects on men's death rates. First, these reforms should disproportionately reduce the care that doctors take when treating male patients. Second, because men are the primary clients of doctors affected by these reforms, and because these reforms have been found to worsen health outcomes, we would expect the harms to be greatest for men.

There are no clear theoretical predictions about the care-level effects and activity-level effects of other reforms such as joint and several liability reform and periodic payments reform. There is no evidence that these reforms disproportionately reduce compensation to either male or female plaintiffs, resulting in disproportionate care-level effects. Similarly, these reforms have not been found to have statistically significant relationships with death rates. Thus, it is unclear whether the primary clients of the doctors affected by these reforms would be disproportionately benefited or harmed.

2. Empirical Analysis of Tort Reforms' Disproportionate Impacts

I now test whether the relationship between tort reforms and death rates differs between men and women.¹⁷⁶ Again, I use accidental non-motor-vehicle death rates as a proxy for health outcomes.¹⁷⁷ However, to determine if the relationship differs between the genders, I now separately examine the death rates of each gender. I estimate an equation that resembles Equation 1 in the primary model. The equation is:

176. I conducted a related analysis testing the impact of tort reform on several disadvantaged groups—African Americans, children, the elderly, and women. See Rubin & Shepherd, *supra* note 157.

177. See *supra* note 98 and accompanying text.

(2)

$$DEATHRATE_{i,t} = \alpha + \beta_1 REFORM_{i,t} + \beta_2 Z_{i,t} + \beta_3 X_{i,t} + \beta_4 s_i + \beta_5 y_t + \varepsilon_{i,t}$$

where *DEATHRATE* is each gender's accidental, non-motor-vehicle death rate in state each state and year. I estimate the equation separately for men and women.¹⁷⁸

Most of the other variables are similar to those in Equation 1. *REFORM* includes the same six tort reform indicator variables: noneconomic damage caps, punitive damage reforms, total damage caps, collateral source rule reforms, joint and several liability reforms, and periodic payments reforms. I examine all six reforms, not just the three reforms that I used as examples in Subpart B.1.

In *Z*, I include state-level controls that are the same for both genders in a given year: the unemployment rate, real per capita personal income, per capita alcohol consumption, and the number of hospital beds per capita. These variables control for earning opportunities, risky behavior, and the availability of medical services, all factors that may influence death rates.

In *X*, I include gender-specific measures of certain demographic variables both to control for additional differences between the genders and to isolate better the effects of the tort reforms on death rates. It includes state-level controls that are specific to each gender in each year; these are the percentage of each gender that is African American, the percentage of each gender that is age four and under, and the percentage of each gender that is age sixty-five and older. These age and race variables capture differences in risk preferences, differences in earning opportunities, and differences in the likelihood of suffering certain injuries.

Once again, the model includes an indicator, *s*, for each state that captures unobservable differences among states that are constant over time, and a year indicator, *y*, that measures any factors that change over time in all states. All regressions are weighted least squares with weights based on the relevant gender's state population, and robust standard errors are used to compute t-statistics. The estimations use the same dataset as before: state-level data from all fifty states for the period 1981–2000.

Table 5 summarizes the results for the tort reform variables. Table 6 uses the coefficients in Table 5 to calculate real-world magnitudes of the relationship between tort reforms and gender-specific death rates. That is,

178. I estimate Equation 2 in levels instead of logs as in my previous article, see Rubin & Shepherd, *supra* note 157, so that Equations 1 and 2 are consistent. The results from the log estimations are generally the same.

Table 6 presents the number of deaths for each gender that were associated with tort reforms in the year 2000 for the entire United States.

In both Tables 5 and 6, the results for men are similar to the overall results presented in Table 2. The negative and significant coefficients on noneconomic damage caps and punitive damage reforms indicate that these reforms are associated with decreases in men's death rates. The positive and significant coefficients on total damage caps and collateral source reforms indicate that these reforms are associated with increases in men's death rates.

The results for women are different. As Tables 5 and 6 show, the direction of the impacts of the various reforms on men and women is generally the same. In the women's estimations, as in the men's estimations, noneconomic damage caps are associated with decreases in death rates, and total damage caps and collateral source reform are associated with increases in death rates.

However, the magnitudes of the relationships for all of these female variables are dramatically less than the magnitudes for the corresponding male variables. Noneconomic damage caps are associated with decreases in deaths for both genders, but men experience much larger decreases. Total damage caps and collateral source reforms are associated with increases in deaths for both genders, but men experience substantially larger increases. Moreover, unlike for men, the coefficient on punitive damage reforms in the female estimation is statistically insignificant. This indicates that, unlike for men, punitive damage reform is not associated with reductions in deaths for women.

TABLE 5: EFFECTS OF TORT REFORMS ON DEATH RATES:
GENDER-SPECIFIC ESTIMATIONS¹⁷⁹

Tort Reform	Men	Women
Noneconomic Damage Caps	-1.28 (4.02)*	-0.445 (2.31)*
Punitive Damage Reform	-0.855 (2.67)*	-0.208 (1.33)
Total Damage Caps	1.87 (3.66)*	0.983 (4.65)*
Collateral Source Reform	0.97 (3.06)*	0.779 (3.70)*
J&S Liability Reform	0.433 (1.33)	0.068 (0.37)
Periodic Payments	0.026 (0.08)	-0.033 (0.16)

TABLE 6: REAL-WORLD MAGNITUDES¹⁸⁰

Tort Reform	Average Change in the Number of Deaths in 2000 Associated With Each Tort Reform	
	Men	Women
Noneconomic Damage Caps	-534	-190
Punitive Damage Reform	-1007	—
Total Damage Caps	234	127
Collateral Source Reform	802	663
J&S Liability Reform	—	—
Periodic Payments	—	—
Net Effect	-505	600

The results are consistent with my theoretical predictions. Noneconomic damage caps and punitive damage reforms benefit women less than men; these reforms should disproportionately reduce care levels for women, and

179. Estimated coefficients and the absolute values of t-statistics are in parentheses; * represents significance at the 1 percent level.

