Tort Reform and Accidental Deaths

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Abstract

Theory suggests that tort reform could have two possible impacts on accidents. Reforms could increase accidents as tortfeasors internalize less of the cost of externalities and have less incentive to reduce the risk of accidents. Alternatively, tort reforms could decrease accidents as lower expected liability costs result in lower prices, enabling consumers to buy more risk-reducing products such as medicines, safety equipment, and medical services, and could result in consumers increasing precautions to avoid accidents. We test these effects by examining the relationship between tort reform and non-motor-vehicle accidental death rates using panel data techniques. We find that noneconomic damage caps, a higher evidence standard for punitive damages, product liability reform, and prejudgment interest reform are associated with fewer accidental deaths, while reforms to the collateral source rule are associated with increased deaths. Overall, the tort reforms in the states between 1981 and 2000 are associated with an estimated 24,000 fewer accidental deaths.

1. Introduction

Classical law and economics analysis of tort law treats torts as externalities. A well-functioning legal system creates incentives for potential tortfeasors to internalize the costs of the externalities by making injurers liable for damages if a tort actually occurs. This leads to efficient behavior under many circumstances (Brown 1973; Landes and Posner 1987; Shavell 1987, 2004). As a result, any tort reform that reduces the scope of liability could increase accident risk as potential tortfeasors internalize fewer costs.[1]

However, this premise depends on numerous assumptions. These include the

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[1] If liability is excessive, tort reform might be efficient, but in most cases it would still lead to increased risk.

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following: damages are pecuniary, not nonpecuniary; injurers and victims are strangers, and not in any preaccident contractual relationship; victims as well as injurers have incentives to take optimal precautions; the system operates costlessly; and actions of tortfeasors are harmful, not protective.

As modern liability has expanded to include product liability and medical malpractice and as the system has moved toward strict liability, these assumptions are increasingly subject to challenge. Damages are now equally pecuniary and nonpecuniary, so nonpecuniary damages (such as pain and suffering) are about one-half of all damage payments (Tillinghast-Towers Perrin 2002). For products liability and malpractice, victims and injurers are in a preinjury contractual relationship. The system is very costly to operate, with estimates of costs and fees of up to 54 percent of total spending (Tillinghast-Towers Perrin 2003). Only $.22 of every dollar that goes through the tort system is returned to consumers for compensation for economic damages. Liability for many types of accidents is strict, with negligence of victims increasingly less important in determining damages and liability.

Most important, many defendants in modern tort suits are actually engaged in reducing, not increasing, accident risk; this applies to makers of many products (medicines, protective equipment) and to physicians. For example, the American Association for Justice (AAJ) Web site lists "litigation groups," that is, "voluntary networks of AAJ members sharing an interest in a particular type of case."[2] As of June 13, 2007, there were 77 such groups; of these, 33 were directly related to health care providers, including categories such as birth trauma, health care disability, medical negligence, and pharmacy liability. Thus, 40 percent of the litigation groups represent health-related providers; the share of health spending in the economy is about 15 percent.

These factors operate together to challenge the very basis of tort law (Calfee and Rubin 1992). Because injurers and victims are often in a preinjury contractual relationship, victims will pay for potential damage payments ex ante in the form of higher prices. The ex ante payments must cover not only pecuniary damages but also nonpecuniary damages and administrative costs. As prices increase, consumers become less willing to pay for the goods and services covered by tort law. And because many of these goods and services would reduce risk, increasing tort liability may actually lead to increased, not reduced, accident risk.

In addition, unpredictable and high liability costs may make it difficult or expensive for potential injurers to obtain insurance for their own liability (Priest 1991). If liability insurance becomes very costly or is unavailable, suppliers may decide to stop supplying the goods and services altogether. Again, if these goods and services are risk reducing, increasing tort liability may increase accidents.

In contrast, tort reforms that decrease tort liability may make risk-reducing products more available and affordable, leading to a reduction in accidents. In

[2] American Association for Justice, Member Resources: Litigation Groups (http://www.atla.org/litgroups/index.aspx).

addition, tort reform may induce some accident victims to take more precautions because the amount of compensation in the event of an accident will be reduced. Increased victim precaution could also reduce accidents.

In this paper, we test whether tort reforms are associated with increases or decreases in accidents. Many aspects of the tort system and tort reform have been studied in detail.[3] The general findings are that tort reform reduces the number of lawsuits and amount of damages and has improved the profitability of insurance companies. Although no studies have examined the impact of tort reform on accidents, it is generally agreed by most economists that "if the liability system has a real purpose today, it must lie in the creation of incentives to reduce risk" (Shavell 2004, p. 268). If it does not reduce risk, then there is a real question about the social purpose of the modern American tort system.

Thus, to evaluate the merits of the tort system and decide on the benefits of tort reform, it is necessary to examine the relationship between tort reform and accidents. Section 2 explores the theoretical relationship between specific tort reform and accidents. Section 3 tests the relationship by investigating the association between tort reform and accidental death rates. Section 4 discusses implications and concludes.

