How do Tort Reforms Affect the Accidental Death Rate? An Empirical Analysis

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Abstract: In order to reduce the volume and costs of tort litigation, since the 1970's most U.S. states have enacted tort reforms limiting liability for committing torts. I estimate whether several common types of tort reforms affect the number of non-motor-vehicle accidental bodily injury torts that are committed, by analyzing data on accidental death rates, the presence of tort reforms, and controls from the 50 U.S. states and D.C. from 1981-2004. Reforms to the collateral source rule are associated with more accidental deaths and reforms to the rule of joint and several liability are associated with fewer accidental deaths, but other reforms such as caps on non-economic damages and punitive damages reforms do not have robust associations with accidental deaths. I find that estimates of the effects of tort reforms on accidental deaths in prior research are sensitive to model specification and the inclusion of overdoses on illegal drugs and abused pharmaceuticals, a leading but non-tortious cause of accidental death, in the dependent variable.

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Section 1: Introduction

Since the 1970's, controversies surrounding the operation of the U.S. tort law system have led most U.S. states to adopt various different types of tort reforms. For discussions of these controversies, see Congressional Budget Office ("CBO"), 2003, 2004; Kaplow and Shavell [esp. pp. 1673-74]; Kessler and Rubinfeld, 2004 [esp. pp. 9-11]; and Rubin and Shepherd, 2007. A tort reform is a law that limits the expected liability of those who commit torts ("tortfeasors"), either by limiting the amount of damages that injured plaintiffs can collect from a tortfeasor in a tort verdict, or by raising the burden of proof for showing that someone has committed a tort. The primary aim of tort reforms is to reduce the volume of tort litigation and its associated costs by reducing the incentives of accident victims to pursue and prolong tort litigation. Economic theory has explained why reductions in the expected size of tort awards that are created by tort reforms might enhance the efficiency of the tort law system, as there are reasons why it is possible for the size of tort awards and, consequently, the volume of tort litigation to be socially excessive (Shavell, 1982; Craswell and Calfee, 1986; Kessler and McClellan, 1996.) A body of empirical research has found much evidence that some types of tort reforms are effective at reducing the average size of tort awards and the volume of tort litigation (see Avraham, 2007; Born, Viscusi, and Baker, 2006; Viscusi and Born, 2005; and additional research summarized in CBO, 2004).

However, in order to know whether tort reforms truly result in efficiency gains, knowledge of whether and to what extent tort reforms affect the number of torts that are committed is also needed. Most torts are acts which cause bodily injuries to others unintentionally, i.e. accidentally (Bureau of Justice Statistics ("BJS") 1995). While litigation expenditures on tort suits in the U.S. are very large (CBO, 2003, 2004; Tillinghast-Towers Perrin, 2003), bodily injuries sustained in accidents are also a leading cause of death and medical expenditures in the U.S. (Centers for Disease Control and Prevention ("CDC"), 2006; National Center for Health Statistics ("NCHS"), 2005.) In this paper, I estimate the effects of the most common and important types of tort reforms on the rate of accidental deaths. Accidental deaths are studied as comprehensive data on them is available from the U.S. Vital Statistics Mortality Data taken from all of the death certificates filed in the U.S., and as the rate of fatal accidents serves as a proxy for the rate of serious accidental injuries, both fatal and nonfatal.

In order to estimate the effects of tort reforms on accidental deaths, I analyze a panel of data on accidental death rates, the presence of tort reforms within states, and control variables for the 50 U.S. states and D.C. from 1981 through 2004, using differences across states in whether and when they have had changes in the presence of the different types of tort reforms within them as identifying variation for the estimates. My main results are that reforms to the Collateral Source Rule ("CSR" reforms) are estimated to have increased the accidental death rate, although the effect of this reform fades and becomes statistically insignificant after several years since the adoption of the reform have passed; and that reforms to the Rule of Joint and Several Liability ("JSL" reforms) cause a statistically significant, lasting decrease in the accidental death rate. The evidence I find that the other reforms I study – caps on noneconomic damages ("NED caps") and punitive damages reforms - affect the accidental death rate is modest at best. However, I do find that the presence of NED caps within states is associated with significantly more accidental deaths occurring after a few years since the adoption of these reforms have passed, suggesting that these reforms may increase the accidental death rate, if anything.

CSR reforms are tort reforms which reduce the expected amount of damages for medical expenses and lost wages that tortfeasors must pay to accident victims. See Section 2.1.1 below for more information on CSR reforms and the other types of tort reforms studied in this paper. JSL reforms concern the apportionment of responsibility for paying damages to accident victims between multiple parties - besides the accident victim herself - who have contributed to causing the accident. When there is no JSL reform in place in a state, an accident victim may collect the entirety of his or her damages from any one of multiple parties found to be to blame for causing the injury; when a JSL reform is in place, a tortfeasor's assessed percentage of the blame for causing the injury generally places a limit on the percentage of the damages that the victim may collect from that tortfeasor. Several theoretical papers have explained reasons why JSL reforms could either increase or decrease the rate of accidents, by making potential tortfeasors either less or more careful at taking precautions against causing accidents (see Kornhauser and Revesz, 1998 for a summary of most of this literature on JSL. See also Kornhauser and Klee, 2007, Section III.B of Currie and MacLeod, 2008, and Section 2.2 of this paper, below.)

Previous empirical research on tort reforms' effects on the number of torts that are committed includes research on how tort reforms applying in medical malpractice claims affect the quality of health care, as measured by rates of adverse health outcomes amongst

patients receiving certain types of health care. These adverse health outcomes are torts when the outcomes are caused by health care providers' negligence (Danzon, 2000). Kessler and McClellan (1996; 2002a,b), who study cardiac care, and Currie and MacLeod, who study obstetric care, find evidence that JSL reforms reduce the rate of adverse health outcomes, and Currie and MacLeod also estimate that NED caps increase the rate of adverse health outcomes. Previously, the effects of tort reforms on accidental deaths have been estimated by Rubin and Shepherd (2007). These authors find that noneconomic damage caps, higher evidence standards for punitive damage awards, product liability reforms, and prejudgment interest reforms are significantly associated with fewer accidental deaths, and that only collateral source rule reforms are significantly associated with increased accidental deaths[1]. They estimate no statistically significant effect of JSL reforms. As explained by these authors, the other types of tort reforms besides JSL reforms could decrease the accidental death rate because of increased precautions to avoid accidents being taken by potential accident victims in response to reduced expected compensation they can receive from tortfeasors; and increased chances of accident victims surviving their injuries due to increases in the supply of medical care, such as emergency room and surgical care, caused by tort reforms, as tort reforms reduce the costs of medical malpractice litigation, a type of tort litigation, that are faced by providers of medical care. See Section 2 below for further details on these points.

The methods used in my paper differ in a number of ways from those used by Rubin and Shepherd, which is why the results of these two papers are different. Amongst the most important of these differences are that, unlike Rubin and Shepherd, I omit the leading category of non-tortious accidental deaths, overdoses on illegal drugs and abused pharmaceuticals, from my dependent variable in order to better measure the causal effects of tort reforms on the rate of accidents; and that I use a more recent, accurate and detailed dataset on tort reforms than was used in Rubin and Shepherd – a dataset created in part for use in this paper - in order to better measure the presence of tort reforms in U.S. states. This dataset also allows me to differentiate between the effects of tort reforms that apply in all or most types of tort suits in general and those that apply only in medical malpractice suits, in

[1] I exclude variables for product liability reforms and prejudgment interest reforms from the regressions appearing in the main body of this paper, since the quality of the data on these reforms is poor (see Sections 3 and Appendix C below), and since I find that the inclusion of variables for these reforms in the regressions has no effect on the significance and sign of the coefficients on the other tort reform variables. However, I do estimate the effects of these two tort reforms in Appendix C, which provides a detailed comparison between my work and Rubin and Shepherd's.

order to provide evidence on the channels by which tort reforms affect the accidental death rate; I differentiate between NED caps which are generally applicable and those that apply in medical malpractice suits only, and find that those applying in medical malpractice suits only have no significant association with the accidental death rate. In addition, this dataset allows me to differentiate between the short- and long-run effects of tort reforms as was done in empirical work by Kessler and McClellan, Kessler, Sage and Becker (2005), and Born, Viscusi, and Baker (2006) on the effects of tort reforms on other tort-related outcomes besides accidental deaths. Further details on differences between my paper and Rubin and Shepherd are given in the text.

The rest of this paper proceeds as follows. Section 2 discusses in detail the possible effects of tort reforms on the accidental death rate, and defines and discusses the different types of tort reforms examined in the empirical analysis. Section 3 discusses the sources of data for this project, the types of accidents included in the primary dependent variable for this paper, and available evidence on whether these types of accidents are often tortious. Section 4 presents the econometric models used in the empirical analysis and defines the variables included in the regressions. Section 5 describes the results of the empirical analysis and Section 6 provides a discussion of these results. Section 7 concludes. Appendix A provides further information on whether the types of accidents included in the primary dependent variable are often tortious, Appendix B provides additional information on the sources of data for this paper, and Appendix C presents the results of additional regressions that show exactly which differences in methods between this paper and Rubin and Shepherd (2007) are driving the differences in results between the two papers.

Section 2. Possible Ways in Which Tort Reforms Could Affect Accidental Deaths

In this section, I discuss the multiple ways in which tort reforms might cause changes in the accidental death rate. There are reasons why each type of tort reform I study could either increase or decrease the accidental death rate. Again, a tort reform is a law that limits the expected liability of those who commit torts ("tortfeasors"), either by limiting the amount of damages that injured plaintiffs can collect from a tortfeasor in a tort verdict, or by raising the burden of proof for showing that someone has committed a tort. The types of tort reforms whose effects I estimate in this paper can be divided up into two different categories. The first is a category I call "Damage Limits". These reforms reduce the expected total amount of

damages accident victims can collect from tortfeasors in tort suits. The reductions these reforms create are in no way dependent on the number of tortfeasors – which may be one or greater than one – who are found to be liable to the victim for damages. The second category of tort reform is a type of tort reform that is in a category by itself, and this reform affects how liability for paying an accident victim's damages is divided between multiple tortfeasors who have played a role in causing the accident. This type of tort reform is reforms to the Rule of Joint and Several Liability ("JSL reforms"), and these reforms have no limiting effect on the total amount of damages the tort victim can be awarded in a tort verdict. JSL reforms only affect how responsibility for paying these damages may be apportioned between the different tortfeasors. The possible effects of these two categories of tort reforms on the accidental death rate differ in nature (although not in sign), and in this section I discuss their possible effects one category at a time. I also name and discuss the specific types of Damage Limits examined in this paper, and cite the literature that explains how damage limits could potentially increase the efficiency of the tort law system. A summary of the material in Section 2 is given in the following table:

Category of Tort Reform:	Definition:	Possible channels through which members of this category of tort reform may affect the accidental death rate:	Sign of the effect of this possible channel on the accidental death rate :
Damage Limits	These reforms reduce the expected total amount of damages accident victims can collect from tortfeasors in tort suits. The types of Damage Limits studied in this paper are CSR Reforms, NED Caps, and Punitive Damages Reforms that apply in all or most types of tort suits in general, and NED caps that apply in medical malpractice suits only.	Decrease level of precautions taken by potential tortfeasors	Increase the accident rate
		Increase level of precautions taken by potential accident victims	Decrease the accident rate
		Increase supply of medical care available to treat accident victims	Decrease the accidental death rate
		Decrease quality of medical care provided to accident victims	Increase the accidental death rate
Joint and Several Liability Reforms ("JSL Reforms")	JSL reforms create a law change from the Common-Law Rule of Joint and Several Liability, which allows an accident victim to collect the entirety of his or her damages from any one of multiple tortfeasors found to be partially to blame for causing an accident, to a rule in which a tortfeasor's assessed percentage of the blame for causing the accident generally places a limit on the percentage of the damages that the victim may collect from that tortfeasor	JSL reforms could either increase or decrease the level of precautions taken by potential tortfeasors	Could either increase or decrease the accident rate
		Increase supply of medical care available to treat accident victims	JSL reforms are unlikely to act through these channels
		Decrease quality of medical care provided to accident victims	

2.1.1. Types of "Damage Limits" Reforms Studied.

I study three types of Damage Limits tort reforms in this paper – Reforms to the common-law Collateral Source Rule ("CSR Reforms"), Caps on Noneconomic Damages ("NED Caps"), and Punitive Damages Reforms ("PD Reforms")[2]. These three types of tort reforms are defined as follows:

Reforms to the Common-Law Collateral Source Rule ("CSR Reforms"). These tort reforms reduce the expected amount of economic damages that an accident victim may collect from a tortfeasor, or tortfeasors if there are more than one, in a tort suit. Payments for economic damages are compensation for monetary losses such as medical expenses and wages lost when work is missed due to an injury. CSR reforms reduce the amount of economic damages an accident victim may collect in the following way. When a CSR reform is in place, and an accident victim has received money as compensation for some of his or her harm from a "collateral" source other than the tortfeasor, such as a health insurer or disability insurer, then the amount of damages that the tortfeasor(s) in the case must pay to the accident victim either must be reduced by the dollar amount of collateral source compensation that the accident victim has received or will receive for his or her injuries (a "mandatory offset" CSR reform), or may be reduced by all or some of this amount at the court's discretion (a "discretionary offset" CSR reform). Since only a few states have enacted discretionary offset CSR reforms, while many have enacted mandatory offset CSR reforms, I do not differentiate between mandatory and discretionary offset CSR reforms in my empirical analysis (the variable I use for the presence of a CSR reform within a state in a given year equals 1 if either a mandatory or a discretionary offset reform is in place, and is 0 otherwise)[3]. If a CSR reform

[2] In some of the regressions whose results are shown in the tables in Appendix C, I also estimate the effects of two other types of Damage Limits tort reforms, Prejudgment Interest Reforms and Product Liability Reforms. These two types of tort reforms are defined and discussed in Appendix C, and their effects were estimated in Rubin and Shepherd (2007). I do not include variables indicating the presence of these two types of tort reforms in the regressions shown in the tables in the main body of my paper, however, for the following reasons. I find little evidence of a statistically significant relationship between these two types of tort reforms and the accidental death rate, and the inclusion of variables for Prejudgment Interest Reforms and Product Liability Reforms in the regressions has no effect on the sign and rarely has any effect on the statistical significance of the other tort reform variables. Also, the source of data for these two types of tort reforms, the American Tort Reform Association Tort Reform Record, is not of as high a quality as the source of data for the other types of tort reforms, which is discussed below in Section 3; data on Prejudgment Interest Reforms in particular appears to be of poor quality.

[3] Rubin and Shepherd (2007) did differentiate between mandatory and discretionary offset CSR reforms in the regressions in their paper, however, so in Appendix C I also experiment with differentiating between CSR reforms in this way in a number of regressions. Also, some collateral source reforms that states have enacted do

is not in place in a state at the time of an accident, meaning that a state follows what is known as the common-law collateral source rule, then an accident victim may actually collect the entirety of his damages from a tortfeasor(s) in a tort suit even when he has already received compensation for some of his harm from collateral sources. This means that the victim will be doubly compensated for some components of his or her harm; however, courts traditionally ruled that it is better to always require tortfeasors to pay for all of the damages they have caused than to prevent this double recovery, for reasons of deterring torts from being committed and fairness.

Caps on Noneconomic Damages ("NED Caps"). Payments for noneconomic damages ("NED") are compensation for nonpecuniary losses such as physical pain and suffering, mental anguish, disfigurement, loss of enjoyment of life, and loss of consortium. The leading source of estimates of tort litigation costs and tort suit damage payments in the U.S., a survey conducted by the actuarial and consulting firm Tillinghast Towers-Perrin, estimates that in 2002 in the U.S., slightly more than half of the total amount of all tort awards and settlement payments in tort cases were for noneconomic damages (CBO, 2003, p. 20, citing Tillinghast Towers-Perrin, 2003). Awards of noneconomic damages are controversial, as their estimated monetary value is intangible and subjective rather than exact. This entails that the size of NED awards may be highly variable and unpredictable, and also that juries may be biased towards awarding excessively high noneconomic damage awards, particularly in suits against wealthy defendants[4]. In response to these controversies, many states have enacted caps on noneconomic damages, a type of tort reform which limits the amount of noneconomic damages that can be awarded in a tort suit to a maximum dollar amount, such as $250,000 or $750,000 (which is sometimes indexed to inflation from the date at which the cap was enacted). The NED caps that states have enacted often apply only in medical malpractice cases, rather in all or most types of tort cases in general, however[5, 6]. Since the effects of the

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not allow awards to be offset by payments made by private sources of insurance such as employer-provided or individually purchased health insurance, while others do not allow offsets of payments made by public sources of health insurance. The variable for the presence of CSR reforms that I use in the regressions results that are shown in the tables in the main body of this paper is equal to 1 only if a CSR reform is in place that allows offsets of payments made by private sources of insurance, since these CSR reforms are much stronger than CSR reforms which do not allow such offsets.