180. The coefficients in Table 5 are the partial derivatives of group-specific deaths per 100,000 population with respect to the enactment of each tort reform. Thus, the number of deaths associated with each tort reform is given by β_i *(group-specific population in tort reform states/100,000).

women should benefit less from these reforms' increases in activity levels. Conversely, total damage caps and collateral source reforms harm men more than women; these reforms should disproportionately reduce care levels for men, and men should be harmed more by these reforms because they are the primary clients of the doctors affected by these tort reforms.

Most significantly, using Table 6 to add up the changes associated with the various reforms demonstrates that all the tort reforms together are associated with a net decrease in male deaths but a net increase in female deaths. The results suggest that the harm from tort reforms' disproportionate reduction in compensation to women is not offset by disproportionate benefits to women in health outcomes. Instead, the tort reforms appear to harm women both by reducing their compensation and by leading to more women's deaths.

To test the robustness of the reforms' differential impact on the genders, I used the sophisticated difference-in-difference-in-difference model. The model's results confirm the primary model's findings. Appendix 3 describes the model, its virtues, and the results.¹⁸¹

V. PROPOSALS FOR NONLETHAL, NONDISCRIMINATORY TORT REFORMS

The empirical analyses in this Article suggest that the medical malpractice tort reforms have three unintended consequences. Some of the reforms are associated with increases in death rates in the reforming state. Some are associated with increases in death rates in neighboring states. Some discriminate against women; they reduce women's compensation and are associated with increases in women's death rates.

Many critics of the tort reforms argue that the reforms should be eliminated altogether.¹⁸² However, they fail to recognize that several tort reforms may provide benefits by increasing the supply of physicians and procedures and, in turn, improving health outcomes. In this Part, I propose various alternative tort reforms that should retain these benefits while eliminating or reducing tort reforms' unintended consequences. My proposals are preliminary and do not provide a complete analysis of costs and benefits. However, the proposals describe beneficial reforms' general nature.

181. See *infra* app. 3.

182. These sources suggest that the authors would prefer to abolish tort reform: See, e.g., Schlegel, *supra* note 144, at 699; Rustad, *supra* note 144, at 759; Koenig & Rustad, *supra* note 134, at 87 (1995).

A. Abolishing Two Reforms

Abolishing total damage caps and collateral source reform may be appropriate because they both have two major defects that likely offset the benefits from reduced litigation costs.

First, total damage caps and collateral source reform limit awards more severely than do other reforms. Moreover, their limits apply most strictly to the victims who have suffered the worst injuries.

Total damage caps limit the victim's entire recovery, including core compensatory damages, rather than limiting only a controversial subpart of the recovery, such as noneconomic damages or punitive damages. Moreover, total damage caps ruthlessly limit the compensation of the most severely injured plaintiffs. Suppose that a victim of medical malpractice suffers a permanent disability that, for the rest of his life, will make him unable to work, will consume considerable medical expenses, and will result in permanent suffering. Millions of dollars will be needed to pay the victim for just his out-of-pocket expenses, let alone for his pain and suffering or punitive damages. However, most caps on total damages impose limits of \$500,000 to \$1.25 million.¹⁸³ This deserving victim will be compensated for only a small fraction of his actual costs.

Likewise, medical malpractice collateral source reforms harshly limit compensatory awards. In many states, such reforms do not give to collateral sources, such as insurers, a right of subrogation.¹⁸⁴ This means that defendants in these states pay only the portion of the plaintiff's damages that is not paid by the collateral source; the insurer cannot seek reimbursement for its payments to the victim. For the many victims of medical malpractice who receive payments from their health insurers, disability insurers, and workers' compensation providers, this reform often results in tortfeasors paying no, or substantially reduced, damage awards. These tortfeasors are neither punished for their wrongdoing nor deterred from committing future wrongs.

The second major defect of total damage caps and collateral source reform is that they both are associated with thousands more deaths each year in reforming states. The numbers are large: Approximately 416 more fatalities per year are associated with total damage caps, and approximately 1498 more for collateral source reform.¹⁸⁵

183. See Avraham, *supra* note 1.

184. *Id.*; see *supra* note 110.

185. See *supra* p. 941 tbl.3.

B. Reducing the Discriminatory Impact

In contrast, two other reforms—noneconomic damage caps and punitive damage reforms—appear to produce various benefits. One of the benefits is that they are associated with reductions in deaths in the reforming state. However, the two reforms also impose unnecessary costs and unfairness. Both reforms discriminate against women; they disproportionately limit women's compensation and are associated with disproportionately worse health outcomes for women. And at least one of the reforms—noneconomic damage caps—is associated with additional deaths in neighboring states.