2. The Relationship between Tort Reform and Accidents

In this section, we explore the relationship between tort reform and accidents. We begin with a general discussion of the opposing effects of liability reduction on accidents. Then we describe how some specific reforms should affect accidents.

2.1. General Relationship

Although a few states have had reforms in place for several decades, the enactment of tort reforms increased dramatically in the mid-1980s in response to rising insurance costs (Congressional Budget Office [CBO] 2004, p. vii).[4] Since 1986, states have enacted various combinations of tort reforms. Most state tort reforms are based on the premise that too many tort claims are filed and damage awards are too high. As a result, almost all reforms try to limit the number of cases filed or the damages awarded.

This reduction in expected liability may have two opposing effects on accidents. It may increase the number of accidents as tortfeasors internalize less of the cost of externalities and thus have less incentive to reduce the risk of accidents. In contrast, reduced liability may decrease the number of accidents for several reasons. First, the number of accidents may decrease if potential victims take more precautions. Because tort reforms lower the liability faced by injurers,

[3] It is common to use state data to examine various effects of tort reform on variables of interest. Congressional Budget Office (CBO) (2004) provides a useful summary of this research.

[4] The reforms were expected to lower insurance premiums by limiting liability exposure. Congressional Budget Office (2004, p. vii) reports that insurance premiums for some commercial policies fell by 40 percent in 1987, after increasing by 300 percent from 1984 to 1986.

victims must bear more of the costs of accidents. As a result, victims may take more precautions to avoid incurring higher accident costs.

Second, tort reform may decrease the number of accidents as lower liability costs result in lower prices, enabling consumers to buy more risk-reducing products and services. Because many potential injurers and victims, such as manufacturers and consumers, are in preinjury contractual relationships, injurers can pass along potential damage payments to victims in the form of higher prices. When tort reforms decrease potential damage payments, potential injurers may respond by lowering prices. Lower prices for risk-reducing products, such as safety equipment, medicines, or medical services, enable consumers to buy more, and as more consumers purchase more risk-reducing products, the number of accidents may decrease.

There is indirect evidence that is consistent with this hypothesis. Some studies have found that several different types of tort reforms have lowered liability costs by decreasing both lawsuits filed and damages awarded (Browne and Puelz 1999; Yoon 2001). Other studies have established that lower liability costs result in lower prices. For example, Manning (1994, 1997) finds that that reductions in liability costs result in lower prices for both vaccines and prescription drugs.

Finally, tort reform may decrease the number of accidents by increasing the supply of risk-reducing products. Tort reforms not only decrease liability costs, they also make liability costs more predictable. Lower, more predictable liability costs make it cheaper and easier for potential injurers to obtain insurance for their own liability (Priest 1991). Suppliers that were deterred from supplying products by the expense or lack of liability insurance before tort reforms may return to supplying goods and services when insurance becomes more available and affordable after tort reform. Once again, if the goods and services that become available after tort reform are risk reducing, then accidents may decrease after tort reform.

There is also evidence to support this hypothesis. Many studies find that tort reforms that reduce liability costs lower the cost of both medical malpractice and general liability insurance (Viscusi et al. 1993; Born and Viscusi 1994, 1998; Thorpe 2004; Viscusi and Born 2005). Other studies find that suppliers—in this case, doctors—base supply decisions on the existence of tort reforms, which lower insurance costs. For example, Klick and Stratmann (2003) find that tort reforms, in general, lead to increased numbers of physicians in a state. Mello and Kelly (2005) find that many physicians decide not to locate in a jurisdiction (in their case, Pennsylvania) because of high malpractice premiums. They find this effect for many classes of physicians, including those in emergency medicine. They also find that those physicians not leaving the state are less likely to practice high-risk specialties, including trauma care. Kessler, Sage, and Becker (2005) find an increase in the number of physicians in states that have adopted tort reform. In the specific case of emergency physicians, they find that "direct reforms led to increased growth in the supply of emergency medicine physicians of approximately 11.5%, almost 3 times the magnitude of the average nongroup effect

of 3.9%" (Kessler, Sage, and Becker 2005, p. 2622). These findings may be particularly relevant for our analysis of accidental deaths, for a lack of emergency physicians will cause more accidents to lead to death.

Our empirical analysis is unable to differentiate among the possible mechanisms through which tort reform affects accidents. Future work could explore which mechanisms are the most important.

2.2. Specific Tort Reforms

In the empirical section of this paper, we examine the relationship between accidental death rates and several different tort reforms: caps on noneconomic damages, caps on punitive damages, a higher evidence requirement for punitive damages, product liability reform, reforms to the prejudgment interest rule, reforms that allow courts to offset awards by the amount of collateral source payments, reforms that permit the admissibility of evidence of collateral source payments, or reforms to joint and several liability rules. We now describe each tort reform and the possible effects of the reforms on death rates.

