

How Does Joint and Several Tort Reform Affect the Rate of Tort Filings? Evidence from the State Courts

Han-Duck Lee
Mark J. Browne
Joan T. Schmit

ABSTRACT

During the mid- to late-1980s, numerous state legislatures took the historically unusual step of passing general tort reform measures. These reforms were purportedly passed in order to alleviate the tort and insurance "crises," believed to be fueled by increases in both litigation frequency and in size of awards for personal injury. The most common reform involved some modification of joint and several liability. To test the impact of joint and several liability reform on litigation frequency, we conducted a regression analysis using data on tort filings for 19 states over a six-year period. Results indicate a strong statistically significant surge (increase) in filings during the last year in which cases could be brought under pre-reform liability rules. Only weak support for an overall reduction in filings is found (and that as a lagged effect). The effectiveness of the reforms, therefore, is unclear.

Introduction

During the 1980s, many states passed laws limiting the tort liability of potential defendants. Interest in these reforms was spurred by a perceived sharp increase in tort litigation during the early 1980s. The tort reform movement was also propelled by a crisis due to the unavailability of many types of liability insurance during the mid-1980s and continuing concerns that the tort system hinders the international competitiveness of U.S. businesses.

The most frequently passed reform involved modification of joint and several liability rules. Thirty-three states adopted some form of joint and several

Han-Duck Lee is Research Analyst, Mark J. Browne is Assistant Professor of Insurance, and Joan T. Schmit is American Family Insurance Professor of Risk Management and Insurance, all at the University of Wisconsin-Madison.

The authors gratefully acknowledge the advice and suggestions of Dan R. Anderson, Edward W. Frees, Marc Galanter, two anonymous referees, and the editor. Thanks are also due the American Tort Reform Association and the National Center for State Courts for providing data.

liability reform between 1985 and 1989.¹ These activities reflected public attitudes about the importance of reforming joint and several liability, as evidenced by a survey conducted by Alexander and Alexander (1989), which found that risk managers ranked modification of joint and several liability as second in importance among 58 legislative and regulatory risk management issues. The purpose of the research reported here is to test the hypothesis that joint and several liability reform legislation passed during the 1980s functioned as intended by reducing the rate of tort filings in state courts.

Under the doctrine of joint and several liability, two or more defendants are together held financially responsible for a plaintiff's injury, and each defendant individually may be held financially responsible for the full value of the harm (Schmit, Anderson, and Oleszczuk, 1991). Various researchers have expressed positive and negative views on the use of joint and several liability. The debate has centered largely on the sometimes conflicting goals of encouraging safety, equitably distributing financial responsibility, and compensating injured parties. A discussion of these issues is found in Schmit, Anderson, and Oleszczuk (1991).

Evaluating the arguments over joint and several liability is difficult because of the paucity of data regarding its use and the contradictory nature of the information that does exist. Three studies indicate that joint and several liability is a significant concern to insurers because the doctrine is involved in a substantial number of insurance claims and adds unpredictability to claims outcomes. Barker (1991) found that states with limited availability of joint and several liability demonstrated lower insurer risk than states without such limitations. Her results coincide with a recent Insurance Services Office (ISO) (1988) Closed Claim Study, in which respondents indicated that 15 percent of all claims, and 33 percent of large claims (those in excess of \$25,000), involved multiple defendants. Viscusi et al. (1993) found some evidence that joint and several liability reforms were related to decreases in general liability insurance losses and premiums.

In contrast, Schmit, Anderson, and Oleszczuk (1991) found that only a small fraction of reported cases between 1963 and 1990 even mentioned "joint and several liability." The discrepancy between these and other findings results from variations in the types of data each study employed. Schmit, Anderson, and Oleszczuk's data base included only litigated cases that reached the National Reporter System (generally those cases that involve an appeal and thus a written judicial opinion). The data bases examined by Barker, the ISO, and Viscusi et al. included insurer claims, which incorporate settled cases and those that ended at the jury trial stage, but exclude cases with noninsured defendants.

This study tests empirically whether state reform of joint and several liability rules enacted during the period 1985 through 1989 reduced the rate of tort filings. The next section briefly introduces the uses of joint and several liability.

¹ Data on tort reforms were obtained from the American Tort Reform Association (1991). Prior to this period, legislatures gave little or no attention to the doctrine of joint and several liability.

ty. A general discussion follows of the economic expectations of how reform will affect litigation frequency. Empirical analyses assessing the validity of those expectations is then presented, with major findings of the study and suggestions for future research concluding the article.

