

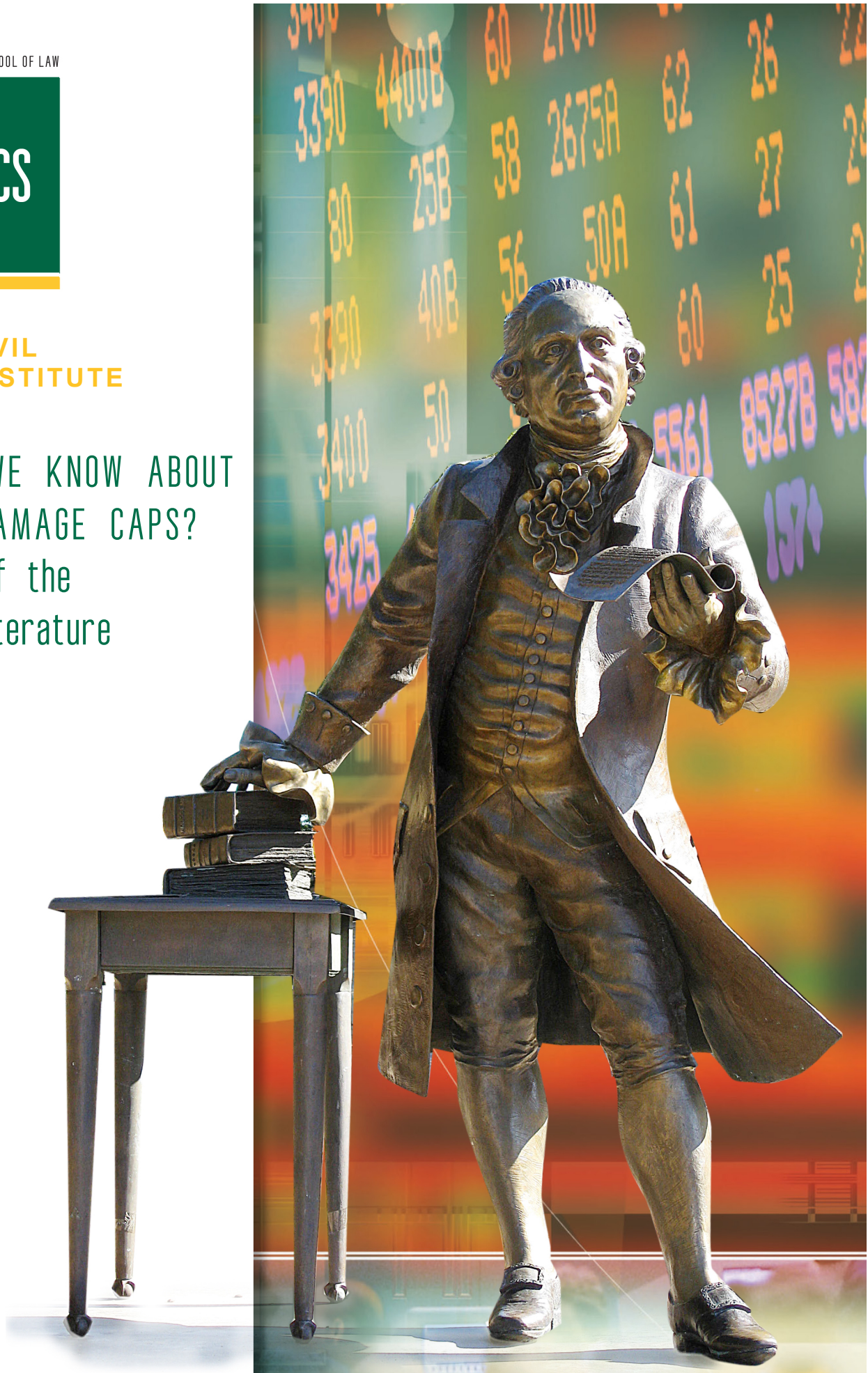
GEORGE MASON UNIVERSITY SCHOOL OF LAW

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WHAT DO WE KNOW ABOUT
PUNITIVE DAMAGE CAPS?
A Review of the
Empirical Literature

MAY 2013



LEGAL & ECONOMIC ANALYSIS. PUBLIC POLICY IMPACT.

Searle Civil Justice Institute

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WHAT DO WE KNOW ABOUT PUNITIVE DAMAGE CAPS? A REVIEW OF THE EMPIRICAL LITERATURE

1. INTRODUCTION

Reform of the nation's tort system has been a prominent issue at both the state and federal levels since the early 1980s. Dozens of reforms have been enacted, struck down, and reenacted in state legislatures. Numerous bills have also been proposed in the U.S. Congress. Although no general tort reform has been passed at the federal level, various reforms that limit liability in specific industries have been enacted.

One important class of tort reform is limitation on damages, including caps on punitive damage awards. Punitive damages are awarded to deter willful, wanton, and malicious conduct. Punitive damages, moreover, may be necessary to achieve adequate deterrence in instances where serious wrongful acts often go undetected (or unchallenged), which may not be deterred by compensatory damages alone. Theoretically, the effects of limiting punitive damages are ambiguous. On one hand, a reduction in punitive damages may reduce incentives to take care, leading to more harm. On the other hand, a reduction in punitive damages may have a negligible effect on harm if current incentives to take care are so high that reducing punitive damages has little marginal deterrent effect. Moreover, the level of accidents may remain unchanged or even fall if reducing punitive damages encourages victims to take efficient levels of care or lowers the price, and hence increases the use, of risk-reducing products and services.

This Report focuses on patterns of punitive damage awards and the effects that punitive damage caps have on primary behavior, such as whether potential tortfeasors change their behavior in response to tort law changes. This Report first presents an empirical overview of punitive damages awards, examining how often punitive damages are sought and awarded, the award amounts for different categories of cases, and the relationship between punitive damages and compensatory damages. The data show that although punitive damages are awarded in only 5 percent of cases in which the plaintiff prevails at trial, they are sought in many more cases, especially for certain categories of cases. Similarly, although overall median punitive damage awards are quite low, certain categories of cases have extremely high median punitive awards, even exceeding \$1 million. Finally, despite courts suggesting that punitive damages typically should be a single-digit multiple of compensatory damages, 17 percent of punitive damages awards are at least 10 times greater than compensatory damages.

The Report next examines the arguments for and against reforms that limit punitive damage awards, the types of caps that various states have enacted to limit these damages, and the theoretical effects of such caps on accident and activity levels. Then the Report reviews empirical studies that test whether state-level caps on punitive and other damages have had a measurable impact on activity levels and accident levels. The basic findings from these empirical studies are summarized below:

- Damage caps appear to be associated with increases in the supply of physicians. Reforms that cap damages at a lower amount have an even greater impact on physician supply. The relationship between damage caps and physician supply, moreover, is generally found to be stronger in rural areas.

- Damage caps generally reduce unproductive defensive medicine by reducing treatments and expenditures, with no associated negative impact on health outcomes.
- Damage caps have either no effect on death rates or even a decreasing effect on death rates. Similarly, studies find no evidence that damage caps increase the risk of environmental accidents.
- There is some evidence that damage caps influence the birth procedures chosen by physicians. However, the studies show that damage caps have no negative impact on infant health. In fact, one study even finds that damage caps improve outcomes for some infants.

The Report concludes by attempting to identify areas in which additional empirical work could improve the measurement and understanding of the effects of damage caps.

2. OVERVIEW OF PUNITIVE DAMAGE AWARDS

Debates over the desirability of punitive damages often involve discussions of the frequency and magnitude of these awards. This section presents data on how often punitive damages are sought and imposed, the award amounts for different categories of cases, and the relationship between punitive damages and compensatory damages. Most of the data discussed are from 2005, the most recent year that the Bureau of Justice Statistics (BJS) collected data on damage awards in civil cases.

Punitive damages are awarded in approximately 5 percent of the trials in which the judge or jury finds for the plaintiff.¹ This rate of punitive damage awards has been stable over time² and has been found in several studies of punitive damages.³

Yet, the threat of punitive damages looms large for many defendants. Using 2005 data, BJS has estimated that punitive damages are sought in approximately 10 percent of torts cases and 16 percent of contract trials in state courts. Moreover, for certain types of cases, the rate at which punitive damages are sought is significantly higher. For example, in torts cases such as slander/libel and conversion, and in contracts cases such as tortious interference, fraud, and employment discrimination, punitive damages are sought in more than 30 percent of cases. Thus, punitive damages likely have a significant impact on defendants; the threat of potentially ruinous damages in so many cases likely forces many defendants to agree to settlements that they would not otherwise. Table 1 reports both the percentage of trials in which punitive damages were sought and the percentage of trials with plaintiff winners in which punitive damages were awarded for various types of cases in 2005.⁴

¹ BUREAU OF JUSTICE STATISTICS, PUNITIVE DAMAGE AWARDS IN STATE COURTS, 2005 (2011).

² BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 1992: CIVIL JURY CASES AND VERDICTS IN LARGE COUNTIES (1995); BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 1996: CIVIL TRIAL CASES AND VERDICTS IN LARGE COUNTIES (1996); BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2001: CIVIL TRIAL CASES AND VERDICTS IN LARGE COUNTIES, 2001 (2004); BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2005: CIVIL BENCH AND JURY TRIALS IN STATE COURTS, 2005 (2008).

³ Theodore Eisenberg, *The Empirical Effects of Tort Reform*, in RESEARCH HANDBOOK ON THE ECONOMICS OF TORTS 3 (Jennifer Arlen, ed., forthcoming 2012).

⁴ BUREAU OF JUSTICE STATISTICS, PUNITIVE DAMAGE AWARDS IN STATE COURTS, 2005 2, 4 (2011).

TABLE 1:
PERCENTAGE OF CIVIL TRIALS IN STATE COURTS IN WHICH
PUNITIVE DAMAGES WERE SOUGHT AND AWARDED, 2005

Case type	Percentage of trials in which punitive damages sought	Percentage of trials with plaintiff winners in which punitive damages were awarded
Slander/libel	33%	-
Conversion	31%	-
Intentional tort	29%	30%
Other or unknown tort	24%	5%
Product liability	12%	1%
Professional malpractice	15%	-
Medical malpractice	8%	1%
Automobile accident	7%	1%
Premise liability	5%	0%
All Torts Cases	10%	3%
Tortious interference	42%	-
Fraud	32%	23%
Employment Discrimination	32%	22%
Other or unknown contract	21%	15%
Buyer Plaintiff	17%	8%
Seller plaintiff	6%	1%
Rental/lease	4%	2%
All Contracts Cases	16%	8%

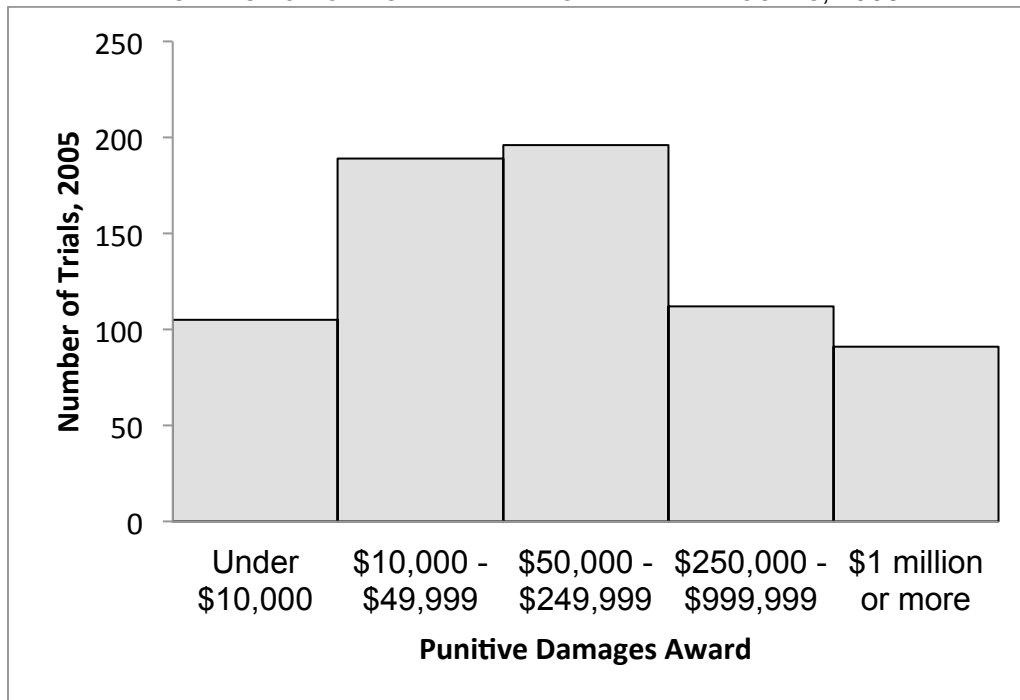
Notes: “-” indicates that there were too few cases to obtain statistically reliable estimates

Not only does the rate at which punitive damages are sought depend on the type of case, the rate at which they are awarded also varies dramatically by case type. Whereas punitive damages were awarded in 30 percent of intentional torts cases and over 20 percent of contracts cases involving fraud and employment discrimination with winning plaintiffs, they were awarded in only 1 percent of products liability, medical malpractice, and automobile accident cases with winning plaintiffs.

Of the 700 trials in 2005 in which punitive damages were awarded, the median punitive damage award was \$64,000. Figure 1 shows the distribution of punitive damage award amounts in 2005. Although the majority of the awards were under \$250,000, 13 percent of the awards were \$1 million or more.⁵

⁵ BUREAU OF JUSTICE STATISTICS, PUNITIVE DAMAGE AWARDS IN STATE COURTS, 2005 (2011).

FIGURE 1:
DISTRIBUTION OF PUNITIVE DAMAGE AWARD AMOUNTS, 2005



Punitive damage awards, moreover, tend to be much higher in certain categories of cases than others. Although the median punitive damage awards in all torts cases in 2005 was \$55,000, the median award in medical malpractice cases was \$2,835,000.⁶ In 2001, the median punitive award in torts cases was only \$27,000, but products liability cases had a median award of \$450,000 and medical malpractice cases had a median award of \$422,000.⁷ Similarly, in 2005, the median punitive damages award in contracts cases was \$69,000, but the median award in tortious interference cases was \$6,888,000.⁸ In 2001, the median contracts case award was \$45,000, but employment discrimination cases had a median punitive award of \$166,000.⁹ Table 2 reports the median punitive damages award for various case types in 2005 and 2001.¹⁰

⁶ BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2005: CIVIL BENCH AND JURY TRIALS IN STATE COURTS, 2005 6 (2008).

⁷ BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2001: CIVIL TRIAL CASES AND VERDICTS IN LARGE COUNTIES, 2001 6 (2004). The significant change in some of the median awards is likely caused by a small number of certain types of cases (i.e. tortious interference). The median awards for all tort cases and all contracts cases more accurately reflect the change in punitive damages. These figures suggest that median damages in torts cases have more than doubled and median damages in contracts cases have increased by over 50 percent.

⁸ BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2005: CIVIL BENCH AND JURY TRIALS IN STATE COURTS, 2005 6 (2008).

⁹ BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2001: CIVIL TRIAL CASES AND VERDICTS IN LARGE COUNTIES, 2001 6 (2004).

¹⁰ BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2005: CIVIL BENCH AND JURY TRIALS IN STATE COURTS, 2005 6 (2008); BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2001: CIVIL TRIAL CASES AND VERDICTS IN LARGE COUNTIES, 2001 6 (2004).

TABLE 2:
MEDIAN PUNITIVE DAMAGES AWARD, 2005 AND 2001

	Median Punitive Damages Award, 2005	Median Punitive Damages Award, 2001
Torts	\$55,000	\$27,000
Medical Malpractice	\$2,835,000	\$422,000
Intentional Torts	\$81,000	\$37,000
Conversion	\$50,000	\$23,000
Slander/Libel	\$13,000	\$121,000
Motor Vehicle	\$7,500	\$16,000
Product Liability		\$450,000
Contracts Cases	\$69,000	\$45,000
Tortious Interference	\$6,888,000	\$94,000
Employment		
Discrimination	\$115,000	\$166,000
Fraud	\$100,000	\$81,000
Seller Plaintiff	\$86,000	\$34,000
Buyer Plaintiff	\$53,000	\$45,000

An area of concern to many torts scholars and courts is the relationship between compensatory and punitive damage awards. In a number of cases since 1996, the United States Supreme Court has examined the issue of what constitutes an excessive ratio between plaintiffs' compensatory and punitive damage award amounts. These cases culminated in the 2003 decision of *State Farm Automobile Insurance Company v. Campbell* in which the Court held that, "few awards exceeding a single digit ratio between punitive and compensatory damages...will satisfy due process."¹¹

Table 3 reports the percentage of punitive damage awards that were greater than compensatory damages by various magnitudes in 2005.¹² The data reveal that punitive damages exceeded compensatory damages in over half of the cases in which they were awarded. However, in 17 percent of cases punitive damages exceeded compensatory awards by a ratio of 10 to 1, or greater.

¹¹ 123 S. Ct. 1513, 1524 (2003).