Noneconomic damages are damages for nonpecuniary losses such as pain and suffering, loss of consortium, emotional distress, and other intangible losses. Nonpecuniary losses are real losses. However, in general they do not increase the marginal utility of wealth, and so consumers do not generally purchase insurance against this class of losses. Moreover, this class of damages involves no direct economic loss and has no precise value. Because of the intangibility of the losses and the lack of guidance from the courts on the value of the losses, jury awards for noneconomic damages are highly erratic. Proponents of tort reform claim that noneconomic damage caps would make the damages more predictable and reduce the excessive size of the awards, promoting both more efficient deterrence and ease of settlement. Moreover, reducing the unpredictability of damage awards may make provision of insurance easier and cheaper, and so some providers may be better able to purchase such insurance. This may also lead to increased supplies of risk-reducing goods and services.

Punitive damages are awarded not to compensate plaintiffs but to punish defendants for intentional and malicious conduct and to deter future conduct. Punitive awards are infrequent but have increased in frequency and size in recent years. As in the case of caps on noneconomic damages, proponents of tort reform claim that caps are needed to make punitive damages more predictable and less excessive. Again, this should improve the settlement process and achieve more efficient deterrence. In most states, reforms to punitive damages have taken one of two forms: caps on punitive damages or higher evidence requirements before punitive damages are awarded. (The U.S. Supreme Court has also limited punitive damages, finding that in most cases a "single digit multiplier" is appropriate, so that punitive damages cannot in general be larger than nine times actual damages; *State Farm Mutual Automobile Insurance Co. v. Campbell et al.,* 538 U.S. 408 [2003]).

Product liability law is intended to compensate consumers injured by defective products and deter manufactures from selling such products. Supporters of tort reform claim that many product liability laws do not send clear signals to manufacturers about how to avoid liability and hold manufacturers liable for defects that it was impossible for them to anticipate (ATRA 2005, p. 41). These laws may also reduce the incentive of consumers to take optimal precautions. Manufacturers may pass along liability risk to consumers in the form of higher prices, and manufacturers often choose to quit producing certain products altogether to avoid liability. Product liability reform is meant to alleviate these problems by imposing certain limits on manufacturers' liability and eliminating absolute liability, replacing it with a rule requiring a product defect in order for a plaintiff to collect.

Prejudgment interest is interest that accrues on losses from the time of a tort to the time damages are paid. Some of this interest is an actual cost to victims because if there had been no tort, then the victim could have earned interest. For example, a victim that covers his own medical costs until the injurer compensates him could have earned interest on the money. In addition, allowing prejudgment interest may encourage early settlements and reduce delay in the disposition of cases. However, proponents of tort reform claim that allowing prejudgment interest can result in overcompensation and punish defendants for delays they may not have caused. Also, recall that economic damages make up only 22 percent of total tort damages, so only one-fourth of prejudgment interest would be paid on economic damages. Thus, most reforms limit the interest rate and include offers of judgment provisions.

Collateral source rules prevent the admission of evidence at trial that shows that a plaintiff's losses have been compensated by other sources, such as insurance or workers' compensation. Such rules promote efficient deterrence by requiring tortfeasors to pay damages even when victims have received payments from a collateral source. However, proponents of tort reform claim that collateral source rules promote double recovery and result in higher insurance premiums. Reforms to collateral source rules include allowing evidence of collateral source payments or completely offsetting awards by the amount of collateral source payments. The result is that injured parties will collect from their own insurance companies, but injurers may not pay anything.

Joint and several liability means that any party who was involved in causing a tort may be responsible for the entire cost of the tort, no matter how small the contribution may be. Essentially, this allows plaintiffs to collect from deep pockets even if they were only marginal contributors. Although the standard rule protects the rights of plaintiffs to be fully compensated, it often fails to equitably distribute liability among defendants. It may also create an incentive for some defendants to settle to avoid becoming liable for the entire loss, which leaves others, who may be almost entirely blameless, liable for large damages. Most reforms to the standard joint and several liability rules involve some sort

of proportionate liability reform that limits exposure for those who played only a small part in causing the tort.

These tort reforms have the two opposing effects on accidents discussed above. That is, the reduction in liability should increase accident risk as potential tortfeasors internalize fewer costs. On the other hand, the reforms may decrease accident risk if they result in increased supply and lower cost of risk-reducing products or services, including medical care, or if they lead consumers to be more careful. Only empirical analysis will determine which effect dominates for each reform.[5]

3. Empirical Evidence of the Relationship between Tort Reform and Accidental Deaths

Next we test the theoretical relationship between tort reform and death rates discussed in Section 2. Figure 1 presents the average accidental, non-motor-vehicle death rates for the United States from 1980 to 2002.[6] We do not include motor vehicle death rates in our primary estimations for several reasons. These death rates are about one-half of all accidental deaths (National Safety Council 2004), but they are affected by many statutory changes in addition to tort reform, such as no-fault insurance laws (Cohen and Dehejia 2004) and changes in speed limits. Moreover, most tort reforms would have only indirect influence on motor vehicle tort law.

We provide two empirical analyses. First, we compare state death rates before and after tort reform and compare death rates in tort reform states to death rates in non-tort-reform states. Then we use panel data regressions to more systematically examine the relationship between tort reform and death rates. We also examine the sensitivity of our regression results to alternative specifications.