Joint and Several Liability Applications and Reforms

Applications

Joint and several liability, like so many U.S. legal doctrines, originated in England. Its initial purpose was to deal effectively with tortious conduct of two or more parties done “in concert.” Typically, such conduct would involve collusion, fraud, embezzlement, or similar activities. Concerted behavior was believed to involve each party wholly, and thus each party is held responsible for the actions of the group. Joint and several liability continues to be employed in concerted action cases.

The doctrine also may be invoked when two or more parties together cause a single indivisible harm, even when each wrongdoer acted independently of the other(s). For example, consider a situation in which two motorists illegally and simultaneously run a red light at a busy intersection. They each hit and badly injure a third motorist. Analysis of the accident indicates that if each negligent motorist had acted alone, the same extent of damages would have occurred. In this scenario, the courts may consider the harm indivisible, and thereby utilize joint and several liability to hold each defendant fully responsible for the harm, although the plaintiff's total compensation from all defendants cannot exceed the court judgment.

Schmit (1989) states that these two situations—concert of action and indivisible harm—continue to be the most common uses of joint and several liability. Some courts, however, go further, using recent innovations such as market share and industry-wide (or enterprise) liability.² These innovations may yield one of the following results. Under industry-wide liability, it is argued that members of an industry acted in concert to cause a dangerous situation. For example, all members may use a particular safety standard that is discussed at trade meetings. If the standard is determined to be unsafe, then the industry members may be considered to have created the hazard jointly.³ Using the industry-wide liability standard, therefore, the court may hold that each member of the industry contributed to the harms caused by its action in proportion to its relative market share.

The same result may be achieved through a different argument when market share liability is employed. Under this theory, individual members of an industry are believed to have acted independently, but each also acted “wrongly.” Because determination of who actually caused the harm is impossible or nearly so, the courts hold each member responsible for its respective market share. If

² Each of which may be used under different terminology (see Friedland, 1984).

³ See *Hall v. E.I. duPont de Nemours & Co.*, 345 F. Supp. 353 (E.D.N.Y. 1972).

a particular company can prove it could not have caused the harm (by not being in the market at the time of injury, for instance), it pays nothing.⁴ Abraham (1992) argues that these legal innovations are attempts to equalize and standardize the legal process for both plaintiffs and defendants, and thereby reduce uncertainty.

More than these innovations, however, most of the expressed concern over joint and several liability has been in its application to pollution liabilities, particularly those imposed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) (which regulates the cleanup of hazardous waste sites, including the liability for such cleanups) and other governmental environmental regulations. Since CERCLA allows for joint and several liability, a generator of waste that disposes of a single drum of toxins could be forced to pay the entire cleanup cost at a hazardous waste dump site, even though thousands of such drums were dumped at the site by hundreds of waste generators. The case of *U.S. v. Conservation Chemical Co.* 628 F. Supp. 391 (W.D. Mo. 1985) is illustrative. The Environmental Protection Agency (EPA) originally sued just seven parties for compensation of cleanup costs at a particular site. Those seven parties, in turn, brought litigation against 152 generators, 16 insurers, and 14 federal agency defendants (cited in Schmit, 1989). Apparently, the seven original defendants were the "deep pockets" available to the EPA. If the other parties are without assets, these seven may be required to pay for the entire cleanup cost at the site.

Reforms

In response to the concern that joint and several liability is a major contributor to an increasingly litigious and risky business environment, many states have passed joint and several liability reforms. These new laws, like the application of the rule, vary greatly.

The most common form of joint and several liability reform is to limit its application in awarding noneconomic, or "general," damages, which are awarded for harms other than the costs of medical care, lost income, and property damage. They include pain and suffering, mental anguish, and similar non-physically-obvious harms. When this type of reform is used, defendants may still be severally liable for economic damages (medical expenses, lost wages, property damage) but not for noneconomic damages. The apparent intent is to provide assurance that an injured plaintiff is paid for his or her out-of-pocket expenses even if some defendants are insolvent, while limiting the "deep pocket" syndrome to the more-difficult-to-measure noneconomic damages. Legislators may believe that the lure of large general damage awards (which typically equal or exceed the specific damage awards) encourage lawyers and injured parties to litigate more often than is desirable. General damages are also difficult to prove or disprove. These types of reforms appear to be potentially ef-

⁴ The classic case of market share liability is *Sindell v. Abbott Laboratories*, 26 Cal. 3d 588, 607 P.2d 924, 163 Cal. Rptr. 132, cert. denied, 449 U.W. 912 (1980).

fective in decreasing tort litigation regardless of the form of joint and several liability involved. The key determinant of the success of the reforms is the extent to which large general damages encourage litigation against multiple defendants in hopes of finding a deep pocket.