¹² BUREAU OF JUSTICE STATISTICS, CIVIL JUSTICE SURVEY OF STATE COURTS, 2005: CIVIL BENCH AND JURY TRIALS IN STATE COURTS, 2005 7 (2008).

TABLE 3:
PERCENT OF PUNITIVE DAMAGE CASES WITH PUNITIVE AWARDS GREATER THAN COMPENSATORY
AWARDS, 2005

	Percent of punitive damage cases with punitive awards			
	Greater than compensatory award	At least 2 times greater than compensatory award	At least 4 times greater than compensatory award	At least 10 times greater than compensatory award
Percent of Cases with Punitive Damage Awards	52.8%	38.2%	26.1%	17.0%

Similarly, the rate at which punitive damages are sought depends on the size of the compensatory damages award. Table 4 reports the percent of trials in which punitive damages were sought for different compensatory damage awards in 2005.¹³ The data reveal that punitive damages are more frequently sought and awarded in cases with higher compensatory damage awards.

TABLE 4:
PERCENT OF TRIALS IN WHICH PUNITIVE DAMAGES WERE SOUGHT FOR DIFFERENT COMPENSATORY
DAMAGE AWARDS, 2005

Amount of compensatory damages awarded	Percent of trials in which punitive damages sought
None	11%
\$1 to \$50,000	12%
\$50,001 to \$100,000	12%
\$100,001 to \$250,000	15%
\$250,001 to \$1,000,000	15%
Over \$1 Million	25%

Thus, the most current data on punitive damages reveal that, although punitive damages are only awarded in 5 percent of cases, they are sought in many more cases, especially for certain categories of cases. Although median punitive damage awards are quite low, certain categories of cases have extremely high median punitive awards, even exceeding \$1 million. Finally, despite courts suggesting that punitive damages should typically be a single-digit multiple of compensatory damages, in 17 percent of cases, punitive damages are at least 10 times greater than compensatory damages.

¹³ BUREAU OF JUSTICE STATISTICS, PUNITIVE DAMAGE AWARDS IN STATE COURTS, 2005 3 (2011).

3. STATE-LEVEL REFORMS OF PUNITIVE DAMAGES

Punitive damages are meant to deter willful, wanton, and malicious conduct. Although they are not awarded to compensate victims, punitive damages may be necessary to achieve adequate deterrence of especially egregious behaviors or behaviors where the probability of detection is low.¹⁴ When victims only discover their harms and/or file claims in a fraction of instances in which they are harmed by serious wrongful acts, damages in the few suits that are filed must exceed the compensatory level to achieve adequate deterrence.

Critics, however, argue that increasing punitive damage awards have led to excessive litigation and windfall gains for plaintiffs.¹⁵ They insist that the grounds for punitive damage awards are inappropriately expanding in many areas.¹⁶ Further, critics argue that excessive and arbitrary punitive damage awards have increased the cost and reduced the availability of insurance.¹⁷ Many also blame punitive damages for producing unjustifiably large awards and forcing otherwise viable industries out of business.¹⁸ Finally, critics argue that the arbitrary and unpredictable imposition of the awards has distorted the settlement process.¹⁹

In light of these arguments, many state legislatures have been persuaded that punitive damages need reform.²⁰ Figure 2 shows the number of states with caps on punitive damages by year, from 1980 to 2012. Although the table reports only the states with caps, 34 states have also enacted heightened pleading, evidentiary, or other procedural standards for punitive damages. For example, many states now require punitive damages to be proven with “clear and convincing evidence” rather than merely the traditional “preponderance of the evidence.” Several states have also enacted reforms that preclude punitive damages when the product or service at issue complied with federal or state regulations or was approved by a government agency.²¹

¹⁴ See, e.g., ROBERT COOTER & THOMAS ULEN, *LAW & ECONOMICS* 368 (2004).

¹⁵ See, e.g., *Punitive Damages Reform*, AM. TORT REFORM ASS'N, available at <http://www.atra.org/issues/index.php?issue=7343> (last visited May 6, 2013) (“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). *But see* Michael L. Rustad, *Nationalizing Tort Law: The Republican Attack on Women, Blue Collar Workers, and Consumers*, 48 RUTGERS L.J. 673, 758–59 (1996) (concluding that punitive damages are not out of control).

¹⁶ For a discussion of the expansion of punitive damage awards, see Terry Morehead Dworkin, *Federal Reform of Products Liability Law*, 57 TUL. L. REV. 602, 615 (1983).

¹⁷ See TORT POLICY WORKING GROUP, REPORT OF THE TORT POLICY WORKING GROUP ON THE CAUSES, EXTENT, AND POLICY IMPLICATIONS OF THE CURRENT CRISIS IN INSURANCE AVAILABILITY AND AFFORDABILITY 66-69 (1986).

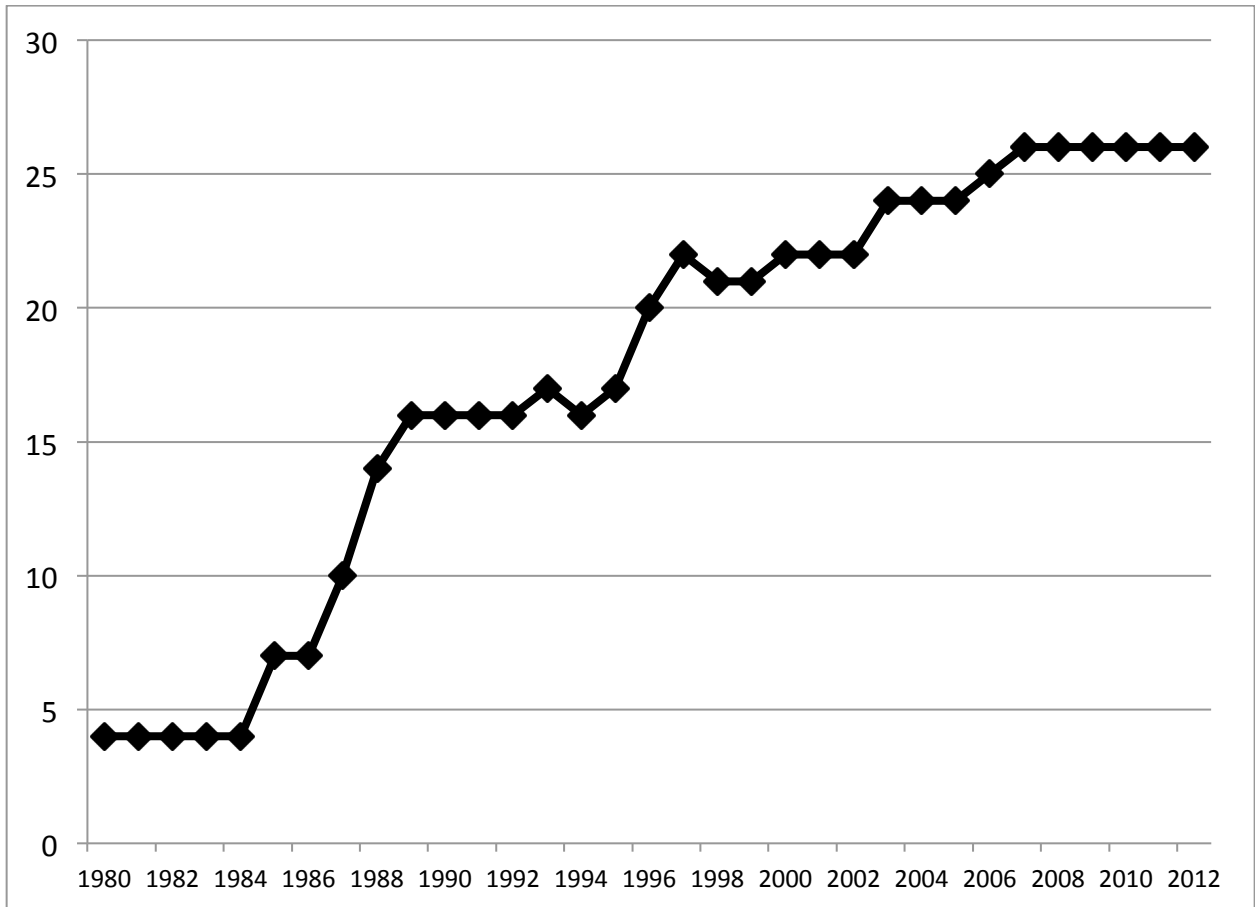
¹⁸ See Dickinson R. Debevoise, *A Trial Judge's View of Tort Reform*, 25 SETON HALL L. REV. 853, 855-57 (1994)(noting anecdotal evidence that HMOs suffer large punitive damage awards).

¹⁹ Dworkin, *supra* note 16.