I address the discriminatory impacts first, and then offer variations to both reforms that reduce their disproportionate harm to women.¹⁸⁶

1. Reforming Noneconomic Damage Reforms

Existing versions of noneconomic damage caps produce both benefits and harms. They benefit the states in which they are adopted by making liability costs more predictable and consistent, increasing the supply of doctors and medical procedures. My results suggest that, in turn, they improve health outcomes in the reforming states.

However, this reform also may lead to two harms. First, it is associated with increasing death rates in neighboring states, suggesting that this reform drains doctors away from nonreform states. Second, the reform not only reduces compensation to all plaintiffs, it disproportionately reduces compensation to women.¹⁸⁷ The reform does not make up for the disproportionate reduction in compensation to women by providing other disproportionate benefits to women. Instead, it is associated with disproportionate improvements in health outcomes for men, not women.

I now discuss a modification of this reform that retains its benefits, but eliminates its harms. A reform that reduced total damages, not just noneconomic damages, by a specified percentage should retain the reform's current benefits while reducing the disproportionate harm to

186. Whether tort law should correct existing discrimination is controversial. See Kyle Logue & Ronen Avraham, *Redistributing Optimally: Of Tax Rules, Legal Rules and Insurance*, 56 TAX L. REV. 157 (2003).

187. See Chamallas & Kerber, *supra* note 137; Ruda, *supra* note 140, at 207 ("While the relevant tort rules have never been explicitly gender-based, the tort system has traditionally burdened women and correspondingly benefitted men. This burden has been the result of the marginalization of claims brought by female plaintiffs. This process is evidenced by the use of apparently neutral rules that have burdened women, and in the treatment traditionally accorded to emotional injuries, such as fright, and loss of consortium." (internal quotation marks omitted)).

women. That is, all compensatory damages—both economic and noneconomic—could be reduced by a specified percentage.

That percentage could be determined in two ways. First, state legislatures could determine a percentage reduction that conforms to the goals and values of the state's citizens. Some states might choose to reduce damage awards by 20 percent, while the reduction in other states would be 30 percent.

As a second alternative, the reforming state could establish a percentage reduction that would achieve the same reduction in total damages that the existing noneconomic damage caps achieve. Previous studies of the impacts of noneconomic damage caps have calculated the reduction in total damages that the caps have caused. For example, in Alabama, noneconomic damage caps have been found to reduce total awards by 38 percent.¹⁸⁸ In California, the caps have reduced total damages in jury verdicts by 34 percent.¹⁸⁹

The current caps on noneconomic damages achieve these average reductions in total awards by reducing the compensation to some plaintiffs much more than others. The reductions in total damage awards resulting from noneconomic damage caps range from 2 percent to 82 percent for nonfatal injuries, and from 6 percent to 88 percent for fatal injuries.¹⁹⁰ And the reductions are greater for women than for men.¹⁹¹

Rather than achieving a reduction of whatever size is sought by having low percentage reductions for men and high percentage reductions for women, the same average reduction could be achieved by reducing each damage award by the average reduction. For example, based on the studies in the previous paragraph, if a state decides it wants to reduce medical malpractice damages by an average of 34 percent, it could reduce all awards by this amount. This would replace the previous approach of higher reductions for women and lower reductions for men. All claims within each category would be reduced by the same amount. Rather than the current noneconomic damage caps that cut most severely from women's awards, a set percentage reduction would take the same percentage from all plaintiffs.

The proposal would also eliminate the existing caps' regressive discrimination against plaintiffs with severe injuries. Current noneconomic damage reforms cut more money from awards for severe injuries than awards

188. Albert Yoon, *Damage Caps and Civil Litigation: An Empirical Study of Medical Malpractice Litigation in the South*, 3 AM. L. & ECON. REV. 199, 215–16 (2001).

189. Studdert et al., *supra* note 105, at 54.

190. *Id.* at 62.

191. See *supra* notes 149–151 and accompanying text.

for mild injuries. For example, a cap of \$250,000 on noneconomic damages will not reduce the damage award for a plaintiff whose injuries are so modest that noneconomic damages are less than \$250,000. In contrast, the cap will reduce the damage award for a severely injured plaintiff whose noneconomic damages are \$1 million by \$750,000. Indeed, data show that noneconomic damage caps produce the greatest reductions in total awards for victims of the worst injuries: brain damage, para- or quadriplegia, and cancer.¹⁹²

The proposal should permit states to continue to enjoy the same benefits provided by caps on noneconomic damages, including lower medical malpractice insurance premiums and lower general insurance premiums, increases in the number of doctors, and improved health outcomes. This is because the benefits of current caps result from their reduction of expected liability costs, and the proposal retains the same reductions.

A potential problem with this proposal is that juries will nullify it. The reform would lose its beneficial effect if jurors who know that a reform will reduce a plaintiff's award by 34 percent award the plaintiff 34 percent higher damages than they would have without the reform. This is a real danger. Several studies have shown that when jurors know that tort reforms will reduce the plaintiff's award, they often find ways to circumvent the reforms in order to ensure that the plaintiff receives the amount that the jury thinks is appropriate.¹⁹³

The proposal therefore must offer a more structured method for calculating the damages from which the reform percentage would be subtracted. Several possibilities exist. Scholars have proposed various ways of standardizing nonpecuniary damages, especially pain and suffering.¹⁹⁴ Some have proposed schedules under which plaintiffs would receive specified noneconomic damage amounts based on their observable injuries, regardless of their idiosyncratic nonpecuniary harms.¹⁹⁵ Others have suggested the use of matrices that standardize awards based on the victim's age and the severity

192. See W. KIP VISCUSI, *REFORMING PRODUCTS LIABILITY* 105–07 (1991) (noting that data show that most severe injuries are undercompensated).