[4] However, a judge of a trial or appellate court may declare a mistrial and call for a new trial if she thinks that the jury's award of noneconomic damages is large beyond reason and/or driven by prejudice or bias against the defendant. See Dobbs, Ch. 8, pp. 357-58, and cases concerning excessive damage awards compiled in and by Westlaw under the legal issue category "DAMAGES 115k127.3 Excessive damages in general."

[5] The common types of tort suits occurring in the U.S. that are neither medical malpractice suits nor tort suits over automobile accidents are premises liability suits and product liability suits (BJS, 1995). Types of tort suits

generally applicable NED Caps on the accidental death rate may differ from the effects of the NED Caps which apply only in medical malpractice cases, as explained below, I differentiate between general and medical malpractice-specific NED Caps in my empirical analysis. However, I do not differentiate between general and medical-malpractice-specific versions of the other tort reforms I study, because medical-malpractice-specific versions of the other reforms have very rarely been enacted by states. Instead, the variables I use for the presence of CSR Reforms, Punitive Damages Reforms, and JSL Reforms within states indicate the presence of generally applicable versions of these reforms within states.

Studies researching how tort reforms affect the number of tort suits, size of payments from defendants to plaintiffs in tort suits, and the price of liability insurance and liability insurers' losses have tended to find that NED caps do reduce each of these things (see Avraham, 2007; Viscusi and Born, 2005; Born, Viscusi, and Baker, 2006; and additional research summarized in CBO, 2004).

Punitive Damages Reforms ("PD Reforms"). Economic damages and noneconomic damages are known as "compensatory damages", since their purpose is to compensate a tort victim for his or her losses. In contrast to compensatory damages, punitive damages are sometimes awarded for the purpose of punishing tortfeasors whose conduct in causing the tort is judged to be worse than mere ordinary negligence and particularly blameworthy as it is indicative of an "antisocial mental state" (Dobbs, p. 1064), in order to deter such conduct. Behavior that is grossly negligent, reckless or done with conscious indifference to or

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in which some of the generally applicable NED caps that have been enacted, as well as generally applicable instances of tort reforms of other types, do not apply tend to be intentional torts, torts involving intoxicated automobile drivers, and toxic torts.

[6] A few states have also enacted caps on total damages – the sum of economic and noneconomic damages - that can be awarded in medical malpractice suits. The total damages caps that have been enacted do not apply in other types of tort suits besides medical malpractice. I consider total damage caps to be equivalent to NED caps in my empirical analysis, as they serve the same purpose as NED caps and have the same type of effect on damage awards. There are only two changes in the presence of total damage caps within states between 1981-2004, the time period of the data I analyze, however: Colorado enacted a cap on total damages in medical malpractice cases in 1988 (after it had already enacted a cap on noneconomic damages that applies in all types of tort cases in 1986), and South Dakota replaced a cap on noneconomic damages in medical malpractice cases with a cap on total damages in 1986, which was struck down as unconstitutional by the state Supreme Court in 1996, at which point the law reverted to the predecessor noneconomic damages cap. Also, in 1988, the Supreme Court of Texas struck down a cap on damages applying in medical malpractice suits only which was labeled as a cap on total damages and which was enacted in 1977. However, this cap, which limited the sum of economic and noneconomic damages in medical malpractice suits to $500,000, made an exception to the cap for medical expenses, a type of economic damages. Since medical expenses were left uncapped by this cap in Texas, this makes this cap more akin to a cap on noneconomic damages than a true total damages cap, and I have coded it as an NED cap in the data as well.

disregard for the plaintiff's well being, or that is malicious, willful or wanton can justify an award of punitive damages. Awards of punitive damages that tort victims receive are awards over and above their awards for compensatory damages. Tort reforms pertaining to punitive damages awards have taken two forms. Caps on punitive damages work as caps on noneconomic damages do: they limit punitive damage awards, either to a certain maximum dollar amount (occasionally zero in states that have adopted outright bans of punitive damage awards), a certain maximum that is a multiple of compensatory damages (such as two or three times the compensatory damages), and occasionally, a certain percentage of the defendant's net worth or income. Punitive Damage Evidence reforms require the plaintiff to prove by clear and convincing evidence, rather than a preponderance of evidence, that the defendant's conduct was of a bad enough nature to justify an award of punitive damages. In the empirical analysis below, the variable for the presence of a PD Reform within a state equals 1 if either one or both of these two types of PD Reforms is present in the state.

2.1.2. Possible Effects of Damage Limits on the Accidental Death Rate

The primary purpose of tort law is to deter torts from being committed by making those who commit torts pay for the damages that they have caused (the other purposes of tort law are compensation of victims of torts and the allocation of risk.) Tort law aims to correct market failures, since torts are incidences of market failures; torts are externalities when the victim and tortfeasor(s) are strangers rather than in a buyer-seller relationship, and when they are in a buyer-seller relationship, torts often reflect moral hazard on the part of the seller, as the efforts taken by the seller to make her good or service reasonably unlikely to cause injury to the buyer are often private information (Kaplow and Shavell, 2002, pp. 1667, 1680-1681). The size of the damage payments transferred from tortfeasors to tort victims determines the strength of potential tortfeasors' incentives to take precautions against causing accidents. Reducing the expected amount of damages potential tortfeasors have to pay by adopting Damage Limits tort reforms could lead them to take fewer precautions against causing accidents, which could cause more accidents to occur.

It should be noted that even under the assumption that limiting damages would just cause more rather than fewer or no change in accidents, some papers have explained reasons why reducing the amount of damages accident victims receive could make the tort law system more efficient. Shavell (1982) gives differences between the private and social incentives of

accident victims to pursue tort litigation as one such reason. The private incentives to bring suit are based on the amount of compensation plaintiffs expect to receive from those they sue and plaintiffs' litigation expenditures on plaintiffs' lawyers, but there are both negative and positive externalities to victims bringing tort suits, as defendants face litigation expenditures of paying defense lawyers, and the likelihood of accident victims bringing suit affects the costs of precautions taken by, and the number and costs of accidents caused by, potential tortfeasors. Craswell and Calfee (1986) and Kessler and McClellan (1996) give errors by the courts in determining whether defendants in tort suits should truly be found liable as another reason why adopting damage limits could generate efficiency gains. If those who did not commit torts are often found liable by mistake, this could lead those who might cause accidents to take an excessively high level of precautions in order to avoid being held liable by mistake. Tort reforms will lead to efficiency gains if they reduce litigation expenditures and costs of taking precautions against causing accidents by more than they increase the cost of injuries sustained in accidents[7].

However, since damage limits reduce the amount of compensation that accident victims can collect in tort suits, damage limits could make potential accident victims themselves take more precautions at avoiding accidents, which could cause fewer accidents to occur. Certainly, for many types of accidents, the chance of an accident happening depends to a large degree on the level of precautions taken by the potential victims as well as the potential tortfeasors (such types of accidents are called "bilateral" accidents by Shavell and Kaplow; see pp. 1667-1668). The legal doctrines of contributory and comparative negligence, assumption of risk, and open and obvious dangers are about the fact that the level of precautions taken by accident victims often plays a role, sometimes the primary or only role, in causing many accidents (see Dobbs, 2001 and McFarland and Weissenberger, 2001 for a description and discussion of these doctrines).

Since medical malpractice suits are a type of tort suit, tort reforms reduce the costs health care providers face due to medical malpractice claims. This means that tort reforms can increase the supply of health care providers, which could lead to more accident victims being able to survive their injuries due to increased access to medical services such as emergency room care and surgery (Rubin and Shepherd, pp. 221-225). An increased supply

[7] It is possible that damage limits tort reforms might have no or negligible effects on the rate of accidents even if they cause a noticeable reduction in the size of tort awards, the number of tort suits, or both; see Kahan (1989) and Kessler and McClellan (1996) for some discussions of why the level of precautions taken by potential tortfeasors might be inelastic with respect to changes in expected liability for causing accidents.

of medical care is another channel by which damage limits could reduce the accidental death rate. The issue of the effects of tort reforms, and of medical malpractice costs in general, on physician labor supply has been studied in a number of papers (and has received much attention in the popular press. For instance, see Blumenthal, 2007.) Theoretical work on this issue (Danzon et al., 1990) emphasizes that if the demand for medical care is inelastic – as, a priori, it would seem likely to be for the types of medical care that determine the chances of surviving an accident – tort reforms will not create a non-negligible change in the quantity of medical care available. Instead, tort reforms will just have some effect on its price. However, empirical work on tort reforms and physician labor supply (Kessler, Sage and Becker 2005; Klick and Stratmann, 2005; Matsa, 2007), as well as related work examining the relationship between premiums for medical malpractice insurance, numbers and sizes of medical malpractice claims, and physician labor supply within states or counties (Danzon et al., 1990; Baicker and Chandra, 2005;), has found mixed findings. For instance, Kessler, Sage and Becker estimate that states which have adopted reforms from a category of tort reforms they call "Direct Reforms", which are essentially the same types of reforms as those in the category of reforms that I call "Damage Limits", have had increases in the number of physicians. They estimate that there is an increasing effect for all types of physicians in general, and they also estimate a particularly large (11%) increase in the supply of ER doctors in response to the adoption of direct reforms. However, Matsa (2007), who studies the effects of NED caps on physician labor supply using a somewhat different dataset than that used by Kessler, Sage and Becker[8], estimates that NED caps have only increased the number of office-based specialist physicians in rural counties, and that NED caps have had no effect on the overall number of physicians of all types within the average county. Rural office-based specialist physicians are physicians for whom demand is fairly elastic, as specialists in the nearest urban areas are a close substitute, and in addition, these types of physicians do not provide types of care that affect seriously injured accident victims' chances of surviving their injuries. Since the literature on tort reforms and physician labor supply is arguably inconclusive, estimating whether a class of persons in need of medical services actually appears to have gained improved health outcomes because of tort reforms, as is done in this paper for accident victims, is a useful endeavor.

[8] Matsa analyzes data from a longer time span than the data used by Kessler, Sage and Becker (1970-2000 rather than 1985-2001), although Matsa's dataset has less information on physicians' practice specialties (emergency medicine, surgery, ob/gyn, etc.)

Tort reforms that apply in medical malpractice claims might also cause health care providers to be less careful when treating accident victims, and if so, this would cause an increase in the accidental death rate. While no research currently exists that directly estimates the effects of tort reforms on how careful healthcare providers are when treating accident victims, research has been conducted that directly estimates how tort reforms affect how careful health care providers are when treating two other types of patients. Kessler and McClellan (1996; 2002a,b) estimate how tort reforms affect the incidence of adverse health care outcomes amongst Medicare patients receiving care for severe cardiac illnesses, and find no effect of damage limits tort reforms on adverse health care outcomes in this population. However, Currie and MacLeod (2008) study the effects of tort reforms on measures of the quality of obstetric care using data from the United States Vital Statistics birth certificates files, and estimate that NED caps increase rates of potentially preventable complications of labor and delivery (and both Kessler and McClellan's studies and Currie and MacLeod find evidence that JSL reforms, which are discussed in the next section, reduce the rate of adverse health outcomes amongst patients receiving cardiac care and obstetric care, respectively). Furthermore, Doyle (2005) has estimated that lacking health insurance coverage causes persons injured in automobile accidents to be given less medical treatment by health care providers than those who have health insurance, and that auto accident victims without health insurance coverage have a mortality rate 1.5 percentage points higher than the average mortality rate of 3.8% in his sample, meaning that uninsured auto accident victims have a mortality rate that is 39% higher than this sample average. Collectively, these studies show that it is indeed quite plausible that health care providers might respond to the incentives created by damage limits tort reforms by being less careful when providing medical treatment to accident victims.

2.2. Reforms to Joint and Several Liability ("JSL Reforms") and their Possible Effects on the Accidental Death Rate

Some accidents are caused by two or more persons or parties other than the accident victim him or herself (who may also be partially to blame for causing the accident as well). In fact, most tort suits over accidental bodily injuries not sustained in auto accidents in the U.S. name multiple defendants (Bureau of Justice Statistics, 1995; see Table 1). The common law doctrine of joint and several liability ("JSL"), which was in place in 45 U.S. states and the

District of Columbia in 1981, allows the plaintiff in a tort suit with multiple defendants to collect the entirety of his or her damages from any one defendant found to be at least partially to blame for causing the tort. This protects the plaintiff in situations in which some tortfeasors are not solvent enough to be able to pay for their share of the damages, which is part of the rationale for following the common law doctrine of JSL. This also makes it easier for the plaintiff to recover the entirety of his or her damages in a tort suit, as he or she need only prove that one of the defendants should indeed be held liable for his or her harm in order to collect the entirety of the damages. JSL is often called the "deep pockets doctrine", as JSL can enable and encourage the plaintiff to, arguably unfairly, focus his or her suit's arguments against wealthy institutional defendants such as local or state governments or large businesses, even when these defendants played only a minor role in causing the accident. Reforms to JSL include replacing JSL with proportional (or "several-only") liability, in which a tortfeasor is liable for damages only in proportion to the percentage of blame for the accident that is assessed to that tortfeasor (a "full repeal" of JSL), and partial repeals of JSL, in which a plaintiff may recover the entirety of his or her damages from one defendant only if that defendant is assessed more than a certain percentage of the blame, 50% or 25% for example, for the causing the tort. As of 2005, the majority of U.S. states had enacted JSL reforms, and JSL reforms are the most common type of tort reform. Almost all JSL reforms that have been enacted apply in all or most types of tort suits in general rather than only in medical malpractice suits, so I only estimate the effects of the generally applicable JSL reforms in my empirical analysis.

The possible effects of JSL reforms on incentives to take precautions against causing accidents have been explored in numerous theoretical papers, which have described reasons why JSL reforms could either increase or decrease the level of precautions against causing accidents that are taken (see Kornhauser and Revesz, 1998, which is a review of prior literature on joint and several liability; Kornhauser and Klee, 2007; and Spier, 1994. Section III.B of Currie and MacLeod, 2008 also presents an original theory of the incentive effects of JSL reforms.) Amongst these reasons is that JSL reforms make it more difficult and expensive for plaintiffs to recover all of their damages in tort suits, as they force plaintiffs to spend time proving that all of the defendants in a case are each partially liable; this factor might discourage lawsuits and thereby decrease precautions. Another reason is that under JSL but not under proportional liability, under a negligence standard, multiple parties who might together contribute to causing an accident or accidents find that each of them choosing

to take a high, non-negligent level of precautions is a mutual best response (if they expect the plaintiff to sue all of them in the event of an accident and they are all solvent enough to each individually pay for the entirety of the harm); this entails that JSL reforms would decrease precautions (Kornhauser and Revesz, pp. 371-72). Furthermore, the size of the sum of the settlement offers the plaintiff can extract from all of the defendants together in a tort suit is higher under JSL than under proportional liability (Kornhauser and Revesz; Spier), which may encourage more lawsuits and thereby more precautions under JSL than under JSL reform. Finally, JSL reforms make tortfeasors' expected liabilities more closely tied to their own efforts at preventing accidents from happening (Currie and MacLeod); this means that, contrary to the other theorized effects of JSL reforms, JSL reforms might increase precautions instead. Another way to state Currie and MacLeod's point is that JSL reforms increase the marginal reduction in expected liability an individual potential tortfeasor gains by taking additional precautions, which increases the incentive to take extra precautions.

As with damage limits reforms, it is possible that JSL reforms might cause health care providers to be less careful when treating accident victims, causing an increase in the accidental death rate. It is also possible that JSL reforms might affect the accidental death rate by causing a change in the supply of health care providers as well. However, a legal feature of emergency room care medical services actually makes these possibilities unlikely. Emergency room physicians are employees of hospitals rather than independent contractors, unlike most other types of physicians, who generally are independent contractors. Since they are employees rather than contractors, under the legal doctrine of respondeat superior, in a medical malpractice suit over negligent treatment of a patient in the emergency room, only the hospital would be sued, rather than the hospital and independent contractor physicians being sued as is common in medical malpractice suits involving other types of patients. As a consequence, the issue of joint and several liability is of limited relevance to the costs of providing medical care to accident victims, and to incentives to be careful when providing medical care to accident victims.

Section 3. Sources of Data for and Categories of Accidents Studied in this Paper.

This paper utilizes state-year level data on accidental death rates, the presence of different types of tort reforms within states, and control variables to estimate the effects of tort reforms on accident rates. The sources of the data that I use for these three sets of variables

are detailed in this section. The three different dependent variables on accident rates that are used in this study are also defined and described in this section.

The source of data on accidental deaths for this paper is the National Vital Statistics Mortality Files. These files collect data from all of the death certificates filed in the United States. The cause of death is given on the death certificate by International Classification of Disease Codes. This information on cause of death states whether the death was caused by an injury sustained in an accident, and also gives some detail on the type of accident (fall, automobile accident, fire, drug overdose, etc.) that caused the death.