²⁰ Ronen Avraham, *Database of State Tort Law Reforms (DSTLR 4th)* (Univ. of Texas Law School, Law and Econ. Research Paper No. 184, 2011), available at SSRN: <http://ssrn.com/abstract=902711> (last visited May 6, 2013). Data updated with recent searches of state tort reforms.

²¹ See, e.g. HB 2503, 50th Legis., 2nd Reg. Sess. (AZ 2012)

FIGURE 2:
NUMBER OF STATES WITH CAPS ON PUNITIVE DAMAGES, 1980-2012



As of 2012, 26 states have enacted caps on punitive damages in at least some portion of cases; another 6 states have completely prohibited punitive damages in some categories of cases.²² The caps take many different forms. For example, some reforms impose a cap of a fixed dollar amount, some are limited by a percentage of a defendant business's net worth, and others use a multiplier of the compensatory damage award. Moreover, some caps apply only to certain types of cases, such as medical malpractice. Appendix 1 details the specifics of each state's cap.

4. EVIDENCE OF THE EFFECTS OF DAMAGE CAPS

The effects of the reforms discussed in Section 3 are theoretically ambiguous. On one hand, some argue that reducing damage awards may reduce incentives for tortfeasors to take precautions or reduce participation in potentially harmful activities, leading to an increase in accidents. On the other hand, if damage levels in the pre-reform regimes led to excess precaution, reducing damages may have only negligible effects on tortfeasor precautions and activity levels. Further, reductions in expected tort liability may induce potential victims to take

²² Avraham, *supra* note 20.

greater levels of precaution or may lower the price of risk-reducing products and services, increasing their use and hence lowering accident levels.

Given that the effect of tort reforms is ultimately an empirical question, it should not be surprising that a substantial body of empirical literature focuses on the various impacts of caps on both punitive and other types of damages. Possible effects are generally separated into two components: (1) observable effects within the legal system, such as lawsuit filings, case outcomes, and damage magnitudes; and (2) observable effects on primary behavior, such as whether potential tortfeasors change their behavior in response to tort law changes. The studies generally find that caps on damage awards reduce the number of claims filed, the magnitude of awards, and insurance costs.²³

This section reviews the empirical literature on the impact of caps on punitive damages on primary behavior, including accidents and activity-level behaviors. Most of the empirical work that examines the effect of punitive damage caps also examines caps on other damages (e.g., non-economic damages). Activity-level behaviors refer to how much potential tortfeasors engage in activities that could result in a tort. Although this report is primarily concerned with the effects of punitive damage caps, I also discuss studies that explore the influence of noneconomic damage and total damage caps on activity levels and accidents. As these damage caps also restrict plaintiffs' recoveries, the empirical findings of their impacts may generalize to punitive damage caps as well.

4.1 Impact of Damage Caps on Activity-Levels

Several empirical studies examine whether damage caps influence the degree to which potential tortfeasors engage in activities that could result in torts. This section reviews the empirical findings on the relationship between damage caps and the activity levels of medical providers. Appendix 2 summarizes the methodologies and findings of these studies.

Most studies of the impact of liability on physician behavior focus on “defensive medicine”—deviations from sound medical practices that are induced primarily by threat of liability. Sometimes, defensive medicine takes the form of additional procedures or expenditures that are intended to dissuade patients from filing claims or protect the physicians in case of litigation. In other instances, defensive medicine involves physicians' declining to supply services in an effort to distance themselves from sources of legal risk. Both of these forms of defensive medicine confer little or no clinical value. In this section, I explore the impacts of damage caps on both forms of defensive medicine—physician supply and unproductive procedures or expenditures.

4.1.1 *Impacts on Physician Supply*

Several studies analyze the relationship between damage caps and the activity levels of medical providers. These studies consistently find that damage caps are associated with increases in the supply of physicians. Reforms that cap damages at a lower amount have an even greater impact on physician supply. Moreover, the relationship between damage caps and physician supply is generally found to be stronger in rural areas.

²³ For a review of several studies, see DOUGLAS HOLTZ-EAKIN, THE EFFECTS OF TORT REFORM: EVIDENCE FROM THE STATES, CONGRESS OF THE UNITED STATES, CONGRESSIONAL BUDGET OFFICE (2004); Michelle Mello, *Medical Malpractice: Impact of the Crisis and Effect of State Tort Reforms*, 10 RES. SYNTHESIS REP. 10 (2006).

To test the impact of damage caps on physician supply, Klick and Stratmann use data from the American Medical Association (AMA) on the number of doctors by specialty and state from 1980 to 2001.²⁴ The researchers employ a triple-differences estimation in which physicians in high-liability specialties in states that pass medical malpractice reform serve as the treatment group and physicians in low-liability specialties in those same states serve as the contemporaneous control group. They find that caps on noneconomic damages have a large and statistically significant effect on doctors' location decisions: these reforms are associated with a 6.1-6.6 percent increase in the number of per capita doctors practicing in a state in the five highest-risk specialties (neurological surgery, thoracic surgery, obstetrics and gynecology, general practice, and emergency room). In contrast, they find that caps on total damages have no statistically significant effect on physician supply.

Kessler, Sage, and Becker also use AMA state-level data from 1985 to 2001 to test the impact of damage caps on physician supply.²⁵ They combine several tort reforms into one "direct reform" variable: caps on noneconomic damages, caps on total damages, abolition of punitive damages, collateral source rule reform, and non-mandatory prejudgment interest reforms. Their difference-in-difference analysis finds that, three-years after the adoption of direct reforms, physician supply increases by an average of 3.3 percent in each state. Moreover, they find that direct tort reforms have a larger effect on non-group physicians than on physicians practicing as part of a group, and a larger effect on physician supply in states with high levels of managed care. Similarly, they find that almost all of the change in physician supply as a result of direct tort reforms is due to retirements and entry into the profession, not physicians moving between states.

Hellinger and Encinosa perform two different studies of the impact of damage caps on physician supply using AMA data. Their first study uses both statewide aggregate data from 1985, 1990, 1995, and 2000 and county-level data from 1996-2000 on physician supply.²⁶ Although their analysis includes only five years of county-level data, these data allow them to control for several county-level characteristics that may influence physician supply, such as the county unemployment rate and county demographics. Hellinger and Encinosa collapse noneconomic damage caps and total damage caps into one variable, but do not include a variable for punitive damage limitations. They also include a separate variable that indicates whether a state has a cap on noneconomic damage awards of less than \$350,000. Their difference-in-difference analysis finds that states with caps on noneconomic damages have about 12 percent more physicians per capita than states without such a cap. They find a similar percentage increase on physician supply using the county-level data. Moreover, they find that states with relatively high caps—over \$350,000—are less likely to experience an increase in physician supply than states with lower caps.

²⁴ Jonathan Klick & Thomas Stratmann, *Does Medical Malpractice Reform Help States Retain Physicians and Does It Matter*, 36 J. LEGAL STUD. 121 (2007).

²⁵ Daniel P. Kessler, William M. Sage, and David J. Becker, *Impact of Malpractice Reforms on the Supply of Physician Services*, 293 J. AM. MED. ASS'N 2618 (2005).

²⁶ FRED J. HELLINGER & WILLIAM E. ENCINOSA, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, THE IMPACT OF STATE LAWS LIMITING MALPRACTICE AWARDS ON THE GEOGRAPHIC DISTRIBUTION OF PHYSICIANS (2003).

In their second study on the impact of damage caps on physician supply, Encinosa and Hellinger use only AMA county-level data from 1985 to 2000.²⁷ They again collapse noneconomic damage caps and total damage caps into one variable and do not include a measure of punitive damage reform. In addition, they include a variable indicating whether a state has a cap with a \$250,000 limit on damages. Their difference-in-difference analysis finds that counties in states with a cap have 2.2 percent more physicians per capita because of the cap, and rural counties in states with a cap have 3.2 percent more physicians per capita. They also find that the size of the cap matters, at least in rural counties. Rural counties in states with a \$250,000 cap have 5.42 percent more obstetrician-gynecologists and 5.51 percent more surgical specialists per capita than do rural counties in states with a cap above \$250,000.

Matsa also uses AMA county-level data from 1970 to 2000 to explore the impact of damage caps on physician supply.²⁸ He also collapses caps on noneconomic damages and total damages into one variable and performs various estimations as robustness checks, including standard OLS regressions, feasible generalized least squares estimations, and regressions of first differences. He finds that malpractice caps do not increase physician supply for the average American but that they do increase total physician supply in the least densely populated areas by 3–5 percent. This effect appears to be driven by a relative increase in the supply of specialists by 10–12 percent in rural areas, with no effect on the supply of general practice physicians.