[5] In most tort cases, the accident occurs in the state where both the plaintiff and defendant reside. In these cases, courts apply the laws and remedies of that state. In contrast to other accident cases, product liability cases often involve residents of different states; in such cases, courts differ on which state's law to apply. Some states use the law of the state where the accident occurred, the lex loci delicti rule (in 1990, 14 states used the lex loci delicti rule; in 2003, only eight used this rule) (see Scoles et al. 2004). Other states use more flexible rules and consider which state has the most significant contacts with the parties and the content of the substantive laws of the contact states. In product liability cases, the relevant contacts are the plaintiff's state of residence, the state where the injury occurred, the state where the product was purchased, the state where the product was manufactured, and the principal place of business for the defendant. However, even in multistate products liability cases, most cases (76 percent) applied the law of a state with plaintiff-affiliating contacts; only 4 percent of the cases involved actual forum shopping, and 4 percent involved borderline forum shopping (Scoles et al. 2004).

[6] From 1981 to 2002, the non-motor-vehicle accidental deaths are 22 percent falls, 17 percent poisonings, 12 percent unspecified, 10 percent drownings, 10 percent suffocations, 9 percent fires, and 6 percent adverse effects to medical care or drugs (Centers for Disease Control, WISQARS Fatal Injuries: Leading Causes of Death Reports, 1981–2002 [http://www.cdc.gov/ncipc/leadcaus.html]).

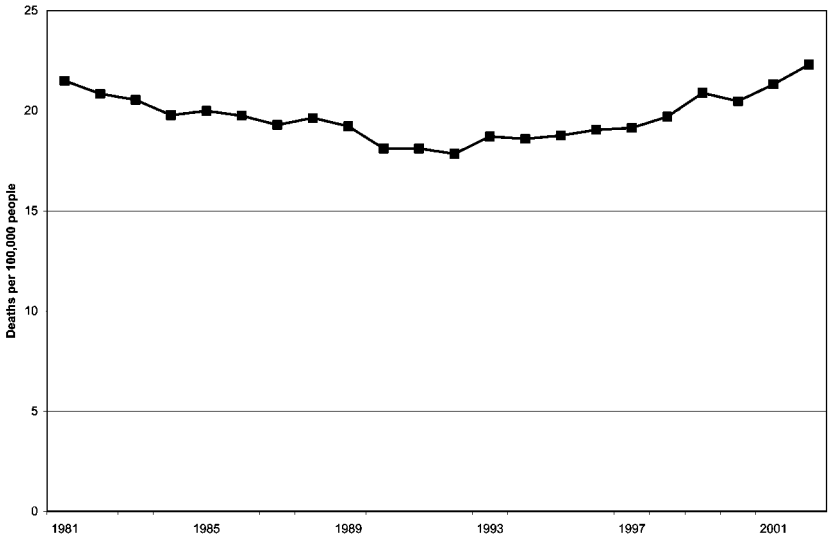

Figure 1. Accidental, non-motor-vehicle death rate: United States, 1981–2002

3.1. Death Rates before and after Tort Reform

Table 1 displays a comparison of death rate trends in the years before and after the enactment of certain tort reforms.[7] The table shows that death rates decreased in the years that five of the seven tort reforms were enacted.[8] For three of these reforms, death rates were increasing in the years prior to enactment but began decreasing the year after.

The table also reveals that tort reform states experienced larger than average decreases (or smaller than average increases) in accidental, non-motor-vehicle death rates in the years after five of the reforms were enacted. Prior to three of the reforms, the tort reform states had the opposite relationship with the average; they had experienced smaller than average decreases (or larger than average increases) in the years before the reforms were enacted.

This analysis controls for no other factors affecting death rates. The relationship between tort reform and death rates is tested more systematically in the next section.

3.2. Panel Data Regressions

Although the preceding analysis suggests an impact of some tort reforms on accidental deaths, it controlled for no other factors affecting death rates. To

[7] Because some states enacted the same tort reform more than once (that is, the second reform was enacted after the first was found unconstitutional), there may be more reforms enacted than states with each reform.

[8] The conclusions are the same if the mean percentage change is used instead of the median percentage change.

Table 1

Trends in Accidental, Non-Motor-Vehicle Death Rates before and after Tort Reforms

	Median % Change in Rates		Median % Change Difference in Rates		
Tort Reform	Year before Tort Reform	Year after Tort Reform	Year before Tort Reform	Year after Tort Reform	Times Enacted
Cap on noneconomic damages	3.37	−4.72	1.76	−2.56	15
Cap on punitive damages	1.07	−1.94	−.2	−2.47	20
Higher evidence standard for punitive damages	−.08	−.5	.29	−.36	32
Product liability reform	−.94	1.17	−.03	.31	25
Collateral source reform:					
Offset awards	.82	1.31	−.27	2.90	18
Admit evidence	2.17	−2.85	.57	−2.39	17
Prejudgment interest reform	−.4	−4.7	−.86	−2.24	14
Joint and several liability reform	−1.2	1.11	−.77	2.7	38