A second reform pattern limits the application of joint and several liability when defendants are together less than 50 percent at fault or less at fault individually than the plaintiff. This type of reform aims to limit the number of situations in which a slightly-at-fault defendant must pay for the entire amount or a large portion of the damages. A concept of “fairness” seems to underlie this type of reform. Legislators likely perceive that too often plaintiffs who contributed significantly to their own harms find deep pockets to pay for those harms. Such a reform may be especially effective if market share liability rules are in force, where many defendants may be sued, each one contributing only a small percentage of the harm. Recent evaluations of market-share liability, however, indicate that the doctrine has seen only limited application. Although plaintiffs have asked courts to employ the doctrine in a number of settings, they have generally been unsuccessful outside of its original use in diethylstilbestrol (DES) cases.⁵

Policy Implications

Reforms of joint and several liability affect the frequency of tort filings by reducing the expected return of such actions (as discussed more fully below). In turn, reforms also affect the general policy objectives of encouraging safety, equitably distributing financial responsibility, and compensating injured parties, as discussed in Schmit, Anderson, and Oleszczuk (1991). By imposing full liability on any single actor, joint and several liability may encourage greater or lesser (Katzman, 1988) safety than would exist without it. Landes and Posner (1980) present requisites for appropriate incentives and conditions when incentives are inappropriate. The complexity of the system does not permit one to say *a priori* if a decrease in tort filings represents an increase, decrease, or no change in the safety structure of the process.

Joint and several tort reform also has important policy implications for the compensation objective of the tort system. Reform is believed to promote fairness by encouraging the placement of financial responsibility in proportion to fault rather than ability to pay. In addition, limited use of joint and several liability brought about by reform may result in lower compensation to injured parties. A change in claiming behavior as a result of joint and several liability reform is suggestive of lower compensation to injured parties.

Very few, if any, of the reforms completely abolish the use of joint and several liability. Of the 33 states that have passed joint and several liability reforms, only four completely eliminated use of the doctrine.

⁵ Birnbaum and Crawford (1993) provide an interesting discussion of the limits placed on the use of various innovative “market share” liability theories.

Economic Effects of Reform

Numerous studies on the economic analysis of law apply economic models to the legal system to analyze the behavior of the participants involved (e.g., Bebchuk, 1988; Cooter and Rubinfeld, 1989; Danzon and Lillard, 1983; Gould, 1973; Landes, 1971; Posner, 1973; Shavell, 1982; Viscusi, 1986). The decision to seek or drop litigation typically is treated as a function of the expected cost and benefit of claiming.⁶ If the expected benefit to the injured party of filing a claim exceeds the expected cost, the claim will be made.

Thus, the plaintiff's decision involves comparing the subjective expected value of filing a claim to the subjective expected cost of a claim. In this type of decision-making model, joint and several liability reform will reduce claim frequency if it reduces the subjective expected value of the claim or increases the subjective expected cost of pursuing the claim. Reform will reduce the expected value of the claim by decreasing the probability of full payment to the plaintiff if one or more of the defendants is unable to pay. With joint and several liability available, defendant insolvency is irrelevant as long as one defendant holds sufficient assets to pay the judgment or settlement. Reform will increase the expected cost of the claim if the plaintiff must prove the relative fault of each of several defendants (assuming that the same defendants would be named in the suit, which might not be accurate).

A counter effect may be possible, however, if reform reduces incentives for defendant safety. A defendant who experiences a limitation in liability through joint and several reform will have lower incentive to be safe. Therefore, claim frequency would rise if the safety incentives outweigh the claiming incentives. Restrictions on the use of joint and several liability may also lead to an increase in litigation as plaintiffs may be forced to bring separate legal actions against each tortfeasor in order to collect the value of all harms.