193. For example, Catherine Sharkey recently has found that some juries increase the amount awarded for economic losses to make up the difference between noneconomic damage caps and the compensation they think is desirable. See Sharkey, *supra* note 153, at 482 n.397 (citing Studdert et al., *supra* note 105, at 64).

194. A thorough discussion of different proposals can be found in Ronen Avraham, *Putting a Price on Pain-and-Suffering Damages: A Critique of the Current Approaches and a Preliminary Proposal for Change*, 100 NW. U. L. REV. 87 (2006).

195. See, e.g., Danzon, *supra* note 28, at 533.

of her injury.¹⁹⁶ The American Law Institute has suggested using guidelines based on a scale of inflation-adjusted damage amounts attached to a number of disability profiles of different severities.¹⁹⁷ Still others have recommended informing juries or judges of patterns of awards in comparable cases.¹⁹⁸

The most recent proposal to standardize noneconomic damages is an age-adjusted multiplier that calculates pain and suffering as a multiplier of medical costs.¹⁹⁹ For most types of injuries, medical costs are correlated with the severity of pain, inconvenience, and emotional distress. Thus, a multiplier of medical costs may provide an objective way to value pain and suffering.

Once noneconomic damages have been calculated using one of these methods, the desired percentage reduction could be taken from the total damage award.

When combined with a structured method for calculating damages, the set-percentage-reduction approach to tort reform would have several benefits. First, it would make damages more predictable; because of the use of the structured method of calculating noneconomic damages, total damage awards would be more consistent. Second, because the reform would impose a percentage reduction rather than a cap, the reform would not disproportionately harm the severely injured victim who has suffered catastrophic losses. Third, the bias that exists in reforms that target only noneconomic damages would be eliminated so that these reforms would no longer disproportionately harm women's compensation.

Fourth, the alternative caps should still attract more doctors and, in turn, improve health outcomes. Men would likely remain the primary beneficiaries of this increase in physician supply, because they are the primary clients of the main types of physicians who tend to be attracted to states that adopt tort reforms.²⁰⁰ However, women's health outcomes would also be better than without this tort reform; my empirical analysis indicates that noneconomic damage caps are associated with reductions in female

196. See, e.g., Bovbjerg et al., *supra* note 29, at 939–42.

197. See 2 AM. LAW INST., ENTERPRISE RESPONSIBILITY FOR PERSONAL INJURY: APPROACHES TO LEGAL AND INSTITUTIONAL CHANGE 202, 221–23 (1991).

198. See, e.g., David Baldus et al., *Improving Judicial Oversight of Jury Damages Assessments: A Proposal for the Comparative Additur/Remittitur Review of Awards for Nonpecuniary Harms and Punitive Damages*, 80 IOWA L. REV. 1109 (1995); Bovbjerg et al., *supra* note 29; Shari Seidman Diamond et al., *Juror Judgments About Liability and Damages: Sources of Variability and Ways to Increase Consistency*, 48 DEPAUL L. REV. 301 (1998). Some appeals courts that review damages awards already do this, carefully comparing the award in the case before them with awards from other cases. See, e.g., *Martell v. Boardwalk Enters., Inc.*, 748 F.2d 740 (2d Cir. 1984).

199. See Avraham, *supra* note 194, at 90.

200. See *supra* text accompanying notes 173–174.

death rates, although the reductions are smaller than for men.²⁰¹ Finally, the set-percentage-reduction method would still achieve all of the goals of compensation and insurance that current versions of caps on noneconomic damages achieve.²⁰²

2. Reforming Punitive Damage Reforms

Current reforms to punitive damages also have harms and benefits. They prevent overly excessive and arbitrary awards, and they are associated with improvements in overall health outcomes. However, like noneconomic damage caps, punitive damage reforms disproportionately harm women in two ways: They disproportionately reduce compensation to women and are associated with disproportionate improvements in health outcomes for men. Thus, ideally, punitive damage reforms could produce the benefits of the existing reforms, but without causing disproportionate harms to women.

A first focus of the reforms should be the variant of punitive damage caps that inflicts the most disproportionate reduction in women's awards: provisions that cap punitive damage awards at some multiple of compensatory damages. Because men tend to earn more than women, the average compensatory awards for male plaintiffs is significantly higher than the average compensatory award for female plaintiffs.²⁰³ Thus, these reforms effectively establish a high male limit on punitive damages, but a significantly lower, more restrictive female limit. At the very least, reforms of punitive damage caps should eliminate the multiplier approach.