For this paper, the data on accidental deaths are used to construct dependent variables for three different categories of accidental death rates. The first of these three is the rate of accidents excluding automobile accidents ("automotive accidents") and fatal overdoses on illegal drugs and abused pharmaceuticals ("drug overdoses"). The second is the rate of automotive accidents only, and the third is the rate of drug overdoses only. The primary dependent variable of interest for this paper is the rate of accidental deaths excluding automobile accidents and drug overdoses, since these are the types of accidents that I believe are most likely to be affected by tort reforms, a priori. Auto accidents are not included in the primary dependent variable since many other factors besides tort reforms, such as no-fault and mandatory auto insurance laws and policies intended to reduce drunk driving, are likely to have a greater influence on auto accidents than tort reforms are, since tort reforms are primarily intended to affect the litigation of tort suits other than suits over automobile accidents (CBO, 2004)[9]. Also, it is likely the case that few drivers are as aware of and responsive to tort reforms as businesses that can be sued for causing premises liability-related or product liability-related accidents are. In Section 5 of this paper I do, however, examine whether there is a statistically significant relationship between tort reforms and the rate of fatal automobile accidents only, in order to evaluate the hypothesis that tort reforms should have little, if any, effect on the rate of automobile accidents. Drug overdoses are also excluded from the primary dependent variable. Drug overdoses are excluded because these deaths appear to be virtually never tortious, so that excluding them better allows me to

[9] Papers which have estimated the effects of no-fault auto insurance on the rate of auto accidents include Landes (1982) and Cohen and Dehejia (2004). A summary of all empirical work on this topic is given in Kessler and Rubinfeld (2004), pp. 14-16. Cohen and Dehejia also estimate the effects of mandatory auto insurance requirements on the rate of auto accidents. Papers estimating the effects of various policies and penalties related to drunk driving include Chaloupka, Saffer and Grossman (1993) and Levitt and Porter (2001). These papers find that decreases in civil liability in tort for causing auto accidents lead to more auto accidents, and that some increases in criminal liability for auto accidents have led to fewer auto accidents.

measure the effects of tort reforms on the accident rate. "Tortious" means that the actions of another party or parties besides the accident victim himself and/or nature are likely to have contributed to causing the accident in such a way that this party or these parties could be found liable for the victim's damages in a tort suit. Drug overdoses are also excluded because the rate of drug overdoses is also influenced by other factors besides tort reforms, such as drug control policies and factors affecting crime more generally, that have no effects on the rate of other accidents. These reasons for excluding drug overdoses from the primary dependent variable are discussed more fully later in this section and in Appendix A. As with the rate of automobile accidents only, in Section 5 of this paper I do examine whether or not there is a statistically significant relationship between the rate of drug overdoses only and the presence of tort reforms within states; estimating that tort reforms have no effect on the rate of drug overdoses, as I expect to be the case, is evidence in favor of the credibility of my estimation approach. Figure 1 shows these three categories of accidental deaths show quite different trends at the nationwide level. In particular, drug overdoses have been rising over time, which tends to drive the rate for all accidents upwards after 1992. In contrast, the non-auto non-OD category I focus on shows a continuous decline over the entire 1981-2004 period. This suggests that there are differences across these categories of deaths in the factors that cause the rates of them to change over time, and provides some justification for considering each of them separately.

The common types of non-automotive accidents that occur in the United States include falls (21.3% of non-automotive accidental deaths that occurred between 1981 and 2004 in the U.S.), poisonings (17.3%), drownings (8.5%), suffocations (8.8%), fires and burns (8.0%), other transportation-related accidents such as boating and train accidents (4.3%), accidental firearm injuries (2.4%), accidents with machinery (1.9%), and being struck by or against objects (1.9%). The type of accident was left unspecified on the death certificate for 11.1% of the non-automotive accidental deaths that occurred between 1981 and 2004. Other categories of accidents make up the remaining 14.5% of non-automotive accidents (CDC, 2007, WISQARS Fatal Injuries: Leading Causes of Death Reports, 1981–2004, http://webappa.cdc.gov/sasweb/ncipc/leadcaus.html).

One might expect tort reforms to cause a change in the rate of these types of accidents (with the exception of drug overdoses, a type of poisoning, as discussed in the next paragraph) since information from legal and public health sources indicates that these types of accidents are often, or at least not infrequently, tortious. That these types of accidents are often tortious

can be learned from various sources, including books on Premises Liability, the most common type of tort suit involving accidents other than automobile accidents[10]; various legal reports on specific legal issues, such as many of the reports in the American Law Reports series, which list and provide summaries of tort suits over all of these types of accidents[11]; and public health literature on causes of accidents[12]. Besides premises liability suits, product liability suits are a common type of tort suit over injuries sustained in accidents other than automobile accidents; there are also numerous tort suits over unintentional bodily injuries not caused by auto accidents that do not fall into either of those two categories (see Bureau of Justice Statistics ("BJS"), 1995.)

However, unlike the other common types of non-automotive accidents, drug overdoses are virtually never tortious. Drug overdoses are a type of poisoning; in fact, the majority (86.4%) of fatal poisonings that occurred between 1981 and 2004, particularly within more recent years, are drug overdoses (Vital Statistics Mortality Data, author's own calculations). The peculiar nature of this type of accident, in which the decedent decided to knowingly and willingly ingest a very dangerous substance, the use or abuse of which is typically criminal in nature, makes it such that it is extremely unlikely that anyone other than the overdose victim

[10] For instance, McFarland and Weissenberger, 2001, Ch. 7: The Slip-and-Fall Case, p. 177, discusses how the slip and fall case is the most common type of premises liability tort suit.

[11] Here are some examples of such reports; many more such reports exist. 26 A.L.R.4th 481, Liability of operator of store, office, or similar place of business to invitee slipping on spilled liquid or semiliquid substance, Sonja A. Soehnel, J.D.; 67 A.L.R.3d 587, Landlord's liability for injury or death caused by defective condition of interior steps or stairways used in common by tenants**,** Allan E. Korpela, LL.B.; 86 A.L.R.3d 1021, Liability of swimming facility operator for injury to or death of swimmer allegedly resulting from hazardous condition in water, Thomas R. Trenkner, J.D.; 2 A.L.R.5th 1, Liability for injury or death allegedly caused by spoilage, contamination, or other deleterious condition of food or food product, Jane Massey Draper, B.C.L.; 19 A.L.R.5th 405, Landlord's liability for injury or death of tenant's child from lead paint poisoning, Sonja Larsen, J.D.; 19 Causes of Action 2d 127, Cause of Action of Carbon Monoxide Poisoning, Bryce M. Baird; 23 Am. Jur. Trials 1, Railroad Crossing Accident Litigation, Jerome Mirza, J.D; Cause of Action Against Operator of Pleasure Boat for Injury Suffered in Boating Accident, Peg A. Williams, J.D.; 86 A.L.R.2d 838, Landlord's liability for personal injury or death of tenant or privies from electrical system or equipment, W. R. Habeeb; 1 A.L.R.4th 748, Products liability: defective heating equipment, Larry D. Scheafer, J.D.; 15 Causes of Action 409, Cause of Action in Strict Tort Liability for Injury or Death Caused by Defective Firearm, James J. O'Malley, J.D.; 80 A.L.R.2d 598, Liability of manufacturer or seller for injury caused by household and domestic machinery, appliances, furnishings, and equipment, R. D. Hursh; 78 A.L.R.2d 594, Liability of manufacturer or seller for injury caused by industrial, business, or farm machinery, tools, equipment, or materials, R. D. Hursh.

[12] For instance, Ahrens (2007) provides details on causes of home structure fires, as given in reports filed by U.S. fire departments. He finds that causes such as heating and electrical equipment, which may well be due to negligence on the part of someone other than the homeowner who is the victim of the fire, are indeed leading causes of home structure fires. Most fatal fires – nearly 90% - occur in homes rather than other locations (Vital Statistics Mortality Data, author's own calculations.) The Centers for Disease Control discusses common causes of drownings at http://www.cdc.gov/ncipc/factsheets/drown.htm (accessed April 14, 2008).

him or herself should or will be held liable in tort for this sort of accidental harm; see Appendix A below for further details on this point. Furthermore, as stated above, the rate of drug overdoses is affected by numerous factors such as drug control policies and factors affecting crime in general which have no effect on other types of accidents. For these two reasons, drug overdoses are not included in the primary dependent variable in this study; excluding them allows me to better measure the true effects of tort reforms on the accident rate.

Accidental deaths are a common occurrence in the United States; between 1981 and 2004, the time period studied in this paper, the Vital Statistics Mortality Files indicate that an average of roughly 97,000 Americans died each year from injuries sustained in accidents, and that accidents were the fourth leading cause of death during this time period (CDC, 2007). In 2004, nearly 115,000 died from injuries sustained in accidents (CDC, 2007). While these numbers also include automobile accidents, in 2004, 67.6% of fatal accidents were not auto accidents, and between 1981 and 2004, 53.6% were not auto accidents (CDC, 2007). The rates of accidental deaths of different types serve as proxies for rates of serious accidental injuries, fatal and nonfatal. For every accidental death that occurs, several other nonfatal but serious injuries also occur. For instance, in 2001 in the U.S., injuries resulted in 33.8 million visits to emergency departments, and injuries required 1.8 million hospitalizations, for a total of 9 million days of inpatient care (NCHS 2005, p. 3) [13]. A large percentage of the nonfatal accidents that occur in the U.S. are non-automotive; for instance, over three times as many accidental injuries leading to hospitalizations are due to falls than are due to auto accidents (NCHS p. 62).

Data on whether and when tort reforms have been in place in each U.S. state between 1981 and 2004, the time period studied in this paper, comes primarily from the database of tort reforms collected for use in Currie and MacLeod (2008), research which was discussed above in Sections 1 and 2.1.2. To create this database, several law student and economics student research assistants compiled, verified, and corrected information from several

[13] Not all injuries are caused accidentally. The statistics here on injuries resulting in visits to emergency departments and in hospitalizations are for all injuries, both unintentional (i.e. accidental) and intentional (predominantly assaults, murders, suicides, and self-inflicted injuries, but also including other causes such as legal intervention, war, and terrorism.) However, most injuries are the result of accidents; for instance, in 2001, 85.3% of injuries resulting in hospitalizations for which a cause is stated in the hospitalization record used by the survey (the National Hospital Discharge Survey) were caused unintentionally; a cause was stated for 68% of the hospitalizations (Heinen et al, p. 60). About 93% of the admissions to emergency departments for treatment of injuries for which information on the cause of the injury is available were for unintentional injuries in 2004 (NCHS, 2008), and from 1981 to 2004, 63.8% of fatal injury deaths were accidental (CDC, 2007).

previously existing sources of data on state tort reforms on the relevant state statutes and court cases that have determined the presence or absence of tort reforms in U.S. states. The most important of these sources were the American Tort Reform Association ("ATRA") Record, McCullough, Campbell and Lane LLP's Summary of U.S. Medical Malpractice Law, and the first edition of Ronen Avraham's Database of State Tort Law Reforms (Avraham, 2006). The text of each statute and court case enacting, modifying, repealing or striking down a tort reform was found in Westlaw or Lexis-Nexis and examined as the database was constructed. The database of tort reforms used by Currie and MacLeod contains information on every instance of a tort reform of four major types (joint and several liability reforms, caps on noneconomic damages, caps on punitive damages, and collateral source rule reforms) that applied in medical malpractice claims in some state at at least some point in time between 1985 and 2004. For the current project, further information on tort reforms in place in states from 1981-1984 and on punitive damages-evidence reforms, which were not studied in Currie and MacLeod, was collected. The database lists whether each particular instance of a tort reform that has been enacted by a U.S. state is specific to medical malpractice, or whether it applies in all or most types of tort suits in general, which, as discussed above, is an important distinction to make when studying accidental deaths[14]. Like Avraham (2006), this database corrects various errors in previously existing databases of tort reforms, such as the ATRA Record, that have been used as the source of data for previous empirical work estimating various effects of tort reforms. Rubin and Shepherd (2007) use data constructed from the information in the ATRA Record, for instance (pp. 230, 236). These errors in previously existing databases include missing reforms, incorrect or missing dates at which the reforms became effective, omission of many of the numerous state Supreme Court decisions that have struck down tort reform statutes for violations of states' constitutions, and lack of information on the relevant tort law, often common law, in place in states at the beginning of the time period examined in the study; this latter type of information is needed to determine if statutes enacted after the beginning of the time period covered by the data and court cases occurring after the beginning of the time period of the data actually produced a real change in the presence of tort reforms within states[15]. Correcting measurement error in previous tort reform

[14] The exceptions in which generally applicable tort reforms do not apply tend to be intentional torts, torts involving intoxicated automobile drivers, and toxic torts. All of the generally applicable tort reforms apply in premises liability suits, and only a few of them do not apply in product liability suits.

[15] For instance, in 1992 Louisiana enacted a statute, LSA-C.C. Art. 3546, barring awards of punitive damages from being granted in Louisiana tort cases, but such awards has already been barred by Louisiana common law

datasets should, of course, produce more accurate estimates of the effects of tort reforms on tort-related outcomes. The literature estimating the effects of tort reforms does contain disparate findings (CBO, 2004), and one reason for this may be that there are many errors in the previously existing tort reform datasets that were used in these studies.

Data for the control variables used in this paper come from several sources, including the Census Bureau, the Bureau of Labor Statistics, the Bureau of Economic Analysis, and the National Institutes of Health; see Appendix B below for more information on the sources of data for the control variables. The exact definitions of each control variable used in this paper are given in Appendix B, as well as in the following section of the paper (Section 4). Summary statistics for the outcome and control variables are given in Table 2.

Section 4. Econometric Models

Table 3 shows that there is variance across U.S. states in whether and when their state legislatures and state courts have adopted the various different types of tort reforms, and in whether and when tort reforms have been struck down as unconstitutional by state Supreme Courts. There have also been a small number of instances in which tort reforms have been repealed by the legislatures of a few states. These changes in the presence of tort reforms within states over time provide a source of identifying variation for estimating the effects of tort reforms. Therefore, in this paper, difference-in-difference estimation techniques applied to panel data are used to estimate the effects of tort reforms on the rate of accidental deaths. The following econometric model is the primary econometric model used in this paper:

$$(1)\quad \ln(RATE)_{st} = a + b_1 TORT_{st} + b_2 XVAR_{st} + b_3 YEAR_t + b_4 STATE_s + b_5 STATE_s * t + \varepsilon_{st}$$

where s and t denote states and years, respectively. RATE denotes a rate (per 100,000 state residents) of accidental deaths. As stated in the previous section, the primary dependent variable used in this study is the rate of accidental deaths, other than deaths caused by automobile accidents and deaths caused by overdoses on illegal drugs and abused pharmaceuticals. The rate of fatal automobile accidents only and the rate of fatal drug overdoses only are also used as dependent variables in this study for the following reason. As

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dating from long before the 1970's, the earliest time period that has been analyzed in empirical work estimating the effects of tort reforms; see *McCoy v. Arkansas Natural Gas Co* (175 La. 487, 143 So. 383 [1932]). Thus, the 1992 statute merely codified Louisiana common law rather than creating an actual change in Louisiana tort law.

discussed in the previous section, I expect that if tort reforms affect the accidental death rate at all, they should have effects on the rate of the types of accidents included in the primary dependent variable, but that tort reforms would have effects on the rate of automobile accidents only is less likely, and that tort reforms would have effects on the rate of drug overdoses only is very unlikely. So, estimating an effect of tort reforms on the first of these rates but not on the second and third of these rates is evidence in favor of the view that my estimates reflect causal effects of tort reforms on the accident rate, while estimating an effect of tort reforms on the second and third of these rates suggests that there may be problems with my estimation strategy instead.

$TORT_{st}$ is a vector of indicator variables for the presence of the different types of tort reforms that I study within state-year observations[16]. Since states have often enacted more than one type of tort reform simultaneously, as can be seen from Table 1, including all of the different tort reform variables in the regression at the same time is necessary to avoid possible omitted variable bias. As detailed in Sections 2.1.1 and 2.2 above, I this paper I study the following different types of tort reforms applying in all or most types of tort suits in general: joint and several liability reforms ("JSL Reforms, General"), collateral source rule reforms ("CSR Reforms, General"), caps on noneconomic damages ("NED Caps, General"), and punitive damages reforms ("PD Reforms, General"). Also studied are caps on noneconomic damages that apply only in medical malpractice suits ("NED Caps, Specific to Med Mal")[17].

$XVAR_{st}$ is a vector of control variables that vary within states over time, consisting of variables besides tort reforms which may affect the accidental death rate. In this paper I use the same well-chosen set of control variables that was used in Rubin and Shepherd (2007). These variables are: the percent of the state population that is age 4 or younger in year t, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population that is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. These variables are desirable as controls as some

[16] The variables are coded as 1 if a tort reform of the relevant type is in place in a state for at least half of the year. So, if a tort reform is enacted on or after July 1st in year t, the variable equals 0 in year t and equals 1 in year t+1 (assuming that the reform is not struck down or repealed before July 1st of year t+1).

[17] Again, JSL Reforms, CSR Reforms, and PD Reforms that apply only in medical malpractice claims have rarely been enacted by states, so I exclude variables for their presence from the empirical analysis, as there is not enough variation in the presence of these reforms within states to reliably estimate the effects of these reforms.

demographic groups have higher accidental death rates than others, as accident victims' incomes and employment status affects the size of their economic damages from accidents and possibly their willingness to bring tort suits (Burstin et al., 1993), and as alcohol often plays a role in causing at least some types of accidents. For instance, the Centers for Disease Control report that "alcohol use is involved in about 25% to 50% of adolescent and adult deaths associated with water recreation" and "alcohol was involved in about one-third of all reported boating fatalities" (http://www.cdc.gov/ncipc/factsheets/drown.htm, accessed April 14, 2008).