A recent Florida case illustrates the uncertainty over the effect of joint and several liability reform. According to Barbara W. Green, a spokesperson for the Academy of Florida Trial Lawyers, the court ruling which upheld Florida's joint and several reform

is going to lead to an increase in litigation, not a decrease, which the Legislature intended. . . . It forces the plaintiff to sue everybody that might conceivably be at fault, which means insurers could end up defending policyholders in more cases . . . [and] settlements will be discouraged (Wolcick, 1993).

Whether joint and several liability results in a reduction or an increase in litigation is an empirical question and is the focus of this study.

⁶ Other models explaining claiming behavior include the fault-and-equity model, the attribution-as-justification model, and the social influence, norms, and scripts model (see Hensler et al., 1991).

Empirical Analysis

Model Specification and Data Description

To test the effect of joint and several reform on litigation frequency this study employs a unique data set that contains information from 19 states for the period 1984 through 1989. Data on tort filings are provided by the National Center for State Courts (NCSC), which began collecting this information in 1984. The NCSC request for information was sent to all 50 states and the District of Columbia; the 19 states that responded comprise our sample. Information on tort reform legislation was provided by the American Tort Reform Association.

The 19 states included in the study are roughly representative of the country as a whole. The states come from all regions of the United States and vary widely in geographic and demographic characteristics (see Table 1).

To test whether reform of joint and several liability rules has affected the rate of litigation, the following model was estimated:

$$F_{it} = a_0 + a_1x_{1it} + a_2x_{2it} + a_3x_{3it} + \dots + a_nx_{nit} + e_{it}, \quad i = 1, \dots, 19 \quad t = 1, \dots, 6,$$

where F_{it} = the number of tort filings per 100,000 people in state i during year t ,

x_{1it} = 1 if state i had a joint and several tort reform law in effect during year t that totally abolished joint and several liability and 0 otherwise,

x_{2it} = 1 if state i had a reform law in effect during year t that was less than a total abolition and 0 otherwise,

x_{3it} = 1 if state i had any other tort reform measures in effect during year t and 0 otherwise,

x_{4it} through x_{nit} = control variables believed to affect the rate of tort filings,

a_1 through a_n = the estimated coefficients of the model,

e_{it} = the random error term, and

a_0 = the intercept.

The x_{1it} and x_{2it} indicator variables test the relationship between joint and several tort reform and the rate of tort filings. Each variable takes the value 1 in the year of enactment and every year thereafter unless the law was later repealed or found unconstitutional, when it again takes on the value of 0. That is, the value of 1 is assigned to the variable if the corresponding tort reform is in effect that year.

Other tort reforms amended the collateral source rule, placed caps on non-economic damages, placed caps on punitive damages, and penalized those who brought frivolous suits and defenses. The possibility exists that the effect of these reforms on the incentive for defendants to take safety precautions will subsume the effect of reducing the plaintiff's subjective expected value of filing a claim. The intent of such reforms appears, however, to be reduced litigation; therefore, the x_{3it} variable is expected to be negatively related to the rate of claim filings.

Table 1
Joint and Several Liability Reform
in the Sample States

<i>State</i>	<i>Description</i>	<i>Effective Date</i>
Alaska	Partial	June 11, 1986
	Total	March 5, 1989
Arizona	Partial	December 31, 1987
California	Partial	June 4, 1986
Colorado	Total	July 1, 1986
	Partial	July 1, 1987
Florida	Partial	July 1, 1986
Hawaii	Partial	August 4, 1986
Idaho	Partial	July 1, 1987
Kansas	None	---
Maine	None	---
Maryland	None	---
Michigan	Partial	October 1, 1986
Montana	Partial	July 1, 1987
New Jersey	Partial	December 18, 1987
New York	Partial	July 30, 1986
North Dakota	Partial	July 8, 1987
Ohio	Partial	January 5, 1988
Texas	Partial	September 1, 1987
Utah	Total	April 28, 1986
Washington	Partial	April 4, 1986

Source: American Tort Reform Association (1991).

Note: Partial = partial abolition of joint and several liability. Total = total abolition of joint and several liability. None = no joint and several liability reform passed.

Control Variables

Tort litigation falls into four major categories: products, medical malpractice, automobiles, and all other causes of injury. In order to control for factors that may affect rates of tort litigation in each of these areas, six environmental and three economic variables are included in the model. The six environmental variables are the number of lawyers per capita, the percentage of the population living in urban areas, population density, the number of surgical operations per capita, the number of vehicle miles of travel per mile of roadway, and the no-fault auto law with verbal and/or dollar thresholds.⁷ The economic variables are the percentage of gross state product from manufacturing and construction, the maximum total disability workers' compensation weekly benefit, and the state unemployment rate. Lastly, a time variable was included.