201. See *supra* p. 959 tbl.6.

202. Notice that the set-percentage reduction from total damages is fairer than total damage caps and should have better impacts on health for three reasons. First, my proposal's impacts will be more consistent and far less severe. My proposal will always reduce a damage award by a fixed percentage, regardless of the award's size. In contrast, the total damage cap will impose a percentage reduction that varies with the size of the judgment. A \$500,000 cap will impose no reduction on a \$400,000 judgment. On a \$10 million judgment, however, it will impose a catastrophic 95 percent reduction. Second, my proposal will be much fairer to plaintiffs who are severely injured. As the example showed, the total damage cap harms the severely injured plaintiff much more than the mildly injured plaintiff. The total damage cap imposed a 95 percent reduction on the severely injured plaintiff's award, including on her compensatory damages. The award of the mildly injured plaintiff completely escaped reduction. In contrast, my proposal will ensure that awards for both plaintiffs are reduced by the same amount. Third, my proposal will create less moral hazard, and it will probably save lives, rather than causing additional deaths. We have seen that total damage caps cause the state's death rate to increase. The caps limit awards so severely that the beneficial effect of new doctors performing more procedures is dominated by the harms from a plunge in doctors' level of care. In contrast, my proposal should save lives, because it will reduce liability the same moderate fraction as the reforms that reduce the death rate.

203. See *supra* note 134 and accompanying text.

Recent punitive damage reforms proposed by Cass Sunstein and coauthors²⁰⁴ might also reduce the discriminatory nature of current caps. For example, these authors suggested granting more authority over punitive damages to judges.²⁰⁵ If judges more objectively grant punitive damage awards than juries, then this approach might increase consistency and reduce excessive punitive damage awards without the discriminatory impact. Judges could be granted the complete authority to set the level of punitive damages, just as judges decide the appropriate level of criminal punishment.²⁰⁶ A similar, but more moderate approach would be to require the trial judges to supervise punitive damage awards to prevent excess or arbitrariness.²⁰⁷

However, it is uncertain whether even complete replacement of juries with judges for deciding punitive damages would change punitive damage awards substantially. Indeed, evidence from recent studies is mixed over whether there is any difference in the frequency, size, and consistency of punitive damage awards by judges and juries.²⁰⁸

Another potential reform suggested by Sunstein and coauthors that might reduce the discriminatory nature of current caps would be to allow (or require) trial judges or juries to ensure that a punitive damage award conforms to other awards in similar cases. A comparison approach would not be foreign to courts. Appellate courts that review punitive damage awards often use such scaling through comparisons.²⁰⁹ Moreover, the Supreme Court, while not insisting on a comparison with other punitive awards, has indicated that it would not “rule out the possibility that the fact that an award is significantly larger than those in apparently similar circumstances”

204. See CASS R. SUNSTEIN ET AL., PUNITIVE DAMAGES: HOW JURIES DECIDE 242–58 (2002).

205. See *id.* at 248–52.

206. See *id.*

207. See *id.* at 249.

208. Compare Theodore Eisenberg et al., *Juries, Judges, and Punitive Damages: An Empirical Study*, 87 CORNELL L. REV. 743 (2002) (finding that punitive damages awarded by judges and juries are similar in frequency and size), with Joni Hersch & W. Kip Viscusi, *Punitive Damages: How Judges and Juries Perform* (Harvard-Olin Ctr. for Law, Econ., and Bus., Discussion Paper No. 362, 2002) (finding that jury awards of punitive damages are more unpredictable, significantly larger, and significantly more frequent.).

209. See SUNSTEIN ET AL., *supra* note 204, at 250. Cases featuring appellate review of punitive awards using comparison cases include *Kimzey v. Wal-Mart Stores, Inc.*, 107 F.3d 568 (8th Cir. 1997); *Lee v. Edwards*, 101 F.3d 805 (2d Cir. 1996); *Allahar v. Zahora*, 59 F.3d 693 (7th Cir. 1995); *Klein v. Grynberg*, 44 F.3d 1497 (10th Cir. 1995); *Stafford v. Puro*, 63 F.3d 1436 (7th Cir. 1995); *King v. Macri*, 993 F.2d 294 (2d Cir. 1993); *Ross v. Black & Decker, Inc.*, 977 F.2d 1178 (7th Cir. 1992); *Vasbinder v. Scott*, 976 F.2d 118 (2d Cir. 1992); *Michelson v. Hamada*, 36 Cal. Rptr. 2d 343 (Ct. App. 1994); *Wollersheim v. Church of Scientology*, 6 Cal. Rptr. 2d 532 (Ct. App. 1992); *Baume v. 212 E. 10 N.Y. Bar Ltd.*, 634 N.Y.S.2d 478 (App. Div. 1995); *Parkin v. Cornell University, Inc.*, 581 N.Y.S.2d 914 (App. Div. 1992).

may be relevant to determining the constitutionality of punitive damage awards.²¹⁰ Such changes would eliminate some arbitrariness and would produce greater consistency in awards. Yet, large awards could still be imposed when warranted.

Another alternative would be for a state to completely eliminate the discretionary role of the judge and jury in deciding punitive damage awards and, instead, to create a schedule of punitive damages. A state's schedule could be consistent with the goals and values of the state's citizens, and could be informed by specialists. Such a system would resemble well-established examples of administrative officials imposing penalties, including the system of workers' compensation, criminal sentencing guidelines, social security disability determinations, and civil fines imposed by administrative agencies such as the Environmental Protection Agency, the Internal Revenue Service, and the Occupational Safety and Health Administration.²¹¹ This approach would also eliminate inconsistency, prevent inappropriately excessive awards, and preclude the disproportionate reduction in awards to women under most current reforms.²¹²

Although the possible changes in punitive damages law that I have discussed so far may produce these benefits, they will not necessarily reduce the size of the awards. Indeed, some reforms, such as the elimination of limits based on a multiple of economic damages, may increase the awards' size. The greater consistency of awards may improve health incomes; doctors may increase their activity levels in response to the reduced risk of a ruinous punitive award.