Finally, instead of focusing on the relationship between caps and the extensive margin—the choice of whether to practice in a state at all—Helland and Showalter focus on the intensive margin—the number of hours worked.²⁹ They use data on hours worked from two cross-sectional surveys: the 1983 and 1988 Physician Practice Costs and Income Surveys conducted by National Opinion Research Center under contract to the Health Care Financing Administration. Instead of using binary variables to measure the impact of malpractice reform, Helland and Showalter develop a new measure of liability that measures the impact of noneconomic damage caps on a specific specialty's expected liability cost. They find that a 10 percent decrease in expected liability costs would lead to a 2.85 percent increase in the average physicians' work hours. The effect is stronger for physicians age 55 and older; among these physicians, a 10 percent decrease in malpractice liability risk is associated with a 12 percent increase in hours worked.

4.1.2 *Impacts on Unproductive Procedures and Expenditure*

Other studies explore the impact of damage caps on potentially unnecessary treatments or expenditures. These studies generally find that damage caps reduce defensive medicine by reducing treatments and expenditures, with no associated negative impact on health outcomes.

²⁷ William E. Encinosa & Fred J. Hellinger, *Have State Caps on Malpractice Awards Increased the Supply of Physicians?*, HEALTH AFF. (May 31, 2005).

²⁸ David Matsa, *Does Liability Keep the Doctor Away? Evidence from Tort Reform Damage*, 36 J. LEGAL STUD. 143 (2007).

²⁹ Eric Helland & Mark Showalter, *The Impact of Liability on the Physician Labor Market*, 52 J.L. & ECON. 635 (2009).

Kessler and McClellan study the impact of damage caps on physicians' reported treatment practices.³⁰ Using data from the AMA Socioeconomic Monitoring System survey on physicians' experiences from 1984-1993, they study the impact of caps on physicians' perceptions of malpractice-induced behaviors including record keeping, diagnostic tests, referrals for consultation, and time spent with patients. They collapse reforms that cap noneconomic damages, cap total damages, abolish punitive damages, abolish mandatory pre-judgment interest, and reform the collateral source into one measure of direct tort reform. Using linear probability models, Kessler and McClellan find that only when the measure of direct reforms is combined with a measure of indirect tort reforms (that includes reforms imposing mandatory periodic payments, caps on attorneys' contingency fees, and abolition of joint-and-several liability) is there an impact of reforms on physicians-reported malpractice-pressure-induced treatments. When these variables are combined, they find that, relative to their counterparts from non-adopting states, physicians report lower growth in malpractice-induced treatment over the 1984 to 1992 period. Specifically, physicians from reform states report less liability-induced pressure to refer patients for consultation and spend time with patients. However, there is no statistically significant effect of reforms on record keeping or diagnostic tests.

Kessler and McClellan also conduct two studies of the impact of damage caps on expenditure per patient. Their first study uses panel data on successive cohorts of heart disease patients from 1984, 1987, and 1990.³¹ They create a measure of expenditure per patient by adding up all reimbursements from insurance claims (including copayments and deductibles not paid by Medicare) for all hospitalizations in the year following each patient's initial admission for heart disease. Again, they collapse reforms that cap noneconomic damages, cap total damages, abolish punitive damages, abolish mandatory pre-judgment interest, and reform the collateral source into one measure of direct tort reform. Their difference-in-difference analysis shows that expenditures declined by 5 to 9 percent, depending on the patients' form of heart disease, in states that adopted direct reforms relative to non-reforming states. However, as the reductions in expenditure do not worsen health outcomes, the authors conclude that the original expenditures were likely financing positive defensive medicine.

In a second study of the impact of damage caps on medical expenditures, Kessler and McClellan also use Medicare claims data for the vast majority of elderly beneficiaries who were admitted to a hospital with a new primary diagnosis of heart disease in every year from 1984 to 1994.³² They use the same measure of direct tort reform as their previous study, and distinguish long-term effects from short-term effects of tort reforms by using models that separate the effect of reforms soon after and long after their enactment. They find that, in the long run, three or more years after the adoption of reforms, patients from states adopting direct reforms have significantly lower growth in medical expenditures for heart disease patients. Specifically, direct reforms decrease long-run hospital expenditures by roughly 4 percent. Again, as health outcomes do not worsen after the reduction in expenditures, Kessler and McClellan conclude that the reforms reduce unproductive treatments, or positive defensive medicine.

³⁰ Daniel Kessler & Mark McClellan, *The Effects of Malpractice Pressure and Liability Reforms on Physicians' Perceptions of Medical Care*, 60 L. & CONTEMP. PROBS. 81 (1997).

³¹ Daniel Kessler & Mark McClellan, *Do Doctors Practice Defensive Medicine?*, 111 Q. J. OF ECON. 353 (1996).

³² Daniel Kessler & Mark McClellan, *Malpractice Law and Health Care Reform: Optimal Liability Policy in an Era of Managed Care*, 84 J. PUB. ECON. 175 (2002).

4.2 Impact of Damage Caps on Accidents

In this section, I review the empirical studies that explore the relationship between damage caps and accident levels. These studies examine whether damage caps affect various measures of accidents: death rates, birth outcomes, and environmental accidents. Appendix 3 reviews the methodologies and findings of the studies discussed in this section.

4.2.1 *Impacts on Death Rates*

Several studies examine the relationship between damage caps and death rates. The studies generally find that damage caps have either no effect on death rates or even a decreasing effect on death rates. Thus, reforms that restrict tort liability do not appear to cause an increase in tort accidents.

In two papers, Rubin and Shepherd examine the relationship between damage caps and accidental, non-motor vehicle death rates. The first study uses state-level accidental death data from the Centers for Disease Control for the period 1981 to 2000.³³ They study the impact of various tort reforms, including caps on punitive damages and caps on noneconomic damages. Their difference-in-difference analysis finds that caps on noneconomic damages reduce annual accidental death rates by 3.5 percent in states with the reform, but caps on punitive damages have no statistically significant relationship with death rates. The authors suggest that their findings imply that decreases in tort liability either induce potential victims to take more precaution or make risk-reducing products more available and affordable, leading to a reduction in accidents.

In their second study, Rubin and Shepherd explore the relationship between damage caps and state-level accidental, non-motor vehicle death rates for different demographic groups over the period 1980 to 2000.³⁴ They test whether tort reforms that disproportionately reduce compensation to certain demographic groups also disproportionately affect accident rates for these demographic groups. They include three measures of damage caps—caps on noneconomic damages, caps on total damages, and punitive damages reforms, which combines reforms that cap punitive damages and require higher evidence requirements for punitive damage awards. Their triple-differences analysis finds that noneconomic damage caps are generally associated with decreases in death rates, but have a disproportionately smaller decreasing effect on the death rates of females relative to males, young children relative to adults, and the elderly relative to non-elderly. They find that total damage caps are associated with increases in death rates, but have a disproportionately smaller increasing effect on the death rates of females relative to males and the elderly versus non-elderly. Punitive damage reforms are associated with decreases in death rates for some demographic groups but have no disproportionate effect.

In Kessler and McClellan's studies of defensive medicine, they also test whether damage caps impact the mortality rates of elderly heart patients. Their first study uses panel data on

³³ Paul H. Rubin & Joanna M. Shepherd, *Tort Reform and Accidental Death Rates*, 50 JOURNAL OF LAW AND ECONOMICS 221 (2007).

³⁴ Paul H. Rubin & Joanna M. Shepherd, *The Demographics of Tort Reform*, 4 REVIEW OF LAW AND ECONOMICS 591 (2008).

successive cohorts of heart disease patients from 1984, 1987, and 1990.³⁵ Their second study uses similar data on heart disease patients in every year from 1984 to 1994.³⁶ In both studies, Kessler and McClellan use two measures of health outcomes: mortality within one-year of the first hospital admission for heart disease (from death reports validated by the Social Security Administration) and rehospitalization for cardiac complications within one year of the initial diagnosis. To measure the impact of tort reform, they collapse reforms that cap noneconomic damages, cap total damages, abolish punitive damages, abolish mandatory pre-judgment interest, and reform the collateral source into one measure of direct tort reform. In both studies, their difference-in-difference analyses show that direct tort reforms have no statistically significant effect on either mortality or hospital readmissions for elderly heart patients.

Sloan and Shadle examine the impact of damage caps on the one-year survival rates for individuals age 65 and older after initial diagnoses of heart disease, stroke, diabetes and breast cancer between 1985 and 2000.³⁷ They use data on individuals randomly drawn for interviews by the National Long-Term Care Survey. Like Kessler and McClellan, they collapse reforms that cap noneconomic damages, cap total damages, abolish punitive damages, abolish mandatory pre-judgment interest, and reform the collateral source into one measure of direct tort reform. Their probit analysis finds no effect of direct reforms on the probability of surviving one year following an initial diagnosis.