Number of lawyers per capita. A positive relationship is expected between the number of lawyers per capita and the rate of tort filings. Robinson (1986) states that, other things being equal, an increase in the number of lawyers will decrease the cost of legal services and thus increase the number of filings.

⁷ The original model specification considered hospital costs per day, the percentage of the population aged 18 to 64, population density, median state income, and number of active physicians and/or surgeons. However, high multicollinearity between independent variables was detected when these variables were included, and, therefore, they were dropped.

Danzon (1986a, 1986b), Sloan (1985), and Zuckerman, Bovbjerg, and Sloan (1990) tested this hypothesis and found conflicting results. Sloan found that the number of lawyers per capita had a positive impact on medical malpractice premiums. In contrast, Danzon and Zuckerman, Bovbjerg, and Sloan found that attorney density did not increase medical malpractice claim frequency.

Although the Danzon and Zuckerman, Bovbjerg, and Sloan results may better reflect reality because their models are more complete, the possibility remains that the size of the legal community has an impact on the rate of litigation. Number of lawyers per capita is included in the analysis to control for this potential effect.

Population living in urban areas. Urbanization is expected to be positively correlated with the rate of tort filings. Because urban areas typically are centers for medical delivery, as well as a great variety of industrial and personal activities, the number of injuries and resulting claims are expected to be higher than in rural areas. Danzon (1986a, 1986b) found a positive and statistically significant relationship between medical malpractice claim frequency and urbanization. However, Zuckerman, Bovbjerg, and Sloan (1990) found the relationship to be not statistically significant.

Population density. Population density accounts for the effect of the social and physical interaction among people on the rate of tort filings. A positive relationship is expected because the greater the population density, the more potential contacts or activities between parties and the more potential injuries and resulting litigation.

Surgical operations per capita. The number of surgical operations per capita is used to measure the state's health service activities. It is expected that the more surgical operations performed in the state, the higher the number of malpractice claims (Danzon, 1986a, 1986b; Coyte, Dewees, and Trebilcock, 1991; Feldman, 1979; Zuckerman, Bovbjerg, and Sloan, 1990).

Vehicle miles of travel per mile of roadway. The number of vehicle miles of travel per mile of roadway, a measure of traffic congestion, is used to account for auto-related incidents. This variable is expected to have a positive relationship with the rate of tort filings because higher traffic density is expected to lead to more accidents and lawsuits.

No-fault auto insurance law. A no-fault auto insurance dummy variable is included to account for an expected decrease in auto-related accident lawsuits where relatively strict no-fault laws have been enacted (i.e., those with verbal or dollar thresholds of \$1,000 or more). No-fault auto insurance allows the policyholder to recover losses for bodily injury from his or her own insurer, regardless of fault. No-fault laws provide for the payment of first-party benefits and restrict the right to sue with verbal or dollar thresholds. Witt and Uruttia (1983) find that no-fault laws may reduce premiums or increase benefits, yet often do not improve insurer predictability. Cummins and Tennyson (1994) provide evidence that no-fault laws reduce the rate of bodily injury liability claims frequency. Those findings are consistent with the hypotheses set forth here.

Gross state product from manufacturing and construction. The percentage of a state's gross state product attributable to manufacturing and construction

is expected to be positively correlated with the rate of tort filings. Manufacturing and construction are major sources of liability, accounting for 70 percent of all product liability premiums (Viscusi, 1991).

If the percentage of manufacturing business is high, more products will be produced with the resulting potential for more litigation, and more industrial activity will result in more liability disputes between employers and employees and between employers and suppliers of workplace products. Similarly, the high risk construction business has significant potential for work-related disputes and tort claims.

Maximum workers' compensation weekly benefit. The relationship between the maximum total disability workers' compensation weekly benefit and the rate of tort filings is indeterminate, *a priori*. If workers receive sufficient payments through the workers' compensation system to compensate for their injuries, they may seek no additional indemnification through the tort system. Conversely, employers and employers' insurers are more inclined to seek compensation through the tort system from responsible third parties when workers' compensation costs are greater. Thus, workers' compensation benefits may have either a positive or negative relationship with the rate of tort filings.