Note. The first column reports the change in death rates from 2 years to 1 year before each tort reform is enacted. The second column reports the change in death rates from the year before to the year after each tort reform is enacted. The third and fourth columns present the difference in the death rate changes between tort reform and non-tort-reform states. Specifically, we calculated the average percentage change in death rates in the year before and after each tort reform and then compared the change in death rates in each tort reform state to this average.

explore the relationship between tort reform and death rates more systematically, we use a state-level panel data set from 1981–2000.[9] We estimate regressions of the form

$$\ln(\text{DeathRate}_{st}) = \alpha + \beta \text{TORTREFORM}_{st} + \chi \boldsymbol{Z}_{st} + \delta_s + \phi_t + \varepsilon_{st}, \qquad (1)$$

where s indexes states and t indexes time. The left-hand-side variable is the logged accidental, non-motor-vehicle death rate, and $\boldsymbol{Z}$ is a vector of state-level controls that includes the unemployment rate, real per capita personal income, the percent of the state population that is African-American, the percent of the state population that belongs to another minority racial group, the percent of the state population that is age 4 or under, the percent of the state population that is age 65 or over, the percent of the state population that is male between the ages of 15 and 24, the per capita alcohol consumption, and the number of hospital beds per capita. The terms δ_s and ϕ_t represent state and year fixed effects. All regressions are weighted least squares with weights based on state populations. The variables and sources are described in the Appendix, and Table 2 presents the summary statistics for each variable.

The tort reforms we include are dummy variables for whether a state has a cap on noneconomic damages, a cap on punitive damages, a higher evidence requirement for punitive damages, product liability reform, reforms to the prejudgment interest rule, reforms that allow courts to offset awards by the amount of collateral source payments, reforms that permit the admissibility of evidence of collateral source payments, or reforms to joint and several liability rules.[10]

The coefficient estimates and standard errors for the tort reform variables are shown in the first row in Table 3.[11] The coefficients on five of the tort reform variables are negative and significant, which indicates that these reforms are associated with lower death rates.[12] The coefficients on the two collateral source reform dummy variables are positive and significant. This suggests that modification and abolishment of the collateral source rule are associated with higher death rates. This is an interesting result; Klick and Stratmann (2003) find that collateral source reform leads to higher infant mortality rates. No other reform

[9] Some of the variables are not available after 2000.

[10] States often pass several tort reforms at the same time. Therefore, estimating separate regressions for each tort reform variable would create bias if one dummy variable picks up the effect of another highly correlated dummy variable. These data do not include any updates based on Avraham (2006) because of the publication timing. Future work will include an updated version of the data.

[11] The coefficients (standard errors) of the control variables in the primary regression are unemployment rate: −.008* (.003); real per capita personal income: −.000005 (.000007); percent African-American: −.003 (.006); percent other minority: −.02* (.006); percent age 4 and under: .007 (.10); percent age 65 and over: .012 (.009); percent male age 15–24: −.004 (.012); per capita alcohol consumption: .057+ (.031); and hospital beds per capita: −48.57* (2.94). The asterisk indicates significance at the 5 percent level, and the plus sign indicates significance at the 10 percent level.

[12] When each tort reform is estimated in a separate regression, the results become even stronger, which possibly indicates that dummy variables are picking up the effects of other reforms. In the separate regressions, the dummy variable for a punitive damages cap is negative and significant. The punitive damages cap may have been significant in the separate regressions because of bias or it may be insignificant in the combined regression because of multicollinearity.

Table 2
Summary Statistics

Variable	Mean	Standard Deviation	
		Overall	Within State
Accidental, non-motor-vehicle death rate	19.48	3.31	2.0
Cap on noneconomic damages ($)	833,257.9	134,350.1	42,392.67
Unemployment rate	6.32	2.10	1.72
Real per capita personal income ($)	12,154.45	1,924.38	1,342.17
Percent African-American	12.35	8.03	.54
Other minority (%)	3.92	5.24	1.10
Age 4 and under (%)	7.39	.78	.39
Age 65 and over (%)	11.49	1.94	.64
Males aged 15–24 (%)	7.73	.89	.77
Per capita alcohol consumption	2.38	.45	.25
Hospital beds per capita	.003	.0008	.0006
Legal services per capita	.003	.002	.0005
Vote	47.82	9.71	8.41

Note. The values reported in the table are means of annual, state-level observations for the period 1981–2000. All values are population weighted averages. The summary statistics are based on 1,020 observations. See the Appendix for further details.

has consistent results in their paper. It is possible that, for this variable, the externality-increasing effect outweighs the safety-increasing effect. Note that other reforms reduce the amount of damage payments for a harmful event, while collateral source reform may lead to injurers paying nothing at all in certain circumstances. Thus, it may not be surprising that this reform is associated with larger injury-increasing effects than are other reforms. A more efficient reform might be increased subrogation (in which the injured party's insurance company pays the victim and then collects from the injurer), since this will maintain incentives for internalization while avoiding double compensation to victims.