4.2.2 *Impacts on Birth Outcomes*

Three studies examine the relationship between damage caps and birth outcomes. Although there is evidence that damage caps influence the birth procedures chosen by physicians, the procedures appear to have no negative impact on infant health. The studies generally find that caps have no adverse impact on birth outcomes. In fact, one study even finds evidence that damage caps improve outcomes for some infants.

Currie and MacLeod use state-level data on birth outcomes from the Vital Statistics natality dataset from 1989 to 2001.³⁸ These data come from birth certificates collected by each state and filed with the National Center for Health Statistics. They randomly selected 10 percent of the births from 25 states for their sample. Currie and MacLeod examine the separate impacts of punitive damage caps and noneconomic damage caps on caesarean section rates, induction of labor, preventable complications, and the APGAR score (routinely used to evaluate the general physical condition of newborns) of the infant. Their difference-in-difference estimations find that both noneconomic damage caps and punitive damage caps increase the probability of caesarean sections by approximately 5 percent. The authors conclude that the reduction in liability under damage caps reduces physicians' incentives to take care, increasing their willingness to undertake risky procedures such as caesarean sections. Caps on noneconomic damages also increase preventable complications by about 6 percent, though the results are

³⁵ Daniel Kessler & Mark McClellan, *Do Doctors Practice Defensive Medicine?*, 111 Q. J. ECON. 353 (1996).

³⁶ Daniel Kessler & Mark McClellan, *Malpractice Law and Health Care Reform: Optimal Liability Policy in an Era of Managed Care*, 84 J. PUB. ECON. 175 (2002).

³⁷ Frank Sloan & John Shadle, *Is There Empirical Evidence for 'Defensive Medicine'? A Reassessment*, 28 J. HEALTH ECON. 481 (2009).

³⁸ Janet Currie & W. Bently MacLeod, *First Do No Harm? Tort Reform and Birth Outcomes*, 123 Q. J. OF ECON. 795 (2008).

not robust to all specifications. Neither damage cap has any effect on the induction of labor or infants' APGAR scores.

Klick and Stratmann test the impact of damage caps on birth outcomes using infant mortality data from the Centers for Disease Control and Prevention from 1980 to 1998.³⁹ The researchers test the impact of both caps on noneconomic damages and caps on total damages on white infant mortality and black infant mortality in a standard difference-in-difference estimation. Although the results are not robust to all specifications, some specifications indicate that noneconomic damage caps lower the black infant mortality rate by about 6 percent. This evidence may imply that, by attracting doctors to underserved areas, noneconomic damage caps improve access to health care for black mothers. They find no effect of either damage cap on white infant mortality rates.

Most recently, Yang, et al. use data from the annual Natality Detail File from the National Center for Health Statistics for years 1991 through 2002.⁴⁰ They randomly selected 5 percent of the births per study year for a total sample size of 2.35 million births. They test the impact of four different measures of damages caps: punitive damage caps, caps limiting noneconomic damages awards at \$250,000, caps limiting noneconomic damages awards at between \$250,000 and \$500,000, and caps limiting either noneconomic or total damages awards at levels greater than \$500,000. The researchers examine the influence of these and other tort reforms on four outcome variables: APGAR score, birth weight, preterm birth, and birth injury (impairment of the infant's body function or structure due to adverse influences that occurred at birth). Their analysis finds that none of the damage cap variables were significantly associated with adverse birth outcomes.

4.2.3 *Impacts on Environmental Accidents*

Viscusi tests the impact of punitive damages on various measures of states' safety and environmental performance.⁴¹ He includes both a variable indicating whether a state allows or has eliminated punitive damages and a variable indicating whether punitive damages are insurable in the state. Thus, he has no measure of caps in the analysis. Viscusi tests whether these measures of punitive damages have any effect on adverse environmental outcomes; because punitive damages increase the expected costs of adverse events, they should make precautions more attractive in corporate risk decisions. Viscusi's difference-in-difference regressions indicate that punitive damages have no statistically significant relationship with toxic chemical accidents, toxic chemical discharges, per capita death rates from medical misadventures, or per capita accidental death rates. The results suggest that punitive damages have no relationship with the risk of accidents.

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³⁹ Jonathan Klick & Thomas Stratmann, *Does Medical Malpractice Reform Help States Retain Physicians and Does It Matter*, 36 J. LEGAL STUD. 121 (2007).

⁴⁰ Tony Y. Yang, David M. Studdert, S.V. Subramanian, & Michelle M. Mello, *Does Tort Law Improve the Health of Newborns, or Miscarry? A Longitudinal Analysis of the Effect of Liability Pressure on Birth Outcomes*, 9 JOURNAL OF EMPIRICAL LEGAL STUDIES, 217 (2012).

⁴¹ Kip Viscusi, *The Social Costs of Punitive Damages Against Corporations in Environmental and Safety Torts*, 87 GEO. L.J. 285 (1998).

In general, the empirical studies find only marginal impacts of punitive damage caps. Studies find little evidence of a relationship between punitive damage caps and business activity such as production, employment, and new businesses. Although no study examines the individual impact of punitive damage caps on physician supply, the studies that combine these caps with other tort reforms find they are associated with increases in the supply of physicians. Similarly, there is no evidence on punitive caps' direct impact on unproductive treatments and expenditures, but the studies that combine the caps with other reforms find that they generally reduce unproductive defensive medicine by reducing treatments and expenditures. Moreover, the empirical evidence indicates that punitive caps have either no effect or even a decreasing effect on death rates. Similarly, the evidence shows that punitive damage caps do not increase the risk of environmental accidents. Finally, although there is evidence that punitive damage caps increase the use of caesarean sections, there is no evidence that these caps negatively impact infant health.

Thus, there appears to be little, if any, relationship between punitive damage caps and activity levels or accidents. Caps may have a negligible effect on primary behavior because current incentives to take care are so high that reducing punitive damages has little marginal deterrent effect. Alternatively, caps may have little impact on the incentives of doctors or businesses because punitive damages are rarely sought, and even more rarely awarded, in medical malpractice and products liability cases. Moreover, individual state caps on punitive damages may have little influence on business incentives because many businesses sell to a national market, and thus, pay little attention to a legal change in one particular state.

5. Areas for Future Research

There are still many areas where more empirical work is needed to determine the impacts of punitive damage caps, and other limitations on damages. In this section, I discuss possible areas of future empirical research on caps' effects on activity levels, accidents, and other relevant topics.

5.1 Activity Levels

Empirical studies consistently show that caps on punitive and other damages increase the supply of physicians. Future research in this area should focus more on the effects in rural areas or low-income areas where a change in physician supply would be felt most strongly and a lack of access to medical care is especially problematic.⁴²

Empirical studies do not provide strong evidence that caps affect business activity such as production, business openings and closings, and employment. The inconclusive findings may be the result of the national market for many goods. Manufacturers and retailers that distribute their products nationwide could be subject to the laws in any state in which a consumer lives, and thus state-specific product liability laws will have less impact on business decisions. The challenge for future studies will be to identify businesses where a product's acquisition, the victim's domicile, and the victim's injury are in the same state; in these situations, evidence shows that courts typically apply the laws of that state. Similarly, caps will have the largest

⁴² Encinosa and Hellinger focus on the effects in rural areas only. See William E. Encinosa & Fred J. Hellinger, *Have State Caps on Malpractice Awards Increased the Supply of Physicians?*, HEALTH AFF. (May 31, 2005).

impact on the activity of businesses that make decisions at the state, rather than the national level. Whereas large national companies may make company-wide decisions that are influenced by the laws of many states, the decisions of a local business are more likely to be influenced by the law of the state in which it is located. Thus, future studies might explore the impact of caps on the activity of businesses that sell locally and make business decisions at the local or state level.

Studies of activity levels should also focus on the kinds of activities that are most likely to be subject to punitive damage awards. Table 1 reveals that punitive damages are most often awarded in cases involving intentional torts, contract fraud, or employment discrimination. Similarly, Table 2 reports that punitive damage awards are highest in cases involving medical malpractice, products liability, employment discrimination, or tortious interference with a contract. Thus, caps should produce the greatest reduction in liability pressure for these kinds of activities. Whereas caps' impacts on the activity levels of physicians and manufacturers have been studied, no study has explored the impact on employment practices that may put companies at risk for employment discrimination suits. Again, the studies should focus on the employment practices of local firms that would likely be affected by the laws of the state in which they are located, rather than a large national firm that may be subject to laws in various states.

Finally, while there have been studies of the relationship between insurance costs and innovation (R&D expenditures and patents), there has been no study of the direct impact of damage caps on innovation.