However, to retain the existing substantial improvements in health outcomes, further reforms may be needed to maintain the low average levels of punitive awards under current reforms. States could employ a variant of my proposal for noneconomic damages. They could replace current reforms with a requirement that all awards of punitive damages be reduced a percentage that would be equal to the average reduction under current reforms. Of course, as with my noneconomic damage proposal, a set-percentage reduction of punitive damages would require that the punitive damages were originally set by a structured method to prevent juries from circumventing the reforms. Any of the proposals above—increased discretion by judges over punitive damage awards, a comparison of awards with similar cases, or determining

210. TXO Prod. Corp. v. Alliance Res. Corp., 509 U.S. 443, 458 (1993).

211. See SUNSTEIN ET AL., *supra* note 204, at 253–54.

212. For potential problems with this and other proposals, see Neal R. Feigenson, *Can Tort Juries Punish Competently?*, 78 CHI.-KENT L. REV. 239 (2003) (reviewing SUNSTEIN ET AL., *supra* note 204).

awards by a predetermined schedule—should standardize punitive damage awards. This approach should produce the same health benefits as current reforms. However, it would ensure that these benefits do not impose disproportionate burdens on women.

C. Reducing the Doctor Drain

My empirical analysis showed that at least noneconomic damage caps, and possibly other reforms, are associated with increases in death rates in neighboring states. The results suggest that because tort reforms in one state attract physicians from neighboring states, the quality of care declines in those neighboring nonreform states. The only way that the tort reforms in one state will not impose harms on neighboring states is if all states have the reforms—or if all states have none. The trend is in the direction of more reforms, as ever more states enact the new rules.

Reform at the federal level would more quickly achieve consistency among states. However, federal reform has disadvantages. Although federal tort reform would ensure that small differences in state tort reforms, such as different cap amounts, did not influence doctor relocations, it would also prevent states from enacting improved reforms that were consistent with their citizens' unique values and preferences.

Moreover, federal tort reform would reduce the health benefits that a state now reaps from state-level tort reforms; because the reforms would now occur in all states, doctors would no longer relocate to the reform state in response to the reform's adoption. Nevertheless, some improvements may still occur if tort reforms increase patients' access to care and beneficial procedures, or if tort reforms attract some new doctors into the profession who might have chosen other careers or dissuade doctors from retiring early.²¹³

In sum, although federal tort reform may produce some benefits by reducing doctor drain, it may also produce substantial costs by reducing health improvements and by preventing states from enacting their preferred tort reforms.

213. This is confirmed both by empirical studies of the types of doctors affected by tort reform, see Kessler et al., *supra* note 81, and by the raw data on trends in physician supply. Between 1991 and 2001, a period during which states were rapidly adopting medical malpractice tort reforms, the number of physicians in the United States increased by 26 percent. GENERAL ACCOUNTING OFFICE, PHYSICIAN WORKFORCE: PHYSICIAN SUPPLY INCREASED IN METROPOLITAN AND NONMETROPOLITAN AREAS BUT GEOGRAPHIC DISPARITIES PERSIST 2 (2003), <http://www.gao.gov/new.items/d04124.pdf>.

CONCLUSION

This study explored the relationship between medical malpractice tort reforms and death rates. It demonstrated that both the care-level effects and activity-level effects of the tort reforms are important, and the relative importance of each varies by reform and by situation. However, the results also suggest that the tort reforms may produce three unintended harms. First, two of the reforms—caps on total damages and collateral source reforms—are associated with increases in the number of deaths. Second, the reforms are associated with increasing deaths in neighboring nonreform states. This result suggests that tort reforms lure doctors from neighboring states and, in turn, worsen health outcomes there. Third, the reforms disproportionately harm women. They disproportionately reduce women's tort awards. Moreover, in contrast to the reforms' relationship with men's deaths, they are associated with increases in women's deaths.

Policymakers should understand the competing care-level and activity-level effects, and the potential harms they produce, as they consider future tort reform legislation. In Part V, I proposed several modifications to the reforms that would help retain their benefits, while reducing their harms.

If these relationships between tort reforms and deaths also hold for future reforms, then my results can reveal the likely consequences of current legislation. For example, two medical malpractice bills before Congress would impose, among other things, a \$250,000 cap on noneconomic damages, a cap on punitive damages that limits the awards to twice the compensatory damages, and a collateral source reform without the right of subrogation.²¹⁴ Both the noneconomic damage caps and the punitive damage reform should attract more doctors to the medical profession and, as my results suggest, improve health outcomes and reduce death rates. However, the two reforms would disproportionately reduce the compensation to female plaintiffs, without an offsetting disproportionate improvement in women's health outcomes. Because it does not include a subrogation right, the collateral source reform would allow some negligent doctors and hospitals to pay their victims little or no damages. My results imply that this might reduce doctors' incentives to take care, worsening health outcomes and increasing deaths.

My results suggest that several similar proposals currently before state legislatures might cause an additional unintended harm: The reforms might increase death rates in neighboring nonreform states.

214. See H.R. 2580, 110th Cong. (2007); S. 243, 110th Cong. (2007).

Consideration of these factors will help to ensure that tort reforms are shaped less by myth and power politics, and more by information about their true impacts.