We use the results from the primary regression in Table 3 to estimate real-world magnitudes of the relationship between tort reforms and death rates; the results of these computations are presented in Table 4.[13] As the table shows, the percentage changes in accidental deaths range between 2 and 5 percent, depending on the associated tort reform. However, even modest percentage changes translate into a substantial number of lives saved: we estimate that tort reforms

[13] The magnitudes are computed by comparing the number of accidental deaths in states with each type of tort reform to what this number would have been had there been no tort reform. The percentage difference in death rates between tort reform states and non-tort-reform states is $100[\exp(\beta) - 1]$, where β is each coefficient estimate (Wooldridge 2003, p. 226). For example, in 2000 there were 9,098 deaths in states with caps on noneconomic damages, but there would have been approximately 9,431 deaths if there had been no caps (9,098 is a 3.53 percent decrease from 9,431). Similarly, in 2000 there were 37,296 deaths in states with higher evidence standards for punitive damages, 31,860 deaths in states with product liability reform, 12,615 deaths in states with prejudgment interest reform, 20,855 deaths in states with reforms that allow courts to offset awards by the amount of collateral source payments, and 12,400 deaths in states with reforms that permit the admissibility of evidence of collateral source payments. To compute the total increase or decrease in deaths, we did the same calculations on the number of accidental deaths across all states and years that had each tort reform, instead of just 2000 deaths.

Table 3

Estimates of the Relationship between Tort Reform and Death Rates

Variable	Cap on Noneconomic Damages	Cap on Punitive Damages	Higher Evidence Standard for Punitive Damages	Product Liability Reform	Prejudgment Interest Reform	Collateral Source Reform		Joint and Several Liability Reform
						Offset Awards	Admit Evidence	
Primary model	−.036*	−.005	−.026*	−.039*	−.05*	.046*	.024+	.021
	(.013)	(.011)	(.009)	(.011)	(.014)	(.013)	(.013)	(.012)
Alaska excluded	−.035*	−.002	−.026*	−.042*	−.05*	.049*	.024+	.020
	(.013)	(.011)	(.009)	(.011)	(.014)	(.013)	(.013)	(.013)
Death rate includes motor vehicle deaths	−.018+	−.015+	.004	−.037*	−.026*	.010	.013	.027*
	(.009)	(.008)	(.007)	(.008)	(.010)	(.009)	(.009)	(.009)
Standard errors corrected for heteroskedasticity and autocorrelation	−.036*	−.005	−.026*	−.039*	−.051*	.046*	.024+	.021
	(.014)	(.016)	(.013)	(.015)	(.018)	(.018)	(.013)	(.017)
Level specification	−.731*	−.325	−.565*	−.750*	−1.07*	.667*	.519*	.408
	(.270)	(.236)	(.187)	(.232)	(.290)	(.278)	(.259)	(.269)
State-specific trends included	−.022+	−.004	.009	.0009	−.017	.035*	−.012	−.014
	(.012)	(.012)	(.009)	(.011)	(.016)	(.014)	(.012)	(.012)
State and year fixed effects only	−.021	−.0007	−.020*	−.039*	−.025	.068*	.050*	−.009
	(.014)	(.012)	(.010)	(.012)	(.015)	(.014)	(.014)	(.013)
Unweighted	−.021	−.016	−.030*	−.025*	−.036*	.031*	.019	.011
	(.016)	(.014)	(.011)	(.013)	(.016)	(.016)	(.015)	(.013)
Endogeneous tort reform variables	−.167*	−.261*	−.250*	−.316*	−.860*	.841*	.264*	−.411*
	(.073)	(.051)	(.065)	(.073)	(.320)	(.385)	(.058)	(.110)
1-Year lead of tort reform variables	.019	.022	.007	−.014	.045+	−.041+	−.023	.002
	(.022)	(.021)	(.015)	(.019)	(.027)	(.025)	(.025)	(.020)
2-Year lead of tort reform variables	.019	.010	.002	−.016	.012	−.049*	−.024	.027
	(.021)	(.022)	(.015)	(.019)	(.027)	(.024)	(.025)	(.019)
Tort reform variables indicate reforms in other states in the region	−.029*	−.004	.002	.053	.032*	−.028*	−.007	−.032*
	(.009)	(.010)	(.007)	(.001)	(.01)	(.01)	(.01)	(.012)

Note. Standard errors are in parentheses.

+ Significant at the 10% level.

* Significant at the 5% level.

Table 4

Real-World Magnitudes of the Relationship between Tort Reform and Death Rates

Tort Reform	Annual Death Rates (%)	Number of Deaths in 2000	Deaths across All Years
Cap on noneconomic damages	−3.54	−333	−5,242
Higher evidence standard for punitive damages	−2.57	−982	−11,798
Product liability reform	−3.83	−1,267	−16,841
Prejudgment interest reform	−4.88	−647	−9,060
Collateral source reform:			
Offset awards	+4.71	+938	+14,160
Admit evidence	+2.43	+294	+4,468
Net effect		−1,998	−24,314

Note. Values presented are average changes. These computations are based on the coefficients from the primary regression (Table 3) and the average annual populations and average annual death rates in the states that had each reform. The sums of the individual reforms differ by one from the net effects owing to rounding.

are associated with almost 2,000 fewer deaths in the year 2000.[14] Computed over all states and years that had each reform, tort reforms are associated with approximately 24,000 fewer deaths.[15]

3.3. Sensitivity Analysis

We also examine the sensitivity of the tort reform coefficients to a range of alternative specifications. Table 3 gives the coefficient estimates and standard errors from alternative specifications of the primary model. The table shows that the results of the primary model are robust to many different specifications.