5.2 Accidents

The empirical studies of damage caps' effects on accidents consistently show no adverse impact on death rates, birth outcomes, or environmental accidents. In fact, some studies show an improvement in certain measures of health outcomes.

Future studies of caps' effects on medical outcomes might focus on the types of outcomes for which timely access to medical care is especially important. For some kinds of injuries or medical conditions, such as labor/delivery and trauma care, timely access to medical providers is critical to prevent adverse outcomes. Thus, if damage caps increase the supply of physicians in these specialties, we would expect caps to improve health outcomes in these areas as well. Moreover, although there is some evidence that caps improve birth outcomes, future studies might focus specifically on birth outcomes in rural or low-income areas where access to medical care might be especially limited in states without caps.

Data limitations make it difficult to determine whether damage caps have reduced product injuries. Moreover, as many products are sold on a national market, it is not evident that the laws of any particular state will increase manufacturers' incentives to make safer products. Nevertheless, future empirical work could explore caps' effects on accidental injuries, intentional injuries, and other sorts of deaths and injuries.

5.3 Other Areas of Research

There are other issues relating to punitive damages that deserve further empirical testing. One area involves the insurability of punitive damages. Directly-assessed punitive damages are insurable in 30 states. However, there is still a debate in the empirical literature about whether punitive damages are proportional to compensatory damages. Yet only if damages are

proportional are they predictable enough to be insurable at a reasonable cost. In contrast, if juries randomly award punitive damages, insurance companies would either refuse to insure them or charge an exorbitant ambiguity premium to account for the uncertainty in their imposition.

Another possible area of research is whether insurance coverage of punitive damages impacts how many claims are brought, the settlement rate, and the settlement amount. Evidence shows that defendants with medical malpractice insurance are more likely to settle cases and often settle at the insurance policy limits. Similarly, litigants with punitive damage coverage may be more inclined to agree to a settlement and be more likely to settle near the policy limits for punitive damage coverage. In addition, plaintiffs may be more likely to file claims if they know that defendants are insured against punitive damages and will more readily agree to a settlement.

Finally, more empirical work is needed to determine whether the insurability of punitive damages affects activity levels and accidents. On one hand, punitive damages insurance may increase activity levels by reducing the litigation risk that accompanies certain activities. On the other hand, insurers may create incentives for the insured to reduce their activity levels to reduce the risk of a punitive damages award. Similarly, the insurability of punitive damages may reduce incentives for potential defendants to take care as they do not face a significant punitive damages award. Alternatively, insurers may monitor and incentivize the precautions taken by the insured to make sure they are not increasing the risk of a punitive damages award. Ultimately, the net effect of insurance for punitive damages is an empirical question.

Another area where more empirical research is needed involves “split-recovery” tort reforms. These laws require a percentage of punitive damage awards to be split or shared with the state, some state-specified fund, or other judge-specified recipient.⁴³ Very little empirical evidence exists about the effects of these reforms. Theory suggests that split-award statutes should lower settlement amounts and the likelihood of trial, as both parties act to cut out the State. However, no empirical evidence confirms this. Similarly, split-recovery statutes differ in how contingency fee attorneys compute their fee; some states allow attorneys to receive a contingency fee based on the gross punitive damages award, but others require any contingency fee to be paid solely out of the plaintiffs’ share of the award. Future empirical studies could test whether the laws specifying how the contingent fee is determined impact the number of claims for punitive damages or the likelihood of settlement.

Finally, empirical research could explore whether there is any relationship between the theoretical foundations of punitive damages and the reality of the cases in which they are awarded. Economic theory indicates that punitive damage awards are important to achieving adequate deterrence in the cases where the probabilities of detection or enforcement are low. However, no study has addressed whether punitive damages are actually awarded in these types of cases.

⁴³ “LSUE Foundation receives settlement distribution,” VermilionToday.com, accessed May 23, 2013, http://vermiliontoday.com/view/full_story/8216542/article-LSUE-Foundation-receives-settlement-distribution.

Appendix 1: State-Specific Punitive Damages Cap¹

<u>State</u>	<u>Cap on Punitive Damages</u>
Alabama	Generally, the greater of 3X compensatory damages or \$500,000
Alaska	Generally, the greater of 3X compensatory damages or \$500,000
Colorado	No more than 100% of the amount of actual damages awarded.
Connecticut	No more than twice the damages awarded to the plaintiff in products liability cases
Florida	Generally, the greater of 3X compensatory damages or \$500,000
Georgia	\$250,000, unless plaintiff can show defendant acted with specific intent to harm, products liability, and defendants acting under the influence.
Idaho	The greater of \$250,000 or 3X compensatory damages
Indiana	3X the greater of compensatory damages or \$50,000
Kansas	The lesser of the defendant's highest annual gross income from the past 5 years or \$5,000,000
Louisiana	General prohibition on punitive damages except in products liability.
Maine	\$250,000 for wrongful death
Massachusetts	General prohibition on punitive damages in most cases.
Michigan	General prohibition on punitive damages except for damages to feelings made with malicious intent.
Mississippi	Sliding scale based on net worth of a defendant; for defendants worth less than \$50 million, 2% of defendant's net worth
Missouri	The greater of \$500,000 or 5X net judgment

¹ Ronen Avraham, *Database of State Tort Law Reforms (DSTLR 4th)* (U of Texas Law, Law and Econ Research Paper No. 184, 2011), available at SSRN: <http://ssrn.com/abstract=902711>. Washington, D.C. also limits punitive damages “to amount necessary to inflict punishment without exceeding the boundaries of such punishment and leading to bankruptcy.” Given this highly subjective standard, it is unclear whether it represents a binding cap on punitive damages.

Montana	The lesser of \$10 million or 3% of a defendant's net worth, except for class actions
Nebraska	General prohibition on punitive damages.
Nevada	3X compensatory damages if \$100,000 or more; or \$300,000 if compensatory damages are less than \$100,000
New Hampshire	General prohibition on punitive damages unless provided by statute.
New Jersey	The greater of \$350,000 or 5X defendant's liability
North Carolina	The greater of \$250,000 or 3X compensatory damages
North Dakota	The greater of \$250,000 or 2X compensatory damages
Ohio	2X compensatory damages, unless the defendant is a small employer/individual, when they are the lesser of 2X compensatory, 10% of the defendant's net worth at the time of the tort, or \$350,000
Oklahoma	\$100,000 when defendant acts in reckless disregard, \$500,000, 2X actual damages, or the direct financial benefit when defendant acted with intent and malice.
Pennsylvania	2X compensatory damages
South Carolina	The greater of \$500,000 or 3X compensatory damages
Tennessee	The greater of \$500,000 or 2X compensatory damages
Texas	The greater of \$200,000 or 2X economic damages plus non-economic damages up to \$750,000
Virginia	\$350,000 for medical malpractice
Washington	Prohibits punitive damages in personal injury cases.
Wisconsin	The greater of \$200,000 or 2X compensatory damages

Appendix 2: The Relationship between Damage Caps and Activity Levels

Citation	Reforms Studied	Outcome Variables	Results: statistically significant effects	Results: statistically insignificant effects
Jonathan Klick & Thomas Stratmann, <i>Does Medical Malpractice Reform Help States Retain Physicians and Does It Matter</i> , 36 JOURNAL OF LEGAL STUDIES S121 (2007)	Caps on noneconomic and caps on total damages	Number of doctors per capita practicing in high-risk specialties	noneconomic damage caps are associated with an increase the number of doctors per capita in 5 highest-risk specialties (neurological surgery, thoracic surgery, obstetrics and gynecology, general practice, and emergency room) who are practicing in a state	No effect of total damage caps.
Daniel P. Kessler, William M. Sage & David Becker, <i>Impact of Malpractice Reforms on the Supply of Physician Services</i> , 293 J. AM. MED. ASS'N 2618 (2005).	Caps on noneconomic damages /total damages (collapsed); abolition of punitive damages, combined with collateral source reform and non-mandatory pre-judgment interest into 1 variable: direct reforms	Percentage change in number of physicians practicing in each state	Three-years after adoption, direct reforms increased physician supply by 3.3%, larger effect on nongroup versus group physicians. Almost all change due to retirements/entry, not physicians moving between states	
FRED J. HELLINGER & WILLIAM E. ENCINOSA, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, THE IMPACT OF STATE LAWS LIMITING MALPRACTICE AWARDS ON THE GEOGRAPHIC DISTRIBUTION OF	Noneconomic damage/total damage caps (collapsed)	Number of practicing physicians per 100,000 population	Both states and counties with caps have about 12% more physicians per capita than states/counties without caps	