State unemployment rate. The state unemployment rate is included to account for an income effect on the rate of tort filings. A positive relationship with the rate of tort filings is expected. Danzon (1986a, 1986b) has observed that, when economic conditions are bad and the unemployment rate is high, the opportunity cost of time for lawyers and injured parties is relatively low. This results in an increase in personal injury and disability claims. Furthermore, because plaintiffs are less likely to have first-party insurance coverage for medical losses through their employers, they may be more willing to seek compensation through the tort system.

Previous empirical tests of this hypothesis have had mixed results. Cummins and Tennyson (1994) found that unemployment rates have a significant positive effect on fraudulent auto liability insurance claims, suggesting that unemployment is related to a willingness to invest in seeking compensation for losses. On the other hand, Danzon (1986a, 1986b) and Zuckerman, Bovbjerg, and Sloan (1990) found no systematic relationship between frequency of medical malpractice claims and the unemployment rate.

Time. Time is used to detect any changes in the rate of tort filings due to any consistent temporal trend. It is believed that as society grows over time, for instance, the propensity of people to litigate—and, hence, the rate of tort filings—increases.

Munger (1987) hypothesizes that larger, more industrialized societies rely on litigation to resolve conflict more than smaller, less industrialized ones. In addition, Coyte, Dewees, and Trebilcock (1991) argue that changes in culture, attitude, and information availability might increase the propensity of people to litigate. Therefore, a positive relationship between the time variable and the rate of tort filings is expected. Furthermore, if, as alleged, there was a "litigation explosion" during the period 1984 through 1989, a strong positive relationship between the time variable and the rate of tort filings is expected.

Descriptions of all variables used in this study and their expected relationships with the rate of tort filings are summarized in Table 2. Descriptive statistics for the variables used in the analysis are provided in Table 3.

Table 2
Descriptions and Sources of Variables Used in the Empirical Analysis

<i>Variable</i>	<i>Description</i>	<i>Expected Relationship</i>
<i>Dependent Variable</i>		
Filings	Tort filings per 100,000 population (National Center for State Courts, 1991).	
<i>Independent Variables</i>		
Tort Reforms	(American Tort Reform Association, 1991)	
JS	Joint and several liability reform	—
JS1	Limited abolition of joint and several	—
JS2	Total abolition of joint and several	—
OTHERS	Other tort reforms regarding collateral source rules, noneconomic damages, punitive damages, and frivolous lawsuits or defenses	—
<i>Control Variables</i>		
LAWYRPOP	Number of lawyers per capita (American Bar Association, 1985, 1988, 1991).	+
URBAN	Percentage of the population living in urban areas (U.S. Department of Commerce, various years)	+
DENSITY	Population density per ten square miles of land (U.S. Department of Commerce, various years)	+
SURPOPUL	Number of surgical operations per capita (American Hospital Association, 1985-1989)	+
VEHIMILE	Thousands of vehicle miles per mile of roadway (U.S. Federal Highway Administration, 1984-1990)	+
NOFAULT	No-fault auto insurance law with a verbal threshold and/or a dollar threshold of \$1,000 or more (Insurance Information Institute, 1989-1990)	—
%GSP	Percentage of gross state product from manufacturing and construction (U.S. Department of Commerce, 1988, 1991)	+
WCMAX	Maximum workers' compensation weekly benefit in dollars (U.S. Chamber of Commerce, 1985-1991)	+/-
UNEMPLOY	State unemployment rate (%) (U.S. Bureau of Labor Statistics, annual)	+
TIME	Linear time trend, 1984 = 1 and 1989 = 6	+
JS1SURGE	Surge effect of JS1	+
JS2SURGE	Surge effect of JS2	+

Modeling Variations

Figure 1 illustrates the average rate of tort filings for the 16 states in the sample that passed joint and several tort reform during the study period. The graph is a time continuum from two years prior to enactment of a joint and several liability reform law to one year following enactment of such legisla-

Table 3
Variable Descriptive Statistics (N = 114)