APPENDIX 1

TABLE 7: FULL RESULTS OF THE PRIMARY MODEL²¹⁵

Variable	Coefficient (T-statistic)
Noneconomic Damage Caps	-0.925 (4.14)*
Punitive Damage Reform	-0.525 (2.37)+
Total Damage Caps	1.61 (5.07)*
Collateral Source Reform	0.876 (3.93)*
J&S Liability Reform	0.058 (0.25)
Periodic Payments	-0.109 (0.42)
Unemployment Rate	-0.153 (2.49)+
Real Per Capita Personal Income	0.00001 (0.07)
Percent African American	0.0129 (0.07)
Percent Other Minority	-0.547 (2.91)*
Percent Age 4 and Under	0.471 (1.89) ^a
Percent Age 65 and Over	0.286 (1.21)
Percent Male Age 15-24	0.166 (0.60)
Per Capita Alcohol Consumption	0.448 (0.57)
Hospital Beds Per Capita	-1672 (4.14)*
Constant	26.88 (3.31)*
Observations	1000
Adjusted R-squared	0.828

215. The dependent variable is the non-motor-vehicle, accidental death rate (deaths/100,000 population). Absolute values of t-statistics are in parentheses. *, +, and ^a represent significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The estimated coefficients for the year and state dummies are not shown.

APPENDIX 2: CONFIRMING THAT THE RESULTS ARE ROBUST

I also performed eight alternative estimations to test whether factors other than the tort reform and my other control variables were driving my results. These are standard robustness checks used to confirm the results of empirical analyses. The alternative estimations, which Table 8 below reports, demonstrate that the primary results indeed are robust. Signs and magnitudes for the tort reform variables are similar to those in the primary model. The eight estimations are:

1. I reestimated the model excluding Alaska to test the sensitivity of the results to eliminating states with high death rates; the mean death rate in Alaska is over seven standard deviations above the population-weighted mean death rate of all states.²¹⁶

2. I reestimated the primary model using all accidental deaths, including motor vehicle deaths, as the dependent variable; the primary estimations had excluded motor vehicle deaths. This specification tested the robustness of my results to the type of accidental deaths used as the dependent variable.

3. I present two sets of results that remedy any potential serial correlation.²¹⁷ First, I present t-statistics that are computed from Newey-West Heteroskedastic-Autocorrelation Consistent standard errors.²¹⁸

4. Then, I present t-statistics computed from standard errors clustered by state to correct for possible clustering effect—dependence within clusters (groups, which are states here) that could artificially inflate my t-statistics.

5. I present the results from an estimation that uses the log of the death rate as the dependent variable, instead of the death rate itself.

6. I reestimated the model excluding all controls except for state and year fixed effects (FE).

7. The next reestimation employed unweighted panel data regressions, rather population-weighted regressions, as in the primary model.

8. I tested whether the decrease in accidental deaths happened before the enactment of the tort reform and, thus, cannot be attributed to the tort reform. The eighth and ninth rows report results of estimations that include one-year and two-year leads, respectively, to indicate one and two

216. See WISQARS, Mortality, *supra* note 98.

217. Marianne Bertrand, Esther Duflo, and Sendhil Mullainathan raised concerns about serial correlation in difference-in-difference studies, and suggested the remedies that I implement. Marianne Bertrand et al., *How Much Should We Trust Differences-in-Differences Estimates?*, 119 Q.J. ECON. 249 (2004).

218. See JAMES STOCK & MARK W. WATSON, INTRODUCTION TO ECONOMETRICS 505–06 (2002).

years before each tort reform was passed. That the majority of the lead coefficients are statistically insignificant suggests that accidental death rates did not begin decreasing in the years before the tort reforms.

TABLE 8: SENSITIVITY ANALYSIS²¹⁹

Variable	Noneconomic Damage Caps	Punitive Damage Reforms	Total Damage Caps	Collateral Source Reform	J&S Liability Reform	Periodic Payments
1. Exclude Alaska	-0.858 (4.12)*	-0.535 (2.76)*	1.698 (4.85)*	0.839 (3.61)*	0.126 (0.59)	-0.177 (0.80)
2. Death Rate Includes Motor Vehicle Deaths	-0.527 (1.82) ^a	-0.662 (2.46)+	2.487 (5.11)*	0.844 (2.61)*	0.098 (0.33)	0.122 (0.40)
3. Standard Errors Recomputed	-0.925 (3.20)*	-0.525 (1.80) ^a	1.610 (3.86)*	0.876 (3.12)*	0.058 (0.20)	-0.109 (0.31)
4. Standard Errors Clustered by State	-0.925 (2.08)*	-0.525 (1.07)	1.610 (2.95)*	0.876 (2.18)+	0.058 (0.13)	-0.109 (0.18)
5. Log Specification	-0.051 (4.95)*	-0.022 (2.33)+	0.087 (4.99)*	0.040 (3.41)*	0.012 (1.12)	-0.005 (0.46)
6. No Control Variables but State/Year FE	-0.846 (3.60)*	-0.698 (3.23)*	1.42 (3.58)*	0.604 (2.48)+	-0.121 (0.51)	0.216 (0.90)
7. Unweighted	-0.470 (1.68) ^a	-0.738 (2.72)*	0.348 (0.61)	0.748 (2.37)+	-0.080 (0.27)	-0.086 (0.27)
8. One-Year Lead of Tort Reform Variables	0.011 (0.02)	-0.29 (0.95)	0.18 (0.19)	-0.129 (0.31)	0.335 (1.07)	-0.672 (1.72) ^a
9. Two-Year Lead of Tort Reform Variables	-0.02 (0.05)	0.386 (1.24)	0.014 (0.01)	-0.041 (0.11)	0.106 (0.34)	0.406 (1.10)

219. The dependent variable is the non-motor-vehicle, accidental death rate (deaths/100,000 population). Absolute values of t-statistics are in parentheses. *, +, and ^a represent significance at the 1 percent, 5 percent, and 10 percent levels, respectively. The estimated coefficients for the year and state dummies are not shown.