First, we exclude Alaska to test the sensitivity of the results to eliminating states with high death rates; the mean death rate in Alaska is over 7 standard deviations above the population-weighted mean death rate of all states. Then we use all accidental deaths, including motor vehicle deaths, as the dependent variable in our estimations to test the robustness of our results to the type of accidental deaths used as the dependent variable. Next, we present Newey-West standard errors, where the error structure is assumed to be heteroskedastic and possibly autocorrelated up to lag(2).[16] Then we use the death rate, instead of

[14] The 95 percent confidence intervals for the increase or decrease in deaths associated with each tort reform in 2000 are as follows: cap on noneconomic damages (96–577 fewer deaths), higher evidence standard for punitive damages (313–1,664 fewer deaths), product liability reform (561–1,989 fewer deaths), prejudgment interest reform (288–1,016 fewer deaths), collateral source reforms that offset awards (424–1,439 more deaths), and collateral source reforms that allow admission of evidence of collateral source payments (18 saved and 599 more deaths).

[15] The 95 percent confidence intervals for the increase or decrease in deaths associated with each tort reform for all years are as follows: cap on noneconomic damages (1,512–9,069 fewer deaths), higher evidence standard for punitive damages (3,760–19,979 fewer deaths), product liability reform (7,450–26,438 fewer deaths), prejudgment interest reform (4,032–14,229 fewer deaths), collateral source reforms that offset awards (6,397–21,728 more deaths), and reforms that allow admission of evidence of collateral source payments (279 saved and 9,096 more deaths).

[16] The lag is estimated by $.75 \times T^{(1/3)}$ where T is the number of periods (Stock and Watson 2002).

the log of the death rate, as the dependent variable. Next, we include state-specific trends in the estimation. Subsequently, we exclude all controls except for state and year fixed effects. After that, we estimate unweighted panel data regressions, as opposed to population weighted.

Next we investigate the robustness of our results to the possible endogeneity of the tort reform variables. It is very unlikely that reverse causation is driving our primary results.[17] Several papers have concluded that the primary drivers of tort expansion and tort reform are the relative power of lawyers and businesses in a state, not death rates. (This literature is summarized in Rubin [2005]). If anything, increasing death rates should lead to more tort reform: increases in death rates increase tort claims, which should motivate potential defendants to fight for tort reform to lower liability damage payments. However, this relationship would cause a bias in the opposite direction of our results: we should find a positive relationship between tort reform and death rates, not a negative one. The ninth row presents results from an instrumental variables estimation using the following variables as instruments for the enactment of each tort reform: the percentage of the state legislature that was Republican and the per capita number of people employed in the legal profession.[18]

We also test whether the decrease in accidental deaths happened before the enactment of tort reform and thus cannot be attributed to tort reform. Estimations that include 1-year and 2-year leads result in a majority of statistically insignificant lead and lag coefficients, which suggests that accidental death rates did not begin decreasing in the years before tort reform.

Next we test whether tort reforms in one state affect death rates in another, nearby state. Interstate effects in the same direction as the state effects could be evidence of a broader regional force driving the relationship between tort reform and accidental deaths, or they could be evidence of spillover effects—perhaps people across the border will travel into the tort reform state to gain more access to medical care. Interstate effects in the opposite direction from state effects could be evidence of doctors moving to nearby tort reform states, which would decrease death rates in the tort reform states and increase death rates in the doctors' original states. In an estimation that includes dummy variables indi-

[17] Endogeneity tests confirm that ordinary least squares is a consistent estimator for equation (1) for all tort reforms.

[18] The instruments perform extremely well in the first-stage regressions. The *F*-statistics average over 16.0, and the instruments are positive and significant for most of the tort reform variables. Because of the impracticality of finding eight or more instrumental variables, we estimate a separate regression for each tort reform variable. Some bias is likely in separate regressions as dummy variables pick up the effect of other highly correlated dummy variables. Thus, we also perform an instrumental variables estimation in which the tort reform variable is one when a state has enacted any of the following tort reforms: a cap on noneconomic damages, a cap on punitive damages, a higher evidence requirement for punitive damages, product liability reform, reforms to the prejudgment interest rule, or reforms to joint and several liability rules; and zero otherwise. Using the same instruments, the coefficient on this combined tort reform variable is also negative and significant, with a coefficient of $-.70$.

cating whether any other state in the region[19] has each tort reform, although most coefficients are insignificant, the interstate effects are opposite to the state effects for three tort reforms and in the same direction as the state effects for one tort reform.