In (1), $YEAR_t$ and $STATE_s$ are year and state fixed effects, respectively. $STATE_s*t$ are state-specific time trends, which are included in the model to allow the levels and impact of the state-specific unobserved variables to vary over time. A number of factors which may impact the accidental death rate are not included in XVAR as they cannot be measured well or since data on them is not readily available; these factors include changing attitudes towards risky behaviors, adoption of and reaction to safety regulations, and diffusion of knowledge related to accident prevention. Including state-specific time trends in the regressions control for gradual changes in these omitted factors within states over the time period from which data for this study is drawn, 1981-2004[18].

In this paper I also make use of another econometric model, (2), that estimates whether the effects of tort reforms change as time since the adoption of the reforms passes. The effects of tort reforms may change in this way as newly enacted reforms may be less effective than older reforms if it is thought that the newly enacted reform might soon be struck down as unconstitutional (CBO, 2004; Avraham, 2007). Indeed, we can see from Table 1 that the Supreme Courts of a few states, such as Illinois and Ohio, have in some instances struck down tort reforms only a few years after they were enacted. Also, potential tortfeasors and accident victims may need some time to learn that a reform has been enacted,

[18] In Appendix C, where I explore which differences in estimation methods between my paper and Rubin and Shepherd (2007) drive the differences in estimated effects of tort reforms between the two papers, I do run a number of regressions that do not include state-specific time trends in the econometric model, as Rubin and Shepherd's primary, preferred econometric model does not include time trends (Table 3, p. 232; Table 4, p. 233; abstract, p. 221). I do not include the results of regressions that exclude time trends in the tables in the main body of my paper, however, since I find many of the results of the models that exclude time trends to be implausible. For instance, I have found that 2-year leads of some tort reform variables are statistically significant in models that exclude time trends, but find that no 2-year leads are significant in models that include time trends, suggesting that the time trends really do provide a correction for omitted variable and/or endogeneity bias present in the models that exclude time trends. See below for a definition and more discussion of 2-year leads of tort reform variables.

to determine the extent of the changes in liability for accidents that are created by the adoption of the reform, and to respond to these changes (Kessler and McClellan, 1996)[19]. In (2), the vector $TORT_{st}$ in (1) is replaced with a variant, $TORT\_NEW_{st}$ $TORT\_OLD_{st}$, that differentiates between tort reforms which have just recently been adopted in states and tort reforms which have been in place for more than a few years, allowing me to estimate if the effects of the "new" and "old" tort reforms actually do differ:

$$(2)\quad \ln(RATE)_{st} = a + b_1 TORT\_NEW_{st} + b_2 TORT\_OLD_{st} + b_3 XVAR_{st} + b_4 YEAR_t + b_5 STATE_s + b_6 STATE_s * t + \varepsilon_{st}.$$

$TORT\_NEW_{st}$ contains indicator variables that take the value 1 (and are 0 otherwise) when a tort reform of a certain type is in place in state s in year t that was enacted in year t, year t-x+1, or any year in between t and t-x+1, where x is an integer between 2 and 5. So, $TORT\_NEW_{st}$ estimates the effects of tort reforms enacted within the last 2, 3, 4 or 5 years. $TORT\_OLD_{st}$ contains indicators that take the value 1 when a tort reform of a certain type is in place in state s in year t that was enacted prior to year t-x+1, where again x equals either 2, 3, 4 or 5, depending on the specific regression that is being run. So, $TORT\_OLD_{st}$ estimates the effects of tort reforms that have been in place for more than 2, 3, 4, or 5 years. When estimating (2), I experiment with different values of x in different regressions, since it is not clear a priori where to draw the line between a "new" and an "old" tort reform. The definitions of the elements of $TORT\_NEW_{st}$ and $TORT\_OLD_{st}$ follow the variable definitions used in Kessler and McClellan (1996, 2002a, 2002b) and in Kessler, Sage and Becker (2005) when these authors made use of variables differentiating between the short-term and long-term effects of tort reforms.

[19] Estimating whether or not the effects of tort reforms change as time since the adoption of the reform passes also serves the purpose of checking to see whether the inclusion of state-specific time trends in the econometric model may be creating bias in the estimates of the effects of the tort reforms. Wolfers (2006) discusses how including state-specific time trends in regressions could cause bias if the true effects of the laws whose effects are being estimated in a regression change as time since the adoption of the laws passes. If it is indeed the case that the effects of the laws change over time in this way, but the regression model being used assumes that the effects of the laws are constant over time, the time trends will then pick up the changing effects of the laws instead of just the changing effects of the state-specific unobservables, causing bias in the estimates of the effects of laws.

Econometric model (3) is another variant of (1) in which a vector of 2-year leads of the different tort reform variables is included in the regression along with the vector $TORT_{st}$:

(3) $\ln(RATE)_{st} = a + b_1 TORT_{st} + b_2 TORT\_LEAD_{st} + b_3 XVAR_{st} + b_4 YEAR_t + b_5 STATE_s + b_6 STATE_s * t + \varepsilon_{st}$.

A 2-year lead of a tort reform variable is an indicator equal to 1 in the two years preceding the enactment of that type of tort reform and 0 otherwise. The purpose of estimating the coefficients on the leads of the tort reform variables is to test for reverse causality or other forms of bias in the estimated effects of tort reforms on the accidental death rate. If states' decisions to enact tort reforms are influenced by trends in accident rates within those states, then reverse causality bias will be present; the coefficients on the leads being statistically significant indicates that bias is indeed present. While it may seem unlikely that reverse causality would be an issue in this particular context – for instance, Rubin and Shepherd (2007, p. 234) note that "several papers have concluded that the primary drivers of tort expansion and tort reform are the relative power of (trial) lawyers and businesses in a state, not death rates (this literature is summarized in Rubin [2005])" – estimating the effects of these leads allows me to confirm whether this belief is correct.

Finally, I also estimate one last variant of (1), enumerated (4), that includes variables checking to see if the effects of tort reforms being struck down or repealed by states (tort reforms being "turned off") are estimated to be the same as the effects of tort reforms being enacted by states (tort reforms being "turned on"), and to see if the response to a law's turning off actually occurs after or just before the law is turned off (which is interesting and necessary to consider for reasons explained in the next paragraph). (4) is as follows:

(4) $\ln(RATE)_{st} = a + b_1 TORT_{st} + b_2 TORT\_OFF\_LEAD_{st} + b_3 TORT\_OFF\_LAG_{st} + b_4 XVAR_{st} + b_5 YEAR_t + b_6 STATE_s + b_7 STATE_s * t + \varepsilon_{st}$.

Here, TORT_OFF_LEAD is a vector of 2-year leads of tort reform variables turning "off", which are indicator variables equal to 1 in the two years before a reform is struck down or repealed, and 0 otherwise. TORT_OFF_LAG is a vector of 2-year lags of tort reform variables turning "off", which are indicator variables equal to 1 in the two years after a reform is struck down or repealed, and 0 otherwise. Leads and lags of CSR reforms and NED caps that apply in all or most types of tort suits in general turning off are included in TORT_OFF_LEAD and TORT_OFF_LAG, but leads and lags of the other tort reform

variables turning off are not, since these other types of reforms have very rarely, if ever, been turned off by states. One can also see from Table 3 that with one exception (Arizona repealing a CSR reform in 1995 after having just adopted it in 1994), when CSR reforms and NED caps turn "off", it is because they are struck down by state Supreme Courts rather than having been repealed by state legislatures.

Estimating the coefficients on TORT_OFF_LEAD and TORT_OFF_LAG is useful and informative for the following reason. One would expect that the effect of a tort reform turning "off" on the accident rate should be similar in magnitude and opposite in sign to the effect of a tort reform turning "on", since the size of the change in expected liability for committing torts is the same in absolute value in each case. Estimating that this is not true may suggest that the estimates of the coefficients b_1 on the vector $TORT_{st}$ in (1), (3) and (4) are in fact biased, picking up general time trends in accidents caused by omitted variables rather than actual effects of tort reforms. Leads as well as lags of tort reform variables turning "off" are included in (4), though, as it is possible that a tort reform turning "off" could affect the accident rate before the tort reform actually does get struck down, unlike with a tort reform turning "on", which should not affect the accident rate before the reform is actually enacted. When a tort reform is enacted, it applies "prospectively" only, i.e., the tort reform only applies in a tort suit if the reform became effective before the tort itself actually occurred. So there is no reason for a potential tortfeasor to be more or less careful this year if she anticipates that a tort reform will be enacted sometime in the next few years. But if a tort reform is struck down as unconstitutional by a state court, this law change applies "retroactively": i.e., if a tort occurs before the reform is struck down, but the tort suit over this tort is not resolved until after the tort reform is struck down, then the tort reform actually will not apply in the tort suit, since the court ruled the reform not to have been constitutional to begin with (Avraham, 2007). So, if potential tortfeasors anticipate that a tort reform will soon be struck down and respond accordingly, it will be the case that the coefficients b_2 on the leads of the tort reforms turning off, rather than b_3 on the lags of the tort reforms turning off, in equation (4) above will be statistically significant.

The population of each state in each year is used to weight the state-year observations when estimating all of these econometric models. Standard errors on the coefficients are clustered by state in all of these econometric models as well. This method of computing standard errors allows for arbitrary forms of serial correlation and heteroscedasticity in the

error terms, and unlike other methods of computing standard errors, clustering by state is unlikely to overestimate the precision and statistical significance of the estimates (Bertrand, Duflo and Mullainathan, 2004).

Section 5. Results of the Empirical Analysis

Table 4 shows the results of regressions using econometric model (1) above, which contains indicator variables for the presence of the different types of tort reforms within states that equal 1 if a tort reform of the relevant type is present in state s in year t, regardless of how many years ago the reform was enacted, and are zero otherwise. The first column of Table 4 shows that for the types of accidents – all accidents other than drug overdoses and automobile accidents – that are included in the primary dependent variable, JSL reforms have a statistically significant association with a reduced accidental death rate, and CSR reforms have a statistically significant association with an increased accidental death rate. The variables for the other types of tort reforms that are used in the regressions in Table 4 have no significant associations with the primary dependent variable, however. As shown in the second column of Table 4, when the dependent variable used is the rate of unintentional fatal overdoses on illegal drugs and abused pharmaceuticals only, no tort reform variable has a significant association with the dependent variable. As I have argued in Section 3 above and in Appendix A below that drug overdoses are practically never tortious, these results were to be expected, and provide support for the view that the estimated coefficients on the tort reform variables included in the econometric models used in this paper, when significant as two of them are for the primary dependent variable in this table, reflect causal effects of tort reforms on the accident rate. The third column of Table 4 shows that no type of tort reform has a significant association with the rate of automobile accidents only. As explained in Section 4, one would expect a priori that tort reforms would be more likely to affect the rate of the types of accidents in the primary dependent variable than to affect the rate of automobile accidents only, so these results for auto accidents also provide support for the view that the estimates in this paper reflect causal effects of tort reforms.

In the remaining regression results tables shown in this section (but not all of the additional regression results tables shown and discussed in Appendix C), which present the estimates obtained from estimating econometric models (2), (3) and (4), models which are extensions of (1) and/or robustness checks for (1), the only dependent variable used in the

regressions shown in the tables is the primary dependent variable, rather than the rates of drug overdoses and auto accidents only. Table 5 presents the results of regressions which use econometric model (2), which contains a vector of tort reform variables that differentiates between recently enacted "new" tort reforms adopted within the past few years and "old" tort reforms which were adopted more than a few years ago – where "few" equals either 2, 3, 4 or 5 years depending on the particular regression being shown in a given column of Table 5. Precise definitions of these "new" and "old" tort reform variables are given in the footnotes to Table 5 and in Section 4 above. The first two rows of Table 5 show that JSL reforms are estimated to cause a reduction in the accidental death rate as soon as they are adopted, and that this reduction stays statistically significant and may even grow stronger in size as time since the adoption of the JSL reform passes. The second set of rows in Table 5 shows that CSR reforms are estimated to cause an increase in the accidental death rate as soon as they are adopted, but that this increase fades and becomes statistically insignificant as time since the adoption of the reform passes. The third set of rows in the table shows that NED caps applying in all or most types of tort suits in general (rather than just medical malpractice suits) have no significant association with the accidental death rate when they are first adopted, but that these NED caps do have a statistically significant positive association with the accidental death rate after 3 or more years since the adoption of this type of tort reform by a state have passed. The fourth and fifth sets of rows in Table 5 show that the variables for "new" and "old" NED caps that apply only in medical malpractice claims and for "new" and "old" PD Reforms rarely have a significant association with the accidental death rate, and that this association is only marginally significant when it exists.

The results shown in Table 5 indicating that it takes a few years before the effects of generally applicable NED caps on the accident rate materialize is consistent with Avraham (2007)'s hypothesis that potential tortfeasors may wait to see if a NED cap that has recently been enacted in their state is likely to avoid being struck down as unconstitutional by their state's Supreme Court before responding to the reduction in liability for committing torts created by the NED cap. That CSR reforms have caused an increase in the accident rate in the years immediately following the adoption of the CSR reform, but that CSR reforms' effects fade and become statistically insignificant as time since the adoption of the reform has passed, is consistent with the literature estimating the effects of tort reforms on the frequency of tort suits and the size of tort suit settlement payments, as this literature generally does not find an effect of CSR reforms on these outcomes. What appears to have happened with CSR reforms

is, potential tortfeasors thought when the CSR reforms were first enacted that the CSR reforms were going to create a large reduction in expected liability for causing torts, but then they found after a few years that this turned out not to be the case.

Table 6 shows the results of a regression that uses econometric model (3), in which 2-year leads of each tort reform variable are included in the regression along with the standard tort reform indicators included in the vector $TORT_{st}$. Again, the definition of a 2-year lead of a tort reform variable is given in a footnote to Table 6 and in Section 4 above. As with the estimates for the effects of tort reforms on the rate of the types of accidents included in the primary dependent variable that are obtained using econometric model (1) and shown in the first column of Table 4, the coefficient on the JSL Reform variable in Table 6 is negative and significant. The coefficient on the CSR Reform variable also remains positive and significant, and the coefficients on the other tort reform variables remain statistically insignificant too. The leads on every one of the tort reform variables are statistically insignificant however, and the coefficients on the leads of the JSL Reform and CSR Reform variables are much smaller in size than the coefficients on the standard JSL reform and CSR reform variables themselves, suggesting that the estimates obtained in these regressions do not suffer from endogeneity or omitted variable bias (as explained above in Section 4 when econometric model (3) was discussed).

Table 7 presents the results of a regression using econometric model (4), which includes 2-year leads and lags of CSR reform and generally applicable NED cap variables being turned "off" in the regression, along with the standard tort reform indicators included in the vector $TORT_{st}$ (again, precise definitions of these leads and lags are given in a footnote to Table 7 and in Section 4 above, and leads and lags of the other tort reform variables being turned off are not included in the regression as these reforms have very rarely, if ever, been struck down by state Supreme Courts.). The estimates shown in Table 7 indicate that striking down CSR reforms and generally applicable NED caps does cause the accident rate to decrease, consistent with the estimates in Tables 4 through 7 indicating that adopting these types of reforms causes the accident rate to increase. The estimates also indicate that this decrease happens before the reforms are actually struck down, suggesting that potential tortfeasors are able to correctly anticipate that a reform will be struck down, and respond accordingly. That such anticipation may occur is certainly plausible, as the accident leading to the tort suit that goes to the state Supreme Court, challenges the constitutionality of a tort

reform reform, and causes a reform to be struck down is likely to have occurred a number of years before the Supreme Court reaches its ruling. Furthermore, trial and appellate court decisions on this tort suit which challenged the constitutionality of the relevant tort reform and were granted an appeal to be heard by a higher court also will have occurred at least several months prior to the associated state Supreme Court ruling, so that news of the forthcoming Supreme Court ruling has much time to spread.

In summary, the estimates presented in Tables 4 through 7 indicate that JSL reforms applying in all or most types of tort suits in general cause a reduction in the rate of accidents (other than drug overdoses and auto accidents); that generally applicable CSR reforms did cause an increase in the accident rate, but that this increase was not permanent, having faded away after several years since the adoption of these reforms had passed; that generally applicable NED caps cause an increase in the accident rate after potential tortfeasors have had time to determine that it is unlikely that the NED cap will be struck down as unconstitutional, but that NED caps applying only in medical malpractice claims have no effect on the accidental death rate; and that generally applicable PD (Punitive Damages) Reforms have no effect on the accident rate.

Section 6. Discussion of Results

Section 6.1. Through Which Channel or Channels do Tort Reforms Affect the Accidental Death Rate?