APPENDIX 3: ALTERNATIVE SPECIFICATION OF PART IV'S MODEL

To test whether the results of the primary model are robust, I employ here the difference-in-difference-in-difference methodology introduced by Jonathan Gruber.²²⁰ This methodology is the most advanced technique to measure differences among groups in datasets covering different time periods and different geographic units. It measures three differences: differences across reform and nonreform states; differences pre- and post-tort reform; and differences between each gender's death rate in each state and year. Thus, in contrast to a traditional difference-in-difference model, I can control for idiosyncratic differences between gender-specific death rates in reform and nonreform states. Not controlling for these idiosyncratic differences could produce simultaneity bias.²²¹ For example, if tort reforms tend to be adopted in states with high female death rates, it would be essential to control for systematic differences in female death rates between reform and nonreform states in order to isolate the effect of the tort reforms.

I create a difference-in-difference-in-difference model using the following equation:

(3)

$$DEATHRATE_{i,t,g} = \alpha + \beta_1 \cdot Z_{i,t} + \beta_2 \cdot X_{i,t,g} + \beta_3 \cdot female_g + \beta_4 \cdot (female_g * s_i) + \beta_5 \cdot (female_g * y_t) + \beta_6 \cdot (s_i * y_t) + \beta_7 \cdot (female_g * s_i * y_t) + \epsilon_{i,t,g}$$

where i indexes states, t indexes years, and g indexes each gender. I continue to include the same state-level controls common to both genders in the vector Z , and the same state-level controls that are specific to each gender in the vector X .

The coefficient β_3 measures the systematic differences among each gender's death rate across all states and years. With β_4 , I measure the systematic differences among states in the death rates of each gender in order to control for baseline differences in the gender's death rates between reform and nonreform states. With β_5 , I also control for separate year effects for each gender to control for any yearly shocks that affect a specific gender's death rates. With β_6 , I control for any time effect that is common to all individuals in reform states after the enactment of the reforms. That is, β_6 controls for other unobservables that may affect both reforms and overall

220. See Jonathan Gruber, *The Incidence of Mandated Maternity Benefits*, 84 AM. ECON. REV. 622 (1994).

221. See JEFFREY M. WOOLDRIDGE, *INTRODUCTORY ECONOMETRICS* 531–32 (2003).

death rates so that our treatment effect can isolate the residual effect of the reforms on the gender-specific death rate in isolation from the any other unobservables.

The treatment effect, β , isolates tort reforms' relationship with women. This coefficient captures variation in death rates specific to women (relative to the men), in the reform states (relative to the nonreform states), in the years after the tort reforms have been enacted (relative to before the reforms).

Table 9 reports the coefficient estimates and t-statistics computed from robust standard errors. The coefficients represent the differential impact on female death rates compared to male death rates. That is, a positive coefficient indicates that a tort reform has a disproportionately positive relationship with female death rates. This disproportionately positive relationship suggests one of two things: (1) the tort reform produces a greater increase in female death rates compared to men; or (2) the tort reform produces a smaller decrease in female death rates compared to men. The net effects presented in Table 5 reveal which of these is the case. Similarly, a negative coefficient on a tort reform variable indicates a disproportionately negative relationship with female death rates. This suggests that the tort reform either produces a smaller increase or a larger decrease in female death rates compared to men.

The results indicate that, after controlling for baseline differences in the death rates of each gender among reform and nonreform states, noneconomic damage caps and punitive damage reforms have a disproportionately positive relationship with female death rates. Total damage caps have a disproportionately negative relationship with female death rates compared to men.

The results from the difference-in-difference-in-difference model are consistent with the net effects presented in Table 5: The differential impacts on the genders of several tort reforms are statistically significant. The greater reduction in male death rates associated with noneconomic damage caps and punitive damage reforms are statistically significant. Similarly, the greater increase in male death rates associated with total damage caps is statistically significant. The insignificant coefficient for the collateral source reform variable in the difference-in-difference-in-difference model indicates that the differential impact of this reform is not large enough to be considered statistically significant. That is, from Table 5, we see that collateral source reform is associated with increases in both female and male death rates. However, the increases are similar enough in magnitude that there is no significant differential impact between the genders.

TABLE 9: RESULTS FROM THE DIFFERENCE-IN-DIFFERENCE-IN-DIFFERENCE MODEL²²²

Tort Reform	Coefficient (T-statistic)
Noneconomic Damage Caps	0.666 (2.49)+
Punitive Damage Reform	0.734 (2.62)*
Total Compensatory Damage Caps	-1.39 (2.58)*
Collateral Source Reform	-0.294 (0.97)
J&S Liability Reform	-0.25 (0.88)
Periodic Payments	-0.237 (0.77)

222. Estimated coefficients and the absolute values of t-statistics are in parentheses; * represents significance at the 1 percent level, and + represents significance at the 5 percent level.