<i>Variable</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
<i>Dependent Variable</i>				
FILINGS	250.1000	137.0000	72.200	752.200
<i>Independent Variables</i>				
<i>Tort Reforms</i>				
JS	0.4500	0.5000	0.000	1.000
JS1	0.3400	0.4800	0.000	1.000
JS2	0.1100	0.3100	0.000	1.000
OTHERS	0.3900	0.4900	0.000	1.000
<i>Control Variables</i>				
LAWYRPOP	275.2100	61.0900	187.920	473.480
URBAN	69.2470	24.7140	18.900	100.000
DENSITY	1666.3000	2423.0000	9.000	10430.000
SURPOPUL	853.9000	109.8000	647.500	1148.900
VEHIMILE	650.8000	512.0000	63.000	1899.000
NOFAULT	0.3509	0.4794	0.000	1.000
%GSP	20.9980	6.0710	10.130	35.260
WCMAX	347.0000	180.0000	189.000	1140.000
UNEMPLOY	6.2940	1.7360	2.600	11.200
TIME	3.5000	1.7154	1.000	6.000

Note: Variable descriptions are provided in Table 2.

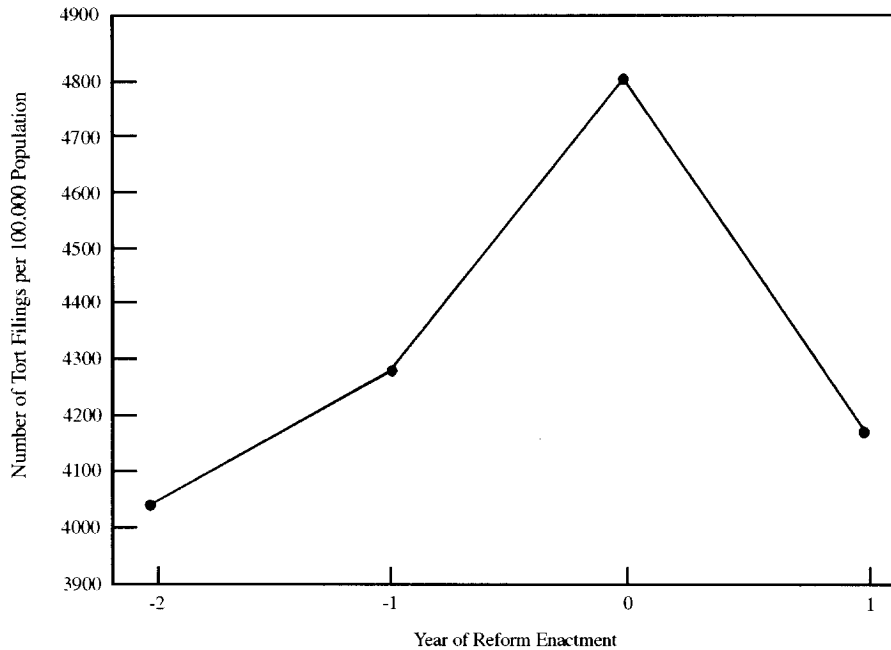
tion. A sizable jump in the number of filings occurs on average during the last year in which claims could be filed under the pre-reform joint and several liability rules. Following the effective date of the reform, the number of claim filings falls almost to pre-reform levels.

To control for this one-time surge in tort filings, a second test with two additional variables was performed. The first variable takes the value of 1 for the last year in which pre-reform litigation could be filed in states that completely abolished joint and several liability. Otherwise, it takes a value of 0. The second variable takes the value of 1 for the last year in which pre-reform litigation could be filed in states that enacted joint and several tort reform that was less than a complete abolition. Otherwise, it takes a value of 0. The use of two variables allows for a test of whether the enactment of different forms of joint and several reform were associated with different surge effects.⁸

Because of constitutional challenges to the reforms and ignorance of the effect of the reform, the impact of joint and several liability reform on claim frequency may not occur until several years after the reform is enacted. Therefore, a third version of the test equation was estimated, in which the joint and

⁸ Tests for surge effects linked to other tort reforms indicate that this effect is unique to joint and several liability reform for the data set studied.

Figure 1
Average Tort Filings Per Year for
States Passing Joint and Several Liability Reform



several reform indicator variable was lagged two years. For instance, if the tort reform was enacted in 1984, the joint and several reform indicator variable would take the value of 0 for all years prior to 1986.⁹ The indicator variable for other tort reforms was also lagged two years.

Robustness was tested by estimating the model under a variety of statistical assumptions. A one-way fixed effects model, a one-way random effects model, and a random effects first-order autoregressive model were estimated. The major findings were similar in all models. The random effects first-order autoregressive model estimation is reported here (see Hsiao, 1986, or Judge et al., 1985, for further discussion). Generalized least squares was used to estimate each model, because the observations over time are correlated due to the common random effects term.