As discussed above in Section 2, there are multiple channels through which tort reforms could potentially act when causing a change in the rate of accidental deaths. Again, these possible channels are the level of precautions taken by potential tortfeasors, the level of precautions taken by potential accident victims, an increased supply of medical care providers available to treat accident victims, and the carefulness with which medical care providers act when providing treatment to accident victims. Here, I discuss how the results of my paper provide evidence on what the answer to the question of precisely how tort reforms actually affect the accidental death rate in practice is (i.e., of these possible channels through which tort reforms might affect the accidental death rate, which of these channels do tort reforms actually seem to operate through in practice?) According to the empirical analysis done in this paper, the level of tortfeasor precautions appears likely to be the only one. To begin with,

NED caps that apply only in medical malpractice suits are not associated with statistically significant differences in the accidental death rate. This suggests that tort reforms from the "Damage Limits" category do not affect the accidental death rate through effects on the supply of medical care providers and/or the quality of medical care given by medical care providers[20]. Second, the types of damage limits reforms that are associated with changes in the accidental death rate, CSR reforms and NED caps applying in all or most types of tort suits in general rather than only in medical malpractice suits, are associated with increases in the accidental death rate rather than decreases, indicating that they affect the level of tortfeasor precautions rather than (or at least much more than) they affect the level of accident victim precautions. JSL reforms applying in all or most types of tort suits in general are associated with decreases in the accidental death rate, but in Section 2.2 above I discussed how, unlike damage limits tort reforms, JSL reforms can give potential tortfeasors greater incentives to be more careful. I also discussed in Section 2.2 how JSL reforms are unlikely to have affects on the accidental death rate through effects on medical care provider supply and care levels, since the legal doctrine of respondeat superior along with the fact that emergency room physicians are employees of hospitals rather than independent contractors means that only a hospital, rather than a hospital and one or more physicians, will be named as defendants in a tort suit alleging medical malpractice in emergency room care; this implies that JSL reforms are not particularly relevant to providing medical treatment to persons injured in accidents. That this supposition is correct is supported by the fact that JSL reforms are associated with decreases in the rate of accidents other than drug overdoses and auto accidents, but are not associated with statistically significant changes in the rate of drug overdoses only and the rate of auto accidents only. I have argued in Section 3 that tort reforms are more likely to affect the level of precautions taken against causing accidents that are neither drug overdoses nor auto accidents, since these types of accidents are often tortious, whereas drug overdoses practically never are, and since auto accidents are influenced by numerous other tort and criminal law changes besides tort reforms that are likely to be more influential than tort reforms at affecting liability for auto accidents. However, if accident victims do benefit from medical care becoming better because of JSL reforms making medical care providers be more careful, it is probably the case that victims of all three of these types of

[20] Although I have not included the results of these regressions in the results tables in this paper, I have run a number of regressions that include indicator variables for the presence within states of CSR reforms that apply only in medical malpractice claims. These variables for CSR reforms specific to medical malpractice are not statistically significant either.

accidents would benefit from this, not just victims of one of these three types. A caveat is in order on this point, though. It is still possible that the types of medical procedures preformed on the different types of accident victims and the frequency with which different types of physicians (emergency room, surgery) are seen by the different types of accident victims vary in ways that cause only victims of types of accidents other than drug overdoses and auto accidents to be given better medical care because of JSL reforms. So, the possibility that JSL reforms affect the accidental death rate through this channel cannot definitively be ruled out.

Section 6.2. Comparison of the Results of this Paper with the Results of the Prior Literature on Tort Reforms' Effects on the Number of Torts Committed

As stated in the introduction, and discussed further in Section 2.1.2, there has been some prior literature that estimates the effects of tort reforms on the number of torts that are committed. Kessler and McClellan (1996, 2002a,b) and Currie and MacLeod (2008) find negative, statistically significant associations between JSL reforms applying in medical malpractice claims and rates of adverse medical outcomes; I find that there is also a negative association between JSL reforms and the rate of accidental deaths (other than auto accidents and drug overdoses). Currie and MacLeod estimate that NED caps cause an increase in the rate at which torts are committed; I do find that NED caps that have been in place for more than 3, 4 or 5 years have a statistically significant association with an increased accident rate, and I also find that CSR reforms, another type of tort reform that limits the amount of compensatory damages injured plaintiffs may recover, are associated with more accidental deaths.

Prior work by Rubin and Shepherd (2007) on the effects of tort reforms on the rate of accidental deaths (other than auto accidents) found a positive, significant association between CSR reforms and the accidental death rate, negative and significant associations between NED caps and the accident rate and Higher Evidence Standards for Punitive Damages and the accident rate, and no significant association between JSL reforms and the accidental death rates. I also find a positive, significant association between CSR reforms and the accidental death rate[21], but find no significant associations between the accidental death rate and either NED caps or Punitive Damages Reforms, and find a negative, significant association between

[21] Unlike Rubin and Shepherd, however, I find that the effects of CSR reforms fade after a few years since the adoption of the reform have passed. This is only because I have run regressions that estimate the differences between the short term and long term effects of tort reforms, while Rubin and Shepherd did not do this.

JSL reforms and the accidental death rate. The reasons for these differences between my results and Rubin and Shepherd's are explored and discussed thoroughly in Appendix C, but I summarize some of the main findings of Appendix C here. I exclude drug overdoses from my primary dependent variable, whereas Rubin and Shepherd include them in all of their dependent variables; removing them causes the association between NED caps and the accidental death rate to lose significance, as there happens to be a spurious negative correlation between NED caps and drug overdoses (the politically conservative states that are more likely to enact tort reforms are also less likely to have large increases in the rate of drug overdoses, it turns out). In Appendix C I differentiate between PD Caps and Higher Evidence Standards for Punitive Damages, rather than grouping them together into one PD Reforms category, and find that the use of my newer, more accurate tort reform dataset, rather than the American Tort Reform Association database on tort reforms used by Rubin and Shepherd, actually causes the association between Higher Evidence Standards for Punitive Damages and accidental deaths to lose significance. With JSL reforms, use of this newer data is the main reason why I am able to find a significant, negative association between this reform and the accident rate, although excluding drug overdoses from the dependent variable strengthens this association.

Section 7. Conclusion

In this paper, I have estimated the effects of several common types of tort reforms on the rate of accidental deaths, by analyzing a panel of data on accidental death rates, the presence of tort reforms within states, and control variables for the 50 U.S. states and D.C. from 1981 through 2004, using differences across states in whether and when they have had changes in the presence of the different types of tort reforms within them as identifying variation for the estimates. I estimate that reforms to the Collateral Source Rule ("CSR" reforms) increase the rate of fatal accidents that are neither auto accidents nor overdoses on illegal drugs and abused pharmaceuticals, although the effect of this reform fades and becomes statistically insignificant after several years since the adoption of the reform have passed; and that reforms to the Rule of Joint and Several Liability ("JSL" reforms) cause a statistically significant, lasting decrease in the rate of these accidents as well. The evidence I find that the other reforms I study – caps on noneconomic damages ("NED caps") and punitive damages reforms - affect the accidental death rate is modest at best. However, I do

find that the presence within states of NED caps that apply in all or most types of tort suits in general is associated with significantly more accidental deaths occurring after a few years since the adoption of these reforms have passed, suggesting that these reforms may increase the accidental death rate, if anything. NED caps that apply only in medical malpractice cases have no significant associations with accidental death rates, however.

My results have the following policy implications. It appears likely that reforms to the rule of joint and several liability have caused and will continue to cause a reduction in the accident rate, and we can be certain that JSL reforms won't increase the number of accidents that occur. Limiting the amount of compensatory damages accident victims can collect from tortfeasors in tort suits may increase the accident rate, and the risk of this increase in accidents occurring must be weighed against any efficiency gains these tort reforms create by reducing litigation expenditures on tort suits. Enacting caps on punitive damages or making it more difficult for plaintiffs to prove that defendants should be held liable for punitive damages will not increase the accident rate, however. Also, enacting tort reforms that apply only in medical malpractice cases is not actually beneficial for accident victims.

Furthermore, my results imply that the existence of the tort law system prevents many accidents from occurring. Because the large administrative costs of the U.S. tort liability system make it a very expensive way of compensating accident victims for their injuries (CBO, 2003, 2004; Tillinghast-Towers Perrin, 2003), many commentators believe that it would be efficient to abolish the tort law system if allowing injured parties to bring tort suits against their injurers does not have a substantial deterrent effect (Kaplow and Shavell, 2002, pp. 1667, 1674; Rubin and Shepherd, 2007, pp. 223, 235). In this paper, I have estimated that changes to the properties of the tort liability system concerning the size of damage payments and the apportionment of responsibility for paying tort awards between multiple tortfeasors create non-negligible changes in the size of the deterrent effects the system creates, at least for incentives to cause accidents other than automobile accidents and drug overdoses. This is evidence that the existence of the tort liability system deters many torts from being committed, and that retaining the tort liability system for these types of torts may very well be efficient. In this respect, my results are analogous to prior results found by Currie and MacLeod (2008) for tort reforms applying in medical malpractice claims and adverse health care outcomes, and by Landes (1982) and Cohen and Dehejia (2004) for no-fault automobile insurance and motor vehicle accidents.

Bibliography.

Ahrens, Marty. 2007. "Home Structure Fires". Fire Analysis and Research Division, National Fire Protection Association, Quincy, MA; www.nfpa.org.

American Tort Reform Association ("ATRA"). 2007. American Tort Reform Association Tort Reform Record. Washington, D.C. Updated biannually. Most recent issue available at http://www.atra.org/files.cgi/8140_Record07-07_3.pdf .

Avraham, Ronen. 2006. Database of State Tort Law Reforms. Northwestern University School of Law Law & Economics Research Paper No.06-08, available at SSRN: http://ssrn.com/abstract=902711. 1st Draft Accessed May, 2006; 2nd Draft Accessed October, 2006.

Avraham, Ronen. 2007. An Empirical Study of the Impact of Tort Reforms on Medical Malpractice Settlement Payments. *Journal of Legal Studies* 36 Supplement 2:s183-s230.

Baicker, Katherine and Amitabh Chandra. 2005. The Effect of Malpractice Liability on the Delivery of Health Care. In *Frontiers of Health Policy Research Vol. 8,* edited by David M. Cutler and Alan M. Garber. The Berkeley Electronic Press, available online at http://www.bepress.com/fhep/8/.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. How Much Should We Trust Difference-in-Differences Estimates? *Quarterly Journal of Economics* 19:249-75.

Blumenthal, Ralph. 2007. More Doctors in Texas After Malpractice Caps. *The New York Times,* October 5.

Born, Patricia, W. Kip Viscusi, and Tom Baker. 2006. The Effects of Tort Reform on Medical Malpractice Insurers' Ultimate Losses. Working Paper. NBER Working Paper Series # 12086, National Bureau of Economic Research.

Bureau of Justice Statistics ("BJS"). 2000. *Tort Trials and Verdicts in Large Counties, 1996, NCJ 179769.* Washington, D.C.: National Center for State Courts, U.S. Department of Justice, Bureau of Justice Statistics.

Bureau of Justice Statistics ("BJS"). 1995. *Civil Justice Survey of State Courts, 1992: Tort Cases in Large Counties, NCJ-153177.* Washington, D.C.: National Center for State Courts, U.S. Department of Justice, Bureau of Justice Statistics.

Burstin, H.R., W.G. Johnson, S.R. Lipsitz, and T.A. Brennan. 1993. Do the Poor Sue More? A Case-Control Study of Malpractice Claims and Socioeconomic Status. *Journal of the American Medical Association* 270: 1697-701.

Centers for Disease Control and Prevention ("CDC"). National Centers for Injury Prevention and Control. 2006. *CDC Injury Fact Book.* Atlanta, GA: Centers for Disease Control and Prevention. Online at http://www.cdc.gov/ncipc/fact_book/InjuryBook2006.pdf.

Centers for Disease Control and Prevention ("CDC"). National Centers for Injury Prevention and Control. 2007. *Web-Based Injury Statistics Query and Reporting System (WISQARS).* http://www.cdc.gov/ncipc/wisqars.

Chaloupka, Frank, Henry Saffer, and Michael Grossman. 1993. Alcohol-Control Policies and Motor-Vehicle Fatalities. *Journal of Legal Studies* 22:161-186.

Cohen, Alma, and Rajeev Dehejia. 2004. The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities. *Journal of Law and Economics* 67:357-94.

Congressional Budget Office ("CBO"). 2003. *The Economics of U.S. Tort Liability: A Primer*. Washington, D.C.: The Congress of the United States, Congressional Budget Office.

Congressional Budget Office ("CBO"). 2004. *The Effects of Tort Reform: Evidence from the States.* Washington, D.C.: The Congress of the United States, Congressional Budget Office.

Craswell, Richard, and John E. Calfee. 1986. Deterrence and Uncertain Legal Standards. *Journal of Law, Economics, & Organization* 2: 279-303.

Currie, Janet, and W. Bentley MacLeod. 2008. First Do No Harm? Tort Reform and Birth Outcomes. *Quarterly Journal of Economics* 123: 795-830.

Danzon, Patricia M. 2000. Liability for Medical Malpractice. Pp. 1338-1404 in *The Handbook of Health Economics, Vol. 1*, edited by Anthony J. Culyer and Joseph P. Newhouse.

Danzon, P., M. Pauly, and R. Kington. 1990. The Effects of Malpractice Litigation on Physician Fees and Incomes. *American Economic Review* 80:122-127.

Dobbs, Dan B. 2001. *The Law of Torts.* St. Paul, Minn.: West Group.

Doyle, Joseph. 2005. Health Insurance, Treatment and Outcomes: Using Automobile Accidents as Health Shocks. *Review of Economics and Statistics* 87: 256-70.

Kahan, Marcel. 1989. Causation and Incentives to Take Care Under the Negligence Rule. *Journal of Legal Studies* 18:427-47.

Kaplow, Louis, and Steven Shavell. 2002. Economic Analysis of the Law. Pp. 1661-1784 in *The Handbook of Public Economics, Vol. 3*, edited by Alan Auerbach and Martin Feldstein. Amsterdam; New York: Elsevier.

Kessler, Daniel, and Daniel Rubinfeld. 2004. Empirical Study of the Civil Justice System. Forthcoming in the Handbook of Law and Economics, edited by Mitchell Polinsky and Steven Shavell. Also NBER Working Paper Series # 10825, National Bureau of Economic Research.

Kessler, Daniel, and Mark McClellan. 1996. Do Doctors Practice Defensive Medicine? *Quarterly Journal of Economics* 111:353-90.

Kessler, Daniel, and Mark McClellan. 2002a. How Liability Reform Affects Medical Productivity. *Journal of Health Economics* 21:931-55.

Kessler, Daniel, and Mark McClellan. 2002b. Malpractice Law and Health Care Reform: Optimal Liability Policy in an Era of Managed Care. *Journal of Public Economics* 84:175-97.

Kessler, Daniel, William Sage, and David Becker. 2005. Impact of Malpractice Reforms on the Supply of Physician Services. *Journal of the American Medical Association* 293:2618-25.

Klee, Elizabeth, and Lewis Kornhauser. 2007. Comparisons of the Incentive for Insolvency under Different Legal Regimes. *Journal of Legal Studies* 36:141-170.

Klick, Jonathan, and Thomas Stratmann. 2005. Does Medical Malpractice Reform Help States Retain Physicians and Does it Matter? Working Paper. Social Science Research Network. Online at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=870492.

Kornhauser, Lewis, and Richard Revesz. 1994. Multidefendant Settlements - The Impact of Joint and Several Liability. *Journal of Legal Studies* 23:41-76.

Landes, Elisabeth M. 1982. Insurance, Liability, and Accidents: A Theoretical and Empirical Investigation of the Effect of No-Fault on Accidents. *Journal of Law and Economics* 25:49-65.

Levitt, Steven D., and Jack Porter. 2001. How Dangerous Are Drinking Drivers? *Journal of Political Economy* 109:1198-237.

Matsa, David. 2007. Does Malpractice Liability Keep the Doctor Away? Evidence from Tort Reform Damage Caps. *Journal of Legal Studies* 36, Supplement 2:s143-s182.

McCullough, Campbell & Lane LLP. 1998. *Summary of Medical Malpractice Law*. McCullough, Campbell & Lane LLP, http://www.mcandl.com/publications.html.

McFarland, Barbara, and Glen Weissenberger. 2001. *The Law of Premises Liability, 3rd Edition.* Cincinnati, OH: Anderson Publishing Co.

Miller, T., K. Covington, and A. Jensen. 1999. Costs of injury by major cause, United States, 1995: Cobbling together estimates in measuring the burden of injuries. Pp. 23-40 in *Proceedings of a Conference in Noordwijkerhout, May 13–15, 1998*, edited by S. Mulder and E.F. van Beeck. Amsterdam: European Consumer Safety Association.

National Center for Health Statistics ("NCHS"). Centers for Disease Control and Prevention. 2008. *FASTSTATS A-Z.* National Center for Health Statistics, online at http://www.cdc.gov/nchs/fastats/default.htm, accessed March 2008.

National Center for Health Statistics ("NCHS"). 2005. *National trends in injury hospitalizations, 1979-2001*. Hyattsville, Maryland: National Center for Health Statistics. Online at http://www.cdc.gov/nchs/about/otheract/injury/injury_chartbook.htm, accessed March 2008.