PHYSICIANS (2003)				
William E. Encinosa & Fred J. Hellinger, <i>Have State Caps on Malpractice Awards Increased the Supply of Physicians?</i> , HEALTH AFFAIRS (May 31, 2005),	noneconomic cap and total cap collapsed into dummy variable, and variable indicating whether cap was <=\$250,000	Physicians per capita	Counties in states with a cap had 2.2 percent more physicians per capita because of the cap, and rural counties in states with a cap had 3.2 percent more physicians per capita. Rural counties in states with a \$250,000 cap had 5.4 percent more obstetrician-gynecologists and 5.5 percent more surgical specialists per capita than did rural counties in states with a cap above \$250,000	In unreported regressions, found caps on punitive damages had no effect on physician supply
David Matsa, <i>Does Liability Keep the Doctor Away? Evidence from Tort Reform Damage</i> , 36 JOURNAL OF LEGAL STUDIES S143 (2007)	noneconomic/total damage caps collapsed into one variable	Physicians per 100,000 residents	Damage caps increase supply of physicians in rural areas by 3-5%; caps increase supply of rural specialist physicians by 10-12%	Damage caps have no effect on physician supply for the average resident of adopting states; no effect beyond lowest quartile of population density;
Eric Helland & Mark Showalter, <i>The Impact of Liability on the Physician Labor Market</i> , 52 JOURNAL OF LAW AND ECONOMICS 635 (2009)	Authors develop a measure of the impact of noneconomic damage caps in a given state on a specific specialty's expected liability cost	Hours worked	Liability exposure and caps reduce hours worked (baseline results imply that a 10 percent increase in expected liability would lead to a 2.85 percent decline in the average physicians' work hours); effect is stronger for physicians 55 and older in those specialties facing the most liability exposure.	
Daniel Kessler & Mark McClellan, <i>The Effects of Malpractice Pressure and Liability</i>	Caps on noneconomic damages and total damages (collapsed into one variable),	Physicians perceptions of malpractice induced treatment:	Only when direct and indirect reforms are collapsed into one variable, is there a statistically significant lower growth in	When direct reforms are separate from indirect reforms, no effect on any

<i>Reforms on Physicians' Perceptions of Medical Care</i> , 60 L. & CONTEMP. PROBS. 81 (1997).	abolition of punitive damages, groups into direct reforms with no mandatory pre-judgment interest & reform to collateral source rule	record keeping, diagnostic tests, referrals for consultation, time with patients	malpractice induced treatment: referrals for consultation & time with patients	treatments. When direct and indirect are combined, no effect on record keeping or diagnostic tests.
Daniel Kesler & Mark McClellan, <i>Do Doctors Practice Defensive Medicine?</i> , 111 Q. J. OF ECON. 353 (1996)	Caps on noneconomic or total damages & abolition of punitive damages (combined into direct reforms with: no mandatory PJI, collateral source rule reform)	Hospital expenditure	direct reforms reduce hospital expenditures by 5-9%	
Daniel Kessler & Mark McClellan, <i>Malpractice Law and Health Care Reform: Optimal Liability Policy in an Era of Managed Care</i> , 84 JOURNAL OF PUBLIC ECONOMICS 175 (2002)	Caps on noneconomic or total damages & abolition of punitive damages (combined into direct reforms with: no mandatory pre-judgment interest, collateral source rule reform)	Hospital expenditure	In the long run (three or more years after the adoption of reforms), patients from states adopting direct reforms have significantly lower growth in medical expenditures for both AMI and IHD patients	

Appendix 3: The Relationship between Damage Caps and Accidents

Citation	Reforms Studied	Outcome Variables	Results: statistically significant effects	Results: statistically insignificant effects
Paul H. Rubin & Joanna M. Shepherd, <i>Tort Reform and Accidental Death Rates</i> , 50 JOURNAL OF LAW AND ECONOMICS 221 (2007)	caps on noneconomic damages, caps on punitive damages, a higher evidence requirement for punitive damages	accidental, non-motorvehicle death rates	caps on noneconomic damages reduce annual death rates by 3.5%;, a higher evidence requirement for punitive damages reduces annual death rates by 2.5%	caps on punitive damages have no statistically significant effect on death rates
Paul H. Rubin & Joanna M. Shepherd, <i>The Demographics of Tort Reform</i> , 4 REVIEW OF LAW AND ECONOMICS 591 (2008)	PD reforms (caps or higher evidence standard), caps on NE, caps on total damages	accidental, non-motorvehicle death rates by race, gender, and age	Noneconomic damage caps are generally associated with decreases in death rates, but have a disproportionate positive effect (i.e. smaller decreases) on the death rates of females relative to males, young children relative to adults, and the elderly relative to non-elderly; total damage caps are associated with increases in death rates, but have a disproportionate negative effect (i.e. smaller increases) on the death rates of females relative to males and the elderly versus non-elderly; PD reforms associated with decreases in death rates for some demographic groups but no disproportionate effect	

Daniel Kesller & Mark McClellan, Do Doctors Practice Defensive Medicine?, 111 QUARTERLY JOURNAL OF ECONOMICS. 353 (1996)	Caps on noneconomic or total damages & abolition of punitive damages (combined into direct reforms with: no mandatory PJI, collateral source rule reform)	mortality rates, and readmission rates of elderly cardiac disease patients		Statistically insignificant results on mortality and readmissions
Daniel Kessler & Mark McClellan, <i>Malpractice Law and Health Care Reform: Optimal Liability Policy in an Era of Managed Care</i> , 84 JOURNAL OF PUBLIC ECONOMICS 175 (2002)	Caps on noneconomic or total damages & abolition of punitive damages (combined into direct reforms with: no mandatory pre-judgment interest, collateral source rule reform)	mortality rates, and readmission rates of elderly cardiac disease patients		Statistically insignificant results on mortality and readmissions
Frank Sloan & John Shadle, <i>Is There Empirical Evidence for 'Defensive Medicine'? A Reassessment</i> , 28 JOURNAL OF HEALTH ECONOMICS, 481 (2009)	Caps on noneconomic or total damages & abolition of punitive damages (combined into direct reforms with: no mandatory PJI, collateral source rule reform)	Medicare payments and 1-year survival rates following index event		Direct reforms don't reduce 1-year survival
Janet Curie & W. Bentley MacLeod, <i>First Do No Harm? Tort Reform and Birth</i>	Punitive Damage caps, NE Damage caps	c-section rates, induction/stimulation of labor, preventable	Both NE and punitive Damage caps increase probability of C-section by 5 %, caps on noneconomic	no statistically significant effect on induction/stimulation of labor, other

<i>Outcomes</i> , 123 QUARTERLY JOURNAL OF ECONOMICS 795 (2008)		complications, other complications, no-c section complications, APGAR score	damages increase preventable complications by 6%,	complications, no-c section complications, APGAR score
Jonathan Klick & Thomas Stratmann, <i>Does Medical Malpractice Reform Help States Retain Physicians and Does It Matter</i> , 36 JOURNAL OF LEGAL STUDIES S121 (2007)	Caps on noneconomic and caps on total damages	Infant mortality rates; black and white	Although not robust to all specifications, NE damage caps lower black infant mortality rate by about 6%	No effect of caps on white infant mortality rate
Tony Y. Yang, David M. Studdert, S.V. Subramanian, & Michelle M. Mello, <i>Does Tort Law Improve the Health of Newborns, or Miscarry? A Longitudinal Analysis of the Effect of Liability Pressure on Birth Outcomes</i> , 9 JOURNAL OF EMPIRICAL LEGAL STUDIES, 217 (2012).	punitive damage caps, caps limiting noneconomic damages awards at \$250,000, caps limiting noneconomic damages awards at between \$250,000 and \$500,000, and caps limiting either noneconomic or total damages awards at levels greater than \$500,000	APGAR score, birth weight, preterm birth, and birth injury (impairment of the infant's body function or structure due to adverse influences that occurred at birth)		No statistically significant effect on APGAR score, birth weight, preterm birth, and birth injury
Kip Viscusi, <i>The Social Costs of Punitive Damages</i>	Variable for whether state allows punitive damages or has	Toxic chemical accidents, toxic discharges	States with insurable PD have lower premium rates for product liability insurance (compared to	PD has no effect on toxic chemical accidents, toxic

<i>Against Corporations in Environmental and Safety Torts</i> , 87 GEORGETOWN LAW JOURNAL 285 (1998)	eliminated PD, variable for whether PD insurable	reported, per capita death rates from medical misadventures, per capita accidental death rates, premiums for total, med mal, product liability, and other liability insurance	uninsurable states)	discharges, per capita death rates from medical misadventures, per capita accidental death rates. Also no effect on premiums levels for total, med mal, or other insurance
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