Finally, we estimate a separate regression to determine whether stricter caps with lower dollar limits have a stronger effect on death rates than more lenient caps with high dollar limits.[20] The coefficient on the amount of the cap on noneconomic damages is positive and significant.[21] This indicates that a cap with a lower dollar limit, or a more stringent cap, is associated with lower death rates.[22]

4. Conclusions

The U.S. tort system is a more significant economic factor than the tort system of any other country. It is estimated that the U.S. tort system costs about 2.3 percent of the gross domestic product (GDP); for no other country was the amount more than 1.3 percent of the GDP (Italy), and the average for all Organisation for Economic Co-operation and Development countries was .9 percent (Rubin 1995, using data from Tillinghast-Towers Perrin). It is an extremely expensive system and can be justified only if it provides substantial deterrence.[23] Our paper suggests quite the opposite: tort reforms are actually associated with increases in the number of accidental deaths.

Although the theoretical predictions about the relationship between tort reform and accidents is mixed, our empirical evidence suggests that several tort reforms—caps on noneconomic damages, a higher evidence standard for punitive damages, product liability reform, and prejudgment interest reform—are associated with decreases in accidental death rates. In contrast, reform of the collateral source rule is associated with increases in accidental death rates. Next we estimate that the tort reforms adopted in the states between 1981 and 2000 are associated with approximately 24,000 fewer deaths. The results are robust to several alternative specifications.

Our results suggest that certain reforms are needed to make the current tort

[19] We use the standard regional categories: South, Northeast, Midwest, and West.

[20] For the variable measuring the amount of the cap on noneconomic damages, states with no caps are assigned values equal to $1 more than the highest cap ($875,001). This variable is meant to represent the maximum amount a potential tortfeasor would expect to pay in damages. Thus, for states with no caps, this variable could actually take on values near infinity. To be more realistic about how much potential tortfeasors expect to pay, and to not bias the results by assigning huge values to no-cap states, we assign values that are only slightly higher than those of the cap states. Assigning even larger values does not change the sign or significance of the results.

[21] The coefficient (standard error) on the amount of the cap on noneconomic damages is .00000006 (.00000003) (significant at the 5 percent level).

[22] We do not have a variable measuring the amount of the cap on punitive damages because the state rules vary widely and apply in different situations and with different conditions.

[23] "Thus, the use of the liability system will be socially worthwhile if and only if the savings from accident reduction it brings about exceed its administrative costs" (Shavell 2004, p. 284).

system more effective. Proponents of tort reform should concentrate on caps on noneconomic damages, a higher evidence standard for punitive damages, product liability reform, and prejudgment interest reform. There should be less attention paid to collateral source reform, although improvements in the subrogation process may be able to eliminate double compensation and preserve incentives for safety.

There are also implications for further research. It is interesting and important to determine which mechanisms are driving the relationship between tort reform and accidents. In addition, although our methods apply only to state-level reforms, many tort laws have cross-state effects. For example, the prices of pharmaceutical and other safety-increasing products are set in a national market, so state-level reform variables would not capture the effects of reforms with a national impact. Our analysis suggests that such interstate effects are likely and may be worth measuring.

Appendix

Variables and Sources

Death Rate Data. Data on death rates are from the Centers for Disease Control and Prevention (2005).

Tort Reform Variables. Tort reform data are from the American Tort Reform Association. Most data are compiled in ATRA (2005). We made some updates and corrections to this data using ATRA Issues Pages (http://www.atra.org//issues/).

Unemployment Rate. Unemployment rate data were collected from U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics (http://www.bls.gov/cgi-bin/surveymost?la).

Income. Per capita income data were obtained from U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, State Annual Personal Income (http://www.bea.gov/bea/regional/spi/). The nominal data were changed into real data using a consumer price index series (with 1983/1984 as the base year); see U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index (http://data.bls.gov/cgi-bin/surveymost?cu).

Demographic Variables. Age, gender, race, and population data were compiled from U.S. Census Bureau, Population Division, Population Estimates (http://www.census.gov/popest/states/).

Per Capita Alcohol Consumption. This variable is the per capita ethanol consumption from beer, wine, and spirits for each state. It is obtained from National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism, Per Capita Ethanol Consumption for States, Census Regions, and the United States, 1970–2004 (Gallons of Ethanol, Based on Population Age 14 and Older) (http://www.niaaa.nih.gov/Resources/DatabaseResources/QuickFacts/AlcoholSales/consum03.htm).

Hospital Beds per Capita. Data on per capita beds in hospitals that are American Hospital Association members (excluding nursing homes) are compiled from American Hospital Association (2007, table 6).

Legal Services per Capita. This variable is the per capita number of employees engaged in legal services. Legal services include all for-profit and nonprofit establishments that are headed by members of the bar and are engaged in offering legal advice or legal services. The data are available from the U.S. Census Bureau, USA Counties (http://censtats.census.gov/usa/usa.html).

Voting Data. The data on voting in presidential elections are from Leip (2004).

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