Rubin, Paul. 1993. *Tort Reform by Contract.* Washington, D.C.: AEI Press.

Rubin, Paul. 2005. Public Choice and Tort Reform. *Public Choice* 124:223-36.

Rubin, Paul, and Joanna Shepherd. 2007. Tort Reform and Accidental Deaths. *Journal of Law and Economics* 50: 221-38.

Shavell, Steven. 1982. The Social versus the Private Incentive to Bring Suit in a Costly Legal System. *Journal of Legal Studies* 11:333-39.

Spier, Kathryn. 1994. A Note on Joint and Several Liability: Insolvency, Settlement, and Incentives. *Journal of Legal Studies, 23(1),* 559-68.

Tillinghast-Towers Perrin. 2003. *U.S. Tort Costs: 2002 Update—Trends and Findings on the Costs of the U.S. Tort System.* Philadelphia, PA: Tillinghast-Towers

Perrin.
Viscusi, W. Kip, and Patricia Born. 2005. Damages Caps, Insurability, and the Performance of Medical Malpractice Insurance. *Journal of Risk and Insurance* 72:23-43.
Viscusi, W. Kip, et al. 1993. The Effects of the 1980s Tort Reform Legislation on General Liability and Medical Malpractice Insurance. *Journal of Risk and Uncertainty* 6:165-186
Wolfers, Justin. 2006. Did Unilateral Divorce Laws Raise Divorce Rates? A Reconciliation and New Results. *American Economic Review* 96:1802-1820.

A.A. Appendix A. Further Discussion of Why Drug Overdoses are Rarely Tortious

In Section 3, I claimed that drug overdoses – overdoses on illegal drugs or abused pharmaceutical drugs – are virtually never tortious. In this appendix I provide further justification of this point. With drug overdoses, it is very likely that a court will find that the action of the overdose victim him or herself in ingesting the drug is the only proximate cause of the accident, or that the contributory negligence or assumption of risk of the victim himself in taking the drug was mostly or completely to blame for the harm from the overdose, barring recovery of the plaintiff from anyone else alleged to be at least partially at fault for causing the harm associated with the overdose. Courts want to discourage drug abuse, and triers of fact will tend to be unsympathetic to those who abuse drugs.

Nonetheless, it is true that a search for tort cases involving overdoses on illegal drugs or abused pharmaceuticals amongst all the reported state court cases in Westlaw does bring up a number of cases in which courts either ruled that another party besides the person who overdosed could be held partially or fully liable for the harm suffered by the overdosing plaintiff, or in which courts ruled that a summary judgment in favor of the defendants in such a suit could not be granted, because the plaintiff had produced enough preliminary evidence to show that the defendants might be liable for at least some portion of the plaintiff's harm. Ways in which someone else besides the overdose victim him or herself may be liable for some or all of the damages from this type of accident include: failure of social hosts who have taken responsibility for looking after a guest to make reasonable efforts at seeking medical

assistance for a guest who had overdosed on drugs (see, for example: *Cook v. Kendrick* (931 So.2d 420, La.App. 2 Cir., [2006]; defendant hosts found 20% liable for harm from overdose, plaintiff, 80% liable) and *Horton v. Freeman* (917 So.2d 1064, Fla.App. 4 Dist., [2006]; appellate court ruled that trial court erred in granting summary judgment to defendant hosts)), failure of police officers to make a reasonable effort at determining whether an arrestee taken into their custody needed medical treatment for a drug overdose and/or at obtaining such medical treatment (for example, *Del Tufo v. Township of Old Bridge* (147 N.J. 90, 685 A.2d 1267 N.J. [1996]; trial court ruled in favor of plaintiff, but Appellate and Supreme Courts ruled that trial court erred in failing to provide a comparative negligence instruction, as "jury should have been instructed to weigh decedent's negligence against the police's negligent failure to summon immediate medical assistance"; this court ruling and accompanying dissenting opinion provide a particularly detailed and lucid discussion of issues surrounding the application of the doctrines of avoidable consequences, aggravation of preexisting condition, contributory negligence, and proximate causation in tort cases over drug overdoses), *Lucas v. County of Los Angeles* (47 Cal.App.4th 277, 54 Cal.Rptr.2d 655, Cal.App. 2 Dist. [1996]; appellate court ruled that defendant was not to be granted summary judgment on the basis of primary assumption of the risk on the part of the plaintiff being a total bar to the plaintiff recovering, and that "There is at least one triable issue of fact, whether the defendants knew or reasonably should have known that plaintiff needed immediate medical attention."), and *Lively v. Trust* (184 Ga.App. 361, 361 S.E.2d 516, Ga.App. [1987]; court ruled in favor of defendant police officer, affirming his duty to determine if arrestees needed medical assistance for overdoses and to acquire such assistance if so, but not finding defendant negligent in this regard)), failure of prison staff to make reasonable efforts at preventing at-risk prisoners from abusing drugs and at obtaining proper medical treatment for prisoners who overdose (*Arias v. State* (8 Misc.3d 736, 795 N.Y.S.2d 855, N.Y.Ct.Cl. [2005]; court ruled against defendants, the Department of Correctional Services and a prison warden, finding them negligent in allowing inmate, who had died due to prescription drug overdose, to have more than one pill in cell)), and negligence in the medical treatment of the overdose victim by substance abuse center staff (*Klassette by Klassette v. Mecklenburg County Area Mental Health* (88 N.C.App. 495, 364 S.E.2d 179, N.C.App. [1988]; court ruled that summary judgment in favor of defendant detoxification center should not have been granted on grounds of the contributory negligence of the plaintiff in ingesting the drugs; detoxification center had a duty to use due care in providing treatment, or referrals to other

care, to those seeking care at center)) or by physicians and/or hospital staff (*University of Florida Bd. of Trustees v. Morris* (--- So.2d ----, 2007 WL 2141805, Fla.App. 2 Dist. [2007]; appellate court addressed issue of which venue to hold trial, and did not dismiss the claim against the defendants); *Gedon v. Bry-Lin Hospitals, Inc*. (286 A.D.2d 892, 730 N.Y.S.2d 641, N.Y.A.D. 4 Dept. [2001]; appellate court ruled that trial court should not have granted summary judgment in favor of defendant physician looking after patient with drug abuse problem who later suffered fatal overdose), *Prince By and Through Bolton v. St. Thomas Hosp.* (945 S.W.2d 731, Tenn.App. [1996]; trial court granted summary judgment in favor of defendants, but appellate court reversed summary judgment and remanded for trial)).

However, although I have found these several cases on tort suits over drug overdoses, the number of reported cases over drug overdoses is very small in comparison to the number of reported cases over other accidental injuries such as falls and drownings. For the various types of falls, various types of drownings, and other types of accidents other than auto accidents and drug overdoses, there exist many law reports, such as those from the American Law Reports series, which compile citation lists of lawsuits and summarize lawsuits over these types of accidents, and these reports often list and detail dozens of cases. No such report exists for drug overdoses, though, and in the previous paragraph I have in fact already listed over half of the tort cases over drug overdoses that I found in a comprehensive search for such cases. All in all, I am persuaded that the special nature of drug overdoses makes it such that these accidental deaths are almost never tortious. Furthermore, certain factors such as factors affecting criminal activity, in particular drug use and distribution, will have a far greater, more direct effect on drug overdoses than they will on other sorts of accidents. Indeed, from Figure 1 in Section 3 of this paper we see that the rate of non-automotive accidents besides drug overdoses has declined nationwide between 1981 and 2004, while the rate of drug overdoses has increased dramatically, suggesting that changes over time in the rate of drug overdoses are driven primarily by a different set of factors than the factors which affect other types of accidents.

A.B. Appendix B. Data Sources for the Set of Control Variables Used in this Study.

Demographic Variables. These variables are the percent of the state population that is age 4 or younger in the year of the observation, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24,

the percent of the state population this is African-American, and the percent of the state population that belong to other racial minority groups. Data for these variables come from the U.S. Census Bureau's Population Division's Population Estimates, which are described and available at http://www.census.gov/popest/states/asrh/ .

Unemployment Rate. Data on the unemployment rate within states in each year come from the Local Area Unemployment Statistics program of the U.S. Department of Labor's Bureau of Labor Statistics, and are described and available at http://www.bls.gov/lau/home.htm .

Per Capita Real Personal Income. Data on nominal per capita income come from the U.S. Department of Commerce's Bureau of Economic Analysis's Regional Economic Accounts, State Annual Personal Income Data, and are described and available at http://www.bea.gov/regional/spi/ . The nominal per capita income variable was deflated to construct a real per capita personal income variable using the Consumer Price Index series, with 1983/1984 as the base year. The Consumer Price Index is constructed by the U.S. Department of Labor's Bureau of Labor Statistics; see http://www.bls.gov/cpi/home.htm.

Per Capita Alcohol Consumption. These data are calculated by the National Institutes of Health's National Institute on Alcohol Abuse and Alcoholism, using data on the volume of beer, wine and spirits sold in each state in each year, and the population of each state that is age 14 and older. This data series, "Per capita ethanol consumption for States, census regions, and the United States, 1970-2005", is described and available at http://www.niaaa.nih.gov/Resources/DatabaseResources/QuickFacts/AlcoholSales/default.htm .

Hospital Beds per Capita. Data on the number of hospital beds per capita in states come from the Area Resource File (*Area Resource File (ARF)*. 2006. U.S. Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions, Rockville, MD.; online at www.arfsys.com.). Data on hospital beds are only available for the years 1985, 1990, and 1995 through 2004 in the Area Resource Variable; for the other years of data examined in this study, data on hospital beds is linearly interpolated or extrapolated.

A.C. Appendix C. The Effects of Differences in Estimation Methods Between This Paper and Rubin and Shepherd (2007) on Estimates of the Effects of Tort Reforms on the Accidental Death Rate

As discussed in the Introduction, the estimation methods used in this paper differ in several ways from the methods used in prior empirical work on tort reforms and accidental deaths by Rubin and Shepherd (2007). These differences in methods cause my estimates of the effects of tort reforms on the accidental death rate to differ in a number of ways from Rubin and Shepherd's estimates. In this appendix, I go through and explain the process of showing how making changes in estimation methods from Rubin and Shepherd's estimation methods to my preferred methods one change at a time affects the results of the regressions that use econometric model (1), which does not differentiate between the short-run and long-run effects of tort reforms. From this exercise, we can see which exact changes and sets of changes drive the difference in results between my paper and theirs for each of the reforms.

The differences in methods between the two papers are as follows. My primary dependent variable is one that excludes drug overdoses from the accidental death rate, rather than one that includes drug overdoses as Rubin and Shepherd's does. The standard errors on my estimates are standard errors clustered at the state level, whereas Rubin and Shepherd use either Huber-White standard errors or Newey-West standard errors allowing up to 2 possible lags of autocorrelation. My econometric model includes state-specific time trends, whereas Rubin and Shepherd's primary, preferred model includes state and year fixed effects only. I include four additional years of data, for 2001 through 2004, in my dataset, whereas Rubin and Shepherd examined data from 1981-2000 only. I use a newer, more accurate source of data on the presence of NED caps, CSR reforms, JSL reforms, Caps on PD, and Higher Evidence Standard for PD reforms within states[22]. Finally, the sets of tort reform variables used in these two papers are different. I study the effects of NED caps specific to medical malpractice, whereas Rubin and Shepherd only study the effects of generally applicable types of tort reforms. Rubin and Shepherd differentiate between mandatory offset and discretionary offset CSR reforms, but I do not (see Section 2.1.1 above for more information on the two types of CSR reforms). Rubin and Shepherd differentiate between Caps on PD and Higher Evidence Standard for PD reforms, but I group these two PD reforms together into one Punitive Damages Reform category. Finally, Rubin and Shepherd include variables for

[22] In all of the regressions I have run for this appendix, I have used this newer, more accurate data on tort reforms. This is the only way in which I have not made one change in methods at a time from Rubin and Shepherd's methods to my preferred methods. In Appendix Table 1, however, I have included Rubin and Shepherd's main regression results from Table 3 on p. 232 of their paper, to show some of the differences that using data from the American Tort Reform Association Tort Reform Record (the data used by Rubin and Shepherd) rather than the newer data makes.

Prejudgment Interest Reforms and Product Liability Reforms in their regressions, whereas I do not. These last two types of tort reforms are defined in the next paragraph. Appendix Table 1 shows when changes in the presence of the types of tort reforms not included in my preferred set of tort reform variables occurred within states.

Product Liability Reforms are tort reforms that apply only in product liability suits. These reforms have come in many different varieties; some are caps on noneconomic or punitive damages that apply only in product liability suits, while many product liability reforms aim to make it more difficult for a plaintiff in a product liability suit to prove that a defendant in such a suit should be held liable for the plaintiff's injury (by, for instance, enabling a defendant to avoid being held liable if it is able to prove that no practical or feasible safer alternative design existed at the time the product was manufactured, or that a product causing injury was not used as intended and was used in a way that the manufacturer could not have foreseen.) As in Rubin and Shepherd (2007), the product liability reform variable used here is an indicator for the presence within a state of a statute adopting a product liability reform that is listed in the American Tort Reform Association's ("ATRA"'s) Tort Reform Record (ATRA, 2007). The ATRA Record lists tort reforms supported by the ATRA (a lobbying association) that have been passed by state legislatures since 1986, the year the ATRA was founded. Prejudgment interest reforms create law changes that have to do with prejudgment interest, which is interest that accrues on the amount of damages that were suffered between the time the harm was incurred and time the victim receives compensation for the harm in a successful tort suit. These reforms affect such issues as whether prejudgment interest will ever be allowed on any component of tort awards in any situation; if prejudgment interest is ever allowed, whether prejudgment interest should be granted on all three types of damages, just economic damages and not noneconomic or punitive damages, or only on certain components of economic damages; the interest rate to be used in computing the amount of prejudgment interest; and whether prejudgment interest should only be awarded to a plaintiff when the plaintiff did not reject a reasonable settlement offer made by the defendant ("offer of judgment provisions", which seek to provide defendants with some protection from delays in the litigation process that the defendants did nothing to bring about). The prejudgment interest variable used here is an indicator for the presence within a state of a statute concerning prejudgment interest that is listed in the ATRA Tort Reform Record. Unfortunately, it is not clear whether each of these statutes about prejudgment interest that are listed in the ATRA Record created an increase or decrease in the expected liability of injurers,

as the ATRA Record does not provide detail on prejudgment interest laws in place in states before these statutes were enacted; the statutes may have allowed some accident victims to receive some prejudgment interest when previously, prejudgment interest had always been disallowed in the state. Many of the statutes appear to deal only with the interest rate to be used in calculating prejudgment interest, and likely created little if any change in the expected amount of damages that tortfeasors pay. Therefore, the tort reforms whose presences are indicated for by this variable may consist of both increases and decreases in liability pressure on tortfeasors, unlike with the other types of tort reforms studied in this paper and in Rubin and Shepherd. Note that both of these two variables may suffer from some of the other problems with data from the ATRA Record that are discussed in Section 3 (missing reforms, incorrect enactment dates of reforms, and so forth.)

To begin the process of making one change at a time between Rubin and Shepherd's methods and my methods, Appendix Table 2 contains a copy of Rubin and Shepherd's main regression results from Table 3 on p. 232 of their paper. Appendix Tables 3 and 4 report the results of regressions I have run that include a vector of tort reform indicator variables in which these variables are constructed according to the variable definitions used in Rubin and Shepherd (2007). The dependent variable used in Appendix Table 3's regressions excludes auto accidents but not drug overdoses, while the dependent variable used in Appendix Table 4's regressions excludes both auto accidents and drug overdoses. Appendix Tables 5 and 6 report the results of regressions I have run that include a vector of tort reform indicator variables that are defined in the same way as those in the regressions reported in Table 4 in the main body of the text of this paper. The dependent variable used in Appendix Table 5's regressions excludes auto accidents but not drug overdoses, while the dependent variable used in Appendix Table 6's regressions excludes both auto accidents and drug overdoses. In each of Appendix Tables 3 through 6, I make the following changes in methods one change at a time: whether standard errors on the estimates are Huber-White standard errors or standard errors clustered by state, whether state-specific linear time trends are included in the regression along with the state and year fixed effects, and whether data from 1981-2000 or 1981-2004 is used in the regressions.

For each of the reforms, the following changes in methods drive the difference in results between the papers. For generally applicable NED caps, removing drug overdoses from the dependent variable alone removes the statistically significant negative association Rubin and Shepherd found between this reform and the accidental death rate (although

Appendix Tables 3 and 5 show that other changes, such as clustering standard errors by state, also remove this association). For Higher Evidence Standards for Punitive Damages, using the newer tort reform dataset created for this paper rather than the ATRA Record dataset removes the statistically significant negative association Rubin and Shepherd found between this reform and the accidental death rate. For Product Liability Reforms, either clustering standard errors by state or using data through 2004 causes these reforms to no longer be associated with fewer deaths. There is no simple pattern to removing the statistically significant negative association between Prejudgment Interest Reforms and accidental deaths, however; no one single change in methods causes this association to become insignificant, although doing both including time trends and clustering standard errors will do this, and, this association is weaker in regressions using data that spans the years 1981 through 2004. Both Rubin and Shepherd's preferred econometric model and my preferred econometric model find that there is a statistically significant positive relationship between CSR reforms and accidental deaths, however. With JSL reforms, Rubin and Shepherd found no significant association between these reforms and the accidental death rate, although there is a negative and significant association between them in my preferred econometric model; use of the newer, more accurate tort reform dataset plays the main role in my finding a negative association with JSL reforms, although removing drug overdoses from the dependent variable and using data from 1981-2004 both strengthen this association. Furthermore, with JSL reforms, Appendix Tables 3 through 6 show that while the indicator for the presence of a JSL reform of any type is not always statistically significant in econometric models including state-specific time trends when data from 1981-2000 is used (although the coefficient on it always remains negative), if an indicator for the presence of a full repeal of JSL is included in the regression instead, this indicator is negative and statistically significant when using data from this time period so long as drug overdoses are omitted from the dependent variable (see Section 2.2 in the text for a discussion of the differences between JSL reforms making partial repeals and JSL reforms making full repeals of the common-law doctrine of joint and several liability. Between 1981 and 2000, 32 states had changes in the presence of JSL reforms of any type within the state, and 17 states had changes in the presence of full repeals to JSL within the state).

Table 1:
Percentages of Tort Suits that Name Multiple Defendants
Tort Suits Terminating in the State Courts of the
75 Largest Counties in the United States, 1992

Premises Liability Suits:	
Percentage naming 1 defendant:	47.8%
Percentage naming 2 defendants:	24.8%
Percentage naming 3 or more defendants:	27.4%

Product Liability Suits:	
Percentage naming 1 defendant:	32.2%
Percentage naming 2 defendants:	24.9%
Percentage naming 3 or more defendants:	42.9%

"Miscellaneous" Tort Suits:
Tort suits over accidental bodily injuries not sustained in automobile accidents, that do not fall into the premises liability, product liability, or medical malpractice categories.

Percentage naming 1 defendant:	40.7%
Percentage naming 2 defendants:	32.1%
Percentage naming 3 or more defendants:	27.1%

Premises Liability, Product Liability, and Miscellaneous Tort Suits Together:	
Percentage naming 1 defendant:	45.3%
Percentage naming 2 defendants:	25.9%
Percentage naming 3 or more defendants:	28.8%

Data Source: The Civil Justice Survey of State Courts, 1992, conducted by the Bureau of Justice Statistics (BJS, 1995).

Note: "The top 75 counties account for about 37 percent of the U.S. population and about half of all civil filings" (BJS, 1995, "Tort Cases in Large Counties" which discusses statistics from this dataset, p. 1).

Figure 1: Accidental Death Rates, U.S., 1981-2004

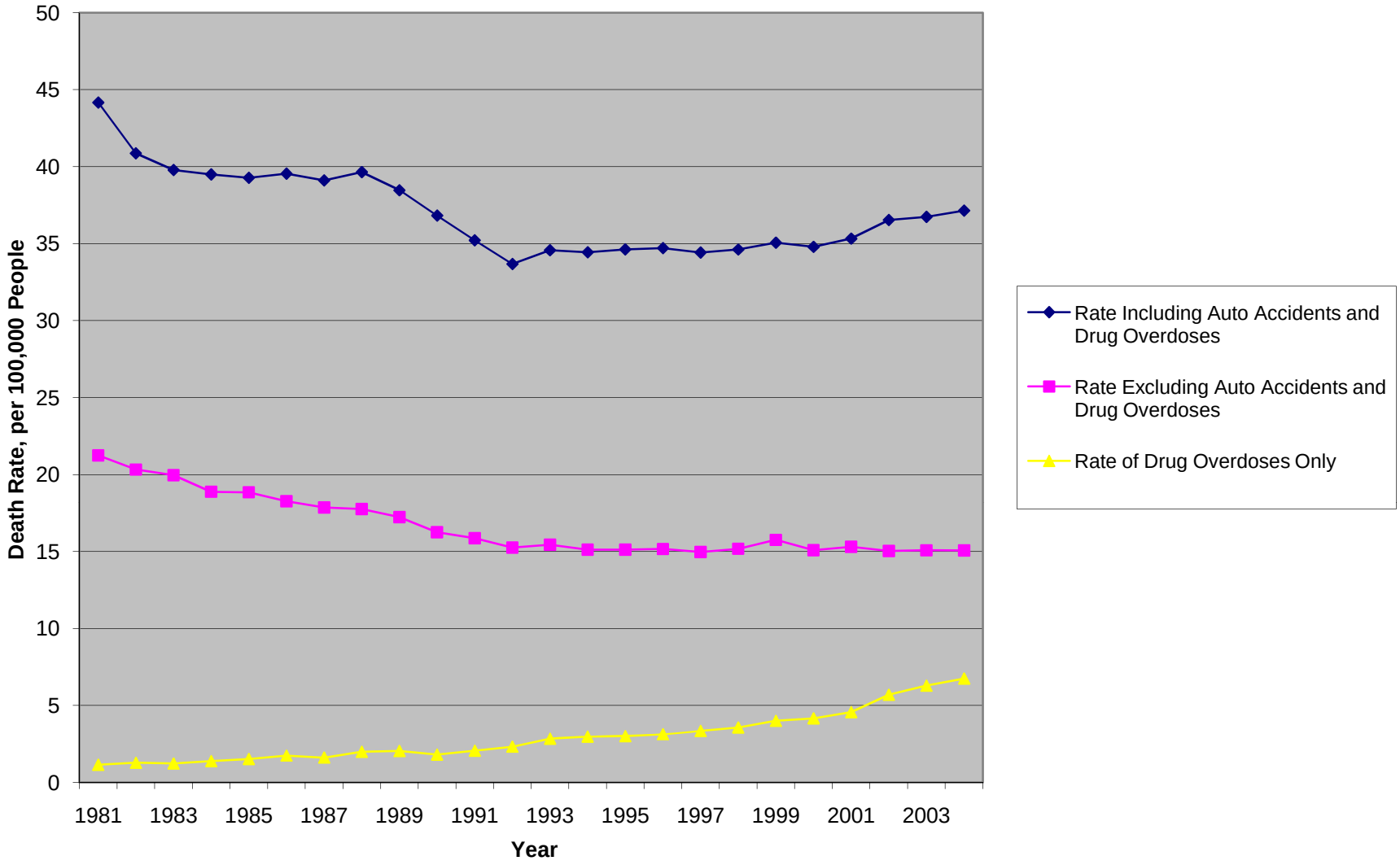

Table 2

Summary Statistics

Variable	Mean	Standard Deviation
Accidental death rates, per 100,000:		
-all types of accidents	37.44	7.96
-excluding auto accidents	20.07	4.02
-excluding auto accidents and drug overdoses	17.01	3.90
-drug overdoses only	3.07	2.33
-auto accidents only	17.36	5.17
State-Year Level Controls:		
Unemployment Rate	6.17	1.95
Real per Capital Personal Income (2004 as base year of CPI)	28742.12	4740.54
Percent African-American	12.34	8.01
Percent Other Minority:	4.11	5.12
Percent Age 4 and Under	7.27	0.79
Percent Age 65 and Over	12.37	2.03
Percent Males Age 15 to 24	7.64	0.85
Per Capita Alcohol Consumption	2.35	0.43
Hospital Beds Per Capita	0.0045	0.0013

Note: All values in the table are for yearly state-level observations from 1981 to 2004 for the 50 U.S. states and D.C. and are weighted by state-year populations.

Table 3: Summary of Changes in State Tort Reforms, 1981-2004

	Law: JSL Reform, General	Law: CSR Reform, General	Law: NED Cap, General	Law: NED Cap, Medmal-Specific	Law: PD Reform, General
1981					
1982	NM* (+)				
1983					IN* (+)
1984					
1985	IN (+) , IA (+)				ME* (+) , MT (+)
1986	AK (+) , CA (+) , UT (+) , WY (+)	AK (+)	AK (+) , WA (+)	MO (+) , WV (+) , WI (+)	SD (+)
1987	CO (+) , CT (+) , FL (+) , HI (+) , IL (+) , MI (+) , NY (+) , SD (+) , WA (+)	AL (+) , CO^ (+) , FL (+) , IL (+) , MI (+) , MN (+) , NY (+)	CO (+), HI (+), MD (+), NH (+)	AL (+), KS (+), MI (+)	AK (+) , AZ* (+) , FL (+) , OK (+)
1988	AZ (+) , GA (+) , ID (+) , LA (+) , MT (+) , NV (+) , NJ (+) , ND (+) , OR (+) , TX (+)	CT (+) , GA (+) , IA (+) , MT (+) , NJ (+) , OH (+)	ID (+), KS (+) , OR (+)	FL (+), KS (-) , TX* (-) , UT (+)	AL (+) , CA (+) , GA (+) , IA (+) , KS (+) , ND (+) , OH (+) , OR (+) , SC (+), TX (+)
1989	MN (+)	KS (+) , KY (+)	WA* (-)		KY (+) , NV (+) , UT (+) , VA (+)
1990	MS (+) , NH (+)	ID (+)			HI* (+)
1991		GA* (-)	NH* (-)		
1992	NE (+) , TN* (+)			AL* (-), OH* (-)	MD* (+) , TN* (+)
1993		KS* (-)			
1994		AZ (+) , OH* (-)			MS (+)
1995	WI (+)	AZ (-) , KY* (-)	IL (+)		IL (+)
1996				MT (+) , ND (+)	DC* (+) , NJ (+) , NC (+)
1997		AL* (-)	OH (+)		MO* (+)
1998			IL* (-) , OH* (-)		IL* (-)
1999					
2000			OR* (-)		
2001		AL* (+)			
2002					
2003	AR (+) , PA (+)			NV (+) , MS (+) , OH (+)	AR (+)
2004				OK (+) , TX (+)	ID (+)

"*" indictes that the law was found unconsitutional and reversed by the state Supreme Court, or created through a court's decision.
"+" indicates that the law was turned on (was enacted), and "-" indicates that the law was turned off (struck down or repealed).
"^" indicates that the CSR reform does not allow offsets of payments from private sources of collateral insurance.

The law is entered as turning on during the first year in which it is in place for at least half the year.
The law is entered as turning off for the first year in which it is no longer in place for at least half the year.

Table 4: Effects of Tort Reforms on Accidental Death Rates

Dependent Variable:	Rate Excluding Auto Accidents and Drug Overdoses (Log of this Rate)	Rate of Drug Overdoses Only (Log of this Rate)	Rate of Auto Accidents Only (Log of this Rate)
Variable			
JSL Reform, General	-0.0336**	-0.0098	0.0043
	[0.0088]	[0.0799]	[0.0150]
CSR Reform, General	0.0440**	0.0397	0.0087
	[0.0089]	[0.0698]	[0.0179]
NED Cap, General	-0.0024	-0.080	0.0112
	[0.0124]	[0.1292]	[0.0198]
Punitive Damages Reform, General	-0.0155	-0.0626	0.0077
	[0.0107]	[0.0754]	[0.0167]
NED Cap, Specific To Med Mal	0.0046	-0.1531	0.0333
	[0.0089]	[0.1036]	[0.0182]
Observations	1224	1224	1224
R-squared	0.95	0.90	0.96

Notes: Standard errors are in brackets, and are clustered at the state level in all regressions in this table.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".

The tort reform variables whose coefficients are shown in this table are equal to 1 if a tort reform of the relevant type is present in state s in year t (regardless of how many years ago the reform was enacted), and are 0 otherwise.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. All regression models include state-specific linear time trends and state and year fixed effects.

Table 5: Estimates Comparing the Effects of "New" and "Old" Tort Reforms

Dependent Variable:	Log of Rate of Accidental Deaths, Omitting Auto Accidents and Drug Overdoses			
	X=2	X=3	X=4	X=5
Variable				
JSL Reform, General,	-0.0241*	-0.0296**	-0.0321**	-0.0358**
Enacted Within the Last _X_ Years	[0.0104]	[0.0095]	[0.0089]	[0.0089]
JSL Reform, General,	-0.0422**	-0.0408**	-0.0443**	-0.0512**
In Place for More than _X_ Years	[0.0134]	[0.0152]	[0.0145]	[0.0141]
CSR Reform, General,	0.0444*	0.0470**	0.0474**	0.0487**
Enacted Within the Last _X_ Years	[0.0189]	[0.0157]	[0.0120]	[0.0095]
CSR Reform, General,	0.0382*	0.0352+	0.0321+	0.0207
In Place for More than _X_ Years	[0.0148]	[0.0193]	[0.0184]	[0.0159]
Cap on NED, General,	-0.001	-0.0132	-0.0082	-0.0065
Enacted Within the Last _X_ Years	[0.0103]	[0.0097]	[0.0106]	[0.0097]
Cap on NED, General,	-0.0078	0.0338*	0.0316*	0.0526*
In Place for More than _X_ Years	[0.0215]	[0.0163]	[0.0133]	[0.0254]
Punitive Damages Reform, General,	-0.0117	-0.0131	-0.0136	-0.0163
Enacted Within the Last _X_ Years	[0.0106]	[0.0107]	[0.0103]	[0.0101]
Punitive Damages Reform, General,	-0.0108	-0.0127	-0.0166	-0.0271+
In Place for More than _X_ Years	[0.0169]	[0.0175]	[0.0164]	[0.0157]
Cap on NED, Specific to Med Mal,	-0.0179	-0.012	-0.0064	-0.002
Enacted Within the Last _X_ Years	[0.0126]	[0.0106]	[0.0093]	[0.0078]
Cap on NED, Specific to Med Mal,	0.0272+	0.0244	0.0206+	0.0139
In Place for More than _X_ Years	[0.0139]	[0.0147]	[0.0111]	[0.0131]
Observations	1224	1224	1224	1224
R-squared	0.95	0.95	0.95	0.95

Notes: Standard errors are in brackets, and are clustered at the state level in all regressions in this table.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".

A tort reform enacted within the last _X_ years was enacted in the current year t, year t-x+1, or any year in between t and t-x+1.
These variables indicating the presence of tort reforms within states are the elements of the vector "TORT_NEW" described in the text (Section 4).
A tort reform in place for more than _X_ years was enacted prior to year t-x+1.
These variables indicating the presence of tort reforms within states are the elements of the vector "TORT_OLD" described in the text (Section 4).

All regressions include the following control variables (coefficients and standard errors not reported):
The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. All regression models include state-specific linear time trends and state and year fixed effects.

Table 6: Estimated Effects of
Leads of Tort Reform Variables

Dependent Variable:	Log of Rate of Accidental Deaths, Omitting Auto Accidents and Drug Overdoses
Variable	
JSL Reform, General	-0.0360**
	[0.0133]
2-Year Lead of Above Tort Reform Variable	-0.0068
	[0.0121]
CSR Reform, General	0.0458**
	[0.0130]
2-Year Lead of Above Tort Reform Variable	0.0143
	[0.0180]
NED Cap, General	-0.0025
	[0.0103]
2-Year Lead of Above Tort Reform Variable	0.0005
	[0.0181]
Punitive Damages Reform, General	-0.0182
	[0.0126]
2-Year Lead of Above Tort Reform Variable	-0.0104
	[0.0118]
NED Cap, Specific To Med Mal	0.0028
	[0.0121]
2-Year Lead of Above Tort Reform Variable	0.0023
	[0.0191]
Observations	1224
R-squared	0.95

Notes: Standard errors are in brackets, and are clustered at the state level in all regressions in this table.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".

A 2-year lead of a tort reform variable is an indicator equal to 1 in the two years preceding the enactment of that type of tort reform and 0 otherwise.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. All regression models include state-specific linear time trends and state and year fixed effects.

Table 7: Estimated Effects of Tort Reforms
Being Struck Down

Dependent Variable:	Log of Rate of Accidental Deaths, Omitting Auto Accidents and Drug Overdoses
Variable	
CSR Reform, General	0.0516**
	[0.0110]
2-Year Lead of Reform Turning Off	-0.0352*
	[0.0137]
2-Year Lag of Reform Turning Off	-0.0146
	[0.0147]
NED Cap, General	0.0202
	[0.0153]
2-Year Lead of Cap Turning Off	-0.0479+
	[0.0282]
2-Year Lag of Cap Turning Off	0.0129
	[0.0126]
NED Cap, Specific To Med Mal	0.0001
	[0.0093]
2-Year Lead of Cap Turning Off	
2-Year Lag of Cap Turning Off	
JSL Reform, General	-0.0363**
	[0.0086]
Punitive Damages Reform, General	-0.0148
	[0.0108]
Observations	1224
R-squared	0.95

Notes: Standard errors are in brackets, and are clustered at the state level in all regressions in this table.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".

A 2-year lead of a tort reform variable turning off is an indicator equal to 1 in the two years before the reform is struck down, and 0 otherwise.

A 2-year lag of a tort reform variable turning off is an indicator equal to 1 in the two years after the reform is struck down, and 0 otherwise.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. Regression models including state-specific linear time trends also include state and year fixed effects.

Appendix Table 1: Summary of Changes in Additional Types of State Tort Reforms, 1981-2004

	Law: PD Cap, General	Law: PD Evidence, General	Law: Prejudgment Interest Reform, ATRA Record	Law: Product Liability Reform, ATRA Record
1981				
1982				
1983		IN* (+)		
1984				
1985	MT (+)	ME* (+) , MT (+)		
1986		SD (+)	MI (+) , MN (+) , NE (+) , OK (+)	CA (+)
1987	CO (+) , FL (+) , OK (+)	AK (+) , AZ* (+)	IA (+) , LA (+) , MO (+) , RI (+) , TX (+)	GA (+) , MT (+) , NJ (+) , OH (+)
1988	AL (+) , GA (+) , KS (+) , MT (-) , TX (+)	AL (+) , CA (+) , GA (+), IA (+), KS (+) , ND (+) , OH (+) , OR (+) , SC (+)	ME (+)	LA (+)
1989	NV (+) , VA (+)	KY (+) , NV (+) , UT (+)		
1990		HI* (+)		
1991				
1992		MD* (+) , TN* (+)		
1993	AL* (-) , ND (+)			MS (+) , NH (+) , TX (+)
1994		MS (+)		
1995	IN (+) , IL (+)	IL (+)		IL (+) , IN (+) , MI (+) , NC (+) , ND (+)
1996	NC (+) , NJ (+)	DC* (+) , NJ (+) , NC (+) , OK (+) , TX (+)		ME (+)
1997	OH (+)	MO* (+)	AK (+)	IA (+)
1998	AK (+) , OH* (-) , IL* (-)	IL* (-)		IL* (-)
1999				FL (+)
2000	AL (+)	FL (+)		
2001			NH (+)	
2002				
2003	AR (+) , MS (+)	AR (+)	GA (+) , OH (+)	CO (+)
2004	ID (+) , MT (+)	ID (+)		

"*" indictes that the law was found unconsitutional and reversed by the state Supreme Court, or created through a court's decision.
"+" indicates that the law was turned on (was enacted), and "-" indicates that the law was turned off (struck down or repealed).
"^" indicates that the CSR reform does not allow offsets of payments from private sources of collateral insurance.

The law is entered as turning on during the first year in which it is in place for at least half the year.
The law is entered as turning off for the first year in which it is no longer in place for at least half the year.

Appendix Table 2: Main Results of Rubin and Shepherd, Journal of Law and Econ (2007)

Specification:	Primary Model: No state-specific time trends; Huber-White Standard Errors	No state-specific time trends; Newey-West Standard Errors with 2 lags of possible autocorrelation	Includes state-specific time trends; Huber-White Standard Errors
Variable			
NED Cap, General	-0.036 [.013]*	-0.036 [.014]*	-0.022 [.012]+
Cap on Punitive Damages (PD), General	-0.005 [0.011]	-0.005 [0.016]	-0.004 [0.012]
Higher Evidence Standard for PD, General	-0.026 [.009]*	-0.026 [.013]*	-0.009 [.009]
Product Liability Reform	-0.039 [.011]*	-0.039 [.015]*	-0.0009 [.011]
Prejudgment Interest, General	-0.05 [.014]*	-0.051 [.018]*	-0.017 [0.016]
CSR Reform, General, Mandatory Offset	0.046 [.013]*	0.046 [.018]*	0.035 [.014]*
CSR Reform, General, Discretionary Offset	0.024 [.013]+	0.024 [.013]+	-0.012 [0.012]
JSL Reform, General, Any Reform	0.021 [0.012]	0.021 [0.017]	-0.014 [0.012]

Notes: Dependent variable is the log of the non-automotive accidental death rate, including overdoses on illegal drugs and abused pharmaceuticals.
Observations are weighted by state-year population.
These estimates come from Table 3 on p. 232 of Rubin and Shepherd (2007).
** Denotes significance at the 1% level; *, 5%; +, 10%.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. All regression models include state and year fixed effects.

Appendix Table 3: Results of regressions that use the set of law variables used in Rubin and Shepherd (2007)

Dependent Variable: All Accidental Deaths Except for Auto Accidents (Log of Rate per 100,000 State Residents)

	Data Years: 1981-2000					Data Years: 1981-2004			
Specification:	State and Year Fixed Effects Only		State-Specific Linear Time Trends			State and Year Fixed Effects Only		State-Specific Linear Time Trends	
Standard Error Computation:	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State
Variable									
NED Cap, General	-0.0372*	-0.0372	-0.0342+	-0.0342	-0.025	-0.0561**	-0.0561+	-0.0048	-0.0048
	[0.0165]	[0.0236]	[0.0202]	[0.0258]	[0.0220]	[0.0177]	[0.0298]	[0.0176]	[0.0260]
Cap on Punitive Damages (PD), General	-0.0164	-0.0164	-0.0149	-0.0149	-0.0186	-0.0225+	-0.0225	-0.0455**	-0.0455**
	[0.0115]	[0.0220]	[0.0127]	[0.0162]	[0.0151]	[0.0117]	[0.0226]	[0.0122]	[0.0166]
Higher Evidence Standard for PD, General	-0.0151	-0.0151	0.004	0.004	0.0093	0.001	0.001	0.0229+	0.0229
	[0.0110]	[0.0184]	[0.0118]	[0.0132]	[0.0135]	[0.0116]	[0.0271]	[0.0122]	[0.0189]
Product Liability Reform	-0.0297**	-0.0297	-0.0084	-0.0084	-0.0042	-0.0034	-0.0034	-0.0005	-0.0005
	[0.0112]	[0.0192]	[0.0133]	[0.0159]	[0.0153]	[0.0121]	[0.0270]	[0.0142]	[0.0187]
Prejudgment Interest, General	-0.0710**	-0.0710*	-0.0349*	-0.0349	-0.0359	-0.0496**	-0.0496	-0.0018	-0.0018
	[0.0131]	[0.0286]	[0.0144]	[0.0218]	[0.0234]	[0.0163]	[0.0329]	[0.0151]	[0.0218]
CSR Reform, General, Mandatory Offset	0.0475**	0.0475+	0.0401**	0.0401**	0.0297+	0.0506**	0.0506	0.0361*	0.0361*
	[0.0133]	[0.0254]	[0.0142]	[0.0133]	[0.0157]	[0.0149]	[0.0305]	[0.0144]	[0.0176]
CSR Reform, General, Discretionary Offset	0.0676**	0.0676**	0.0429**	0.0429**	0.0409*	0.0337*	0.0337*	0.0459**	0.0459*
	[0.0137]	[0.0162]	[0.0136]	[0.0143]	[0.0167]	[0.0151]	[0.0137]	[0.0143]	[0.0179]
JSL Reform, General, Any Reform	0.0109	0.0109	-0.0224+	-0.0224+		0.0087	0.0087	-0.0278*	-0.0278+
	[0.0116]	[0.0175]	[0.0133]	[0.0114]		[0.0124]	[0.0234]	[0.0128]	[0.0158]
JSL Reform, General, Full Repeal					-0.031				
					[0.0208]				
Observations	1020	1020	1020	1020	1020	1224	1224	1224	1224
R-squared	0.84	0.84	0.91	0.91	0.91	0.82	0.82	0.9	0.9

Notes: Standard errors are in brackets.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".
Except in Appendix Tables B1 and B2, CSR reforms which do not allow offsets of payments made by private collateral sources are excluded from the set of CSR reforms whose presence is indicated for by the CSR Reform variable. See text, Section 3.2 for more details on the tort reform variable definitons.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. Regression models including state-specific linear time trends also include state and year fixed effects.

Appendix Table 4: Results of regressions that use the set of law variables used in Rubin and Shepherd (2007)

Dependent Variable: Omits Drug Overdoses as well as Auto Accidents

	Data Years: 1981-2000					Data Years: 1981-2004			
Specification:	State and Year Fixed Effects Only		State-Specific Linear Time Trends			State and Year Fixed Effects Only		State-Specific Linear Time Trends	
Standard Error Computation:	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State
Variable									
NED Cap, General	-0.0105	-0.0105	-0.0194	-0.0194	-0.0082	-0.0169	-0.0169	0.0014	0.0014
	[0.0137]	[0.0144]	[0.0161]	[0.0156]	[0.0145]	[0.0133]	[0.0149]	[0.0143]	[0.0132]
Cap on Punitive Damages (PD), General	-0.0078	-0.0078	-0.0011	-0.0011	-0.0043	-0.0146	-0.0146	-0.0173+	-0.0173
	[0.0101]	[0.0196]	[0.0112]	[0.0162]	[0.0151]	[0.0096]	[0.0203]	[0.0096]	[0.0143]
Higher Evidence Standard for PD, General	-0.009	-0.009	-0.0007	-0.0007	0.0056	-0.0131	-0.0131	0.005	0.005
	[0.0097]	[0.0158]	[0.0096]	[0.0122]	[0.0122]	[0.0092]	[0.0178]	[0.0092]	[0.0121]
Product Liability Reform	-0.0201*	-0.0201	-0.0088	-0.0088	-0.0031	-0.0045	-0.0045	-0.0047	-0.0047
	[0.0095]	[0.0163]	[0.0106]	[0.0141]	[0.0150]	[0.0088]	[0.0165]	[0.0104]	[0.0141]
Prejudgment Interest, General	-0.0592**	-0.0592*	-0.0245+	-0.0245	-0.0258	-0.0442**	-0.0442	0.0007	0.0007
	[0.0134]	[0.0291]	[0.0141]	[0.0165]	[0.0186]	[0.0139]	[0.0307]	[0.0125]	[0.0169]
CSR Reform, General, Mandatory Offset	0.0269*	0.0269	0.0448**	0.0448**	0.0350**	0.0257*	0.0257	0.0468**	0.0468**
	[0.0127]	[0.0224]	[0.0156]	[0.0109]	[0.0125]	[0.0127]	[0.0256]	[0.0147]	[0.0113]
CSR Reform, General, Discretionary Offset	0.0613**	0.0613**	0.0359**	0.0359*	0.0329+	0.0486**	0.0486*	0.0296*	0.0296**
	[0.0136]	[0.0225]	[0.0139]	[0.0158]	[0.0180]	[0.0138]	[0.0221]	[0.0126]	[0.0108]
JSL Reform, General, Any Reform	-0.0052	-0.0052	-0.0186	-0.0186+		-0.0092	-0.0092	-0.0356**	-0.0356**
	[0.0113]	[0.0167]	[0.0116]	[0.0108]		[0.0103]	[0.0206]	[0.0105]	[0.0104]
JSL Reform, General, Full Repeal					-0.0385*				
					[0.0150]				
Observations	1020	1020	1020	1020	1020	1224	1224	1224	1224
R-squared	0.93	0.93	0.96	0.96	0.96	0.92	0.92	0.95	0.95

Notes: Standard errors are in brackets.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".
Except in Appendix Tables B1 and B2, CSR reforms which do not allow offsets of payments made by private collateral sources are excluded from the set of CSR reforms whose presence is indicated for by the CSR Reform variable. See text, Section 3.2 for more details on the tort reform variable definitons.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. Regression models including state-specific linear time trends also include state and year fixed effects.

Appendix Table 5: Results of regressions that use the primary set of tort reform variables used in this paper

Dependent Variable: All Accidental Deaths Except for Auto Accidents (Log of Rate per 100,000 State Residents)

	Data Years: 1981-2000					Data Years: 1981-2004			
Specification:	State and Year Fixed Effects Only		State-Specific Linear Time Trends			State and Year Fixed Effects Only		State-Specific Linear Time Trends	
Standard Error Computation:	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State
Variable									
NED Cap, General	-0.0331*	-0.0331	-0.0369+	-0.0369	-0.0297	-0.0469**	-0.0469	-0.0148	-0.0148
	[0.0168]	[0.0270]	[0.0210]	[0.0301]	[0.0231]	[0.0166]	[0.0289]	[0.0188]	[0.0308]
Punitive Damages Reform, General	-0.0385**	-0.0385+	-0.0124	-0.0124	-0.0149	-0.0413**	-0.0413	-0.0271*	-0.0271+
	[0.0106]	[0.0193]	[0.0112]	[0.0104]	[0.0106]	[0.0114]	[0.0264]	[0.0111]	[0.0157]
CSR Reform, General	0.0444**	0.0444*	0.0461**	0.0461**	0.0397**	0.0319*	0.0319	0.0493**	0.0493**
	[0.0112]	[0.0216]	[0.0113]	[0.0100]	[0.0116]	[0.0127]	[0.0253]	[0.0115]	[0.0122]
JSL Reform, General, Any Reform	-0.0003	-0.0003	-0.0222+	-0.0222*		0.0094	0.0094	-0.0326**	-0.0326*
	[0.0112]	[0.0201]	[0.0132]	[0.0107]		[0.0120]	[0.0251]	[0.0125]	[0.0157]
JSL Reform, General, Full Repeal					-0.0232				
					[0.0222]				
NED Cap, Specific To Med Mal	0.0155	0.0155	0.0087	0.0087	0.0121	0.0252*	0.0252	-0.0046	-0.0046
	[0.0114]	[0.0286]	[0.0127]	[0.0174]	[0.0189]	[0.0125]	[0.0272]	[0.0115]	[0.0206]
Observations	1020	1020	1020	1020	1020	1224	1224	1224	1224
R-squared	0.83	0.83	0.91	0.91	0.91	0.82	0.82	0.9	0.9

Notes: Standard errors are in brackets.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".
Except in Appendix Tables B1 and B2, CSR reforms which do not allow offsets of payments made by private collateral sources are excluded from the set of CSR reforms whose presence is indicated for by the CSR Reform variable. See text, Section 3.2 for more details on the tort reform variable definitons.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. Regression models including state-specific linear time trends also include state and year fixed effects.

Appendix Table 6: Results of regressions that use the primary set of tort reform variables used in this paper

Dependent Variable: Omits Drug Overdoses as well as Auto Accidents

	Data Years: 1981-2000					Data Years: 1981-2004			
Specification:	State and Year Fixed Effects Only		State-Specific Linear Time Trends			State and Year Fixed Effects Only		State-Specific Linear Time Trends	
Standard Error Computation:	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State	Huber-White S.E.s	S.E.s Clustered by State
Variable									
NED Cap, General	-0.0037	-0.0037	-0.015	-0.015	-0.0064	-0.0152	-0.0152	-0.0024	-0.0024
	[0.0142]	[0.0174]	[0.0164]	[0.0154]	[0.0113]	[0.0131]	[0.0147]	[0.0145]	[0.0124]
Punitive Damages Reform, General	-0.0078	-0.0078	-0.008	-0.008	-0.0082	-0.0187*	-0.0187	-0.0155+	-0.0155
	[0.0094]	[0.0170]	[0.0102]	[0.0099]	[0.0100]	[0.0092]	[0.0196]	[0.0093]	[0.0107]
CSR Reform, General	0.0208+	0.0208	0.0430**	0.0430**	0.0374**	0.0167	0.0167	0.0440**	0.0440**
	[0.0109]	[0.0200]	[0.0130]	[0.0100]	[0.0104]	[0.0111]	[0.0225]	[0.0120]	[0.0089]
JSL Reform, General, Any Reform	-0.0125	-0.0125	-0.015	-0.015		-0.0104	-0.0104	-0.0336**	-0.0336**
	[0.0104]	[0.0171]	[0.0117]	[0.0095]		[0.0099]	[0.0210]	[0.0104]	[0.0088]
JSL Reform, General, Full Repeal					-0.0322**				
					[0.0114]				
NED Cap, Specific To Med Mal	0.0414**	0.0414	0.0168	0.0168	0.018	0.0388**	0.0388	0.0046	0.0046
	[0.0109]	[0.0257]	[0.0123]	[0.0103]	[0.0115]	[0.0114]	[0.0233]	[0.0088]	[0.0089]
Observations	1020	1020	1020	1020	1020	1224	1224	1224	1224
R-squared	0.93	0.93	0.96	0.96	0.96	0.92	0.92	0.95	0.95

Notes: Standard errors are in brackets.
+ significant at 10%; * significant at 5%; ** significant at 1%
"General" denotes that the tort reform applies in all or most types of tort suits, not just medical malpractice suits.
"Med Mal" stands for "Medical Malpractice"; "NED" stands for "Noneconomic Damages";
"CSR" stands for "Collateral Source Rule"; "JSL" stands for "Joint and Several Liability".
Except in Appendix Tables B1 and B2, CSR reforms which do not allow offsets of payments made by private collateral sources are excluded from the set of CSR reforms whose presence is indicated for by the CSR Reform variable. See text, Section 3.2 for more details on the tort reform variable definitons.

All regressions include the following control variables (coefficients and standard errors not reported): The percent of the state population that is age 4 or younger in that year, the percent of the state population that is age 65 or older, the percent of the state population that are males between the ages of 15 and 24, the percent of the state population this is African-American, the percent of the state population that belong to other racial minority groups, the unemployment rate, real per capita personal income, the number of hospital beds per capita, and per capita alcohol consumption. Regression models including state-specific linear time trends also include state and year fixed effects.