Empirical Estimation of the Test Equation

The estimated parameters and test statistics for the three models are presented in Table 4. The models explain over 60 percent of the variation in claim

⁹ A model with the variable lagged one year was also estimated. Since the results were very similar and the model with a two-year lag provided a slightly better fit, the model with the one-year lag is omitted here.

filings. Tests of the covariance matrix indicate that significant multicollinearity does not exist among the variables.¹⁰

Table 4
Empirical Estimation of the Test Equations

Variable	Model 1		Model 2		Model 3	
	Parameter Estimate	T-Statistic	Parameter Estimate	T-Statistic	Parameter Estimate	T-Statistic
LAWYRPOP	-0.48	1.35	-0.52	2.03 ⁺	-0.46	1.17
URBAN	0.96	0.81	1.53	1.81 ⁺⁺	1.69	1.18
DENSITY	0.04	3.37 ⁺	0.04	4.84 ⁺	0.03	2.31 ⁺
SURPOPUL	-0.28	1.96 ⁺	-0.35	3.16 ⁺	-0.33	2.04 ⁺
VEHIMILE	0.03	0.55	0.02	0.57	0.08	1.12
NOFAULT	-16.76	0.57	-29.69	1.31	-26.48	0.91
%GSP	1.36	0.42	1.54	0.67	2.77	0.71
WCMAX	0.13	1.35	0.14	1.81 ⁺⁺	0.20	2.06 ⁺
UNEMPLOY	20.47	2.44 ⁺	20.16	2.88 ⁺	17.58	2.05 ⁺
TIME	5.49	0.75	15.77	2.33 ⁺	15.02	2.37 ⁺
CONSTANT	239.37	1.29	251.42	1.81 ⁺⁺	161.05	0.77
JS1SURGE			53.90	3.29 ⁺		
JS2SURGE			7.80	0.20		
OTHERS	-24.00	1.10	-39.38	2.04 ⁺		
JS1	55.60	2.56 ⁺	23.08	1.07		
JS2	8.28	0.24	-10.68	0.29		
OTHERSLAG2					-14.00	0.50
JS1LAG2					-50.39	1.72 ⁺⁺
JS2LAG2					-20.10	0.58
R2 %		68.0		71.9		62.9

Note: Variable descriptions are provided in Table 2.

⁺ Significant at the 0.05 level ⁺⁺ Significant at the 0.10 level

Lawyers per capita and urbanization are significantly related to the rate of tort filings in the second model only. Population density, however, is highly significant in all three models. The results suggest that the number of claim filings in a state is better explained by the state's population density than by the percent of the state population living in urban areas or by the number of lawyers per capita.

Contrary to what was hypothesized, the number of surgical operations per capita has a negative and statistically significant relation to claim filings in each of the equations. Earlier studies that had focused exclusively on medical malpractice suggested a positive relationship.

The percentage of gross state product attributable to manufacturing and construction was not statistically significant in any of the equations. Because

¹⁰ All variance inflation factors fall below five. Factors of ten are considered acceptable. Furthermore, when variables suspected of multicollinearity (urbanization and traffic density) are omitted, the substantive results of the process do not change.

product liability claims are only a small portion of total liability claims, the effect of this variable may be masked in the analysis.

The maximum weekly workers' compensation disability benefit is statistically significant in the second and third models, supporting the hypothesis that employers and insurers are more likely to pursue subrogation against responsible third parties when workers' compensation losses are relatively higher. It should be noted, however, that Alaska is highly influential in the analysis. When Alaska is excluded, this variable was not significant.¹¹

As hypothesized, the number of claim filings increases with the unemployment rate. This may be attributable, in part, to the lower opportunity cost of pursuing legal action during periods of slack economic activity.

Vehicle miles of travel per mile of roadway and no-fault auto insurance laws are not statistically significant in any of the equations. Time is statistically significant in the second and third models.

The coefficient of the indicator variable for "other" tort reforms is statistically significant only in the second model. In this model, passage of other reforms shows a negative and statistically significant relation to the rate of claim filings. This result provides some evidence that the other tort reforms may have reduced litigation.

The first equation, which does not control for the surge in claims, suggests that joint and several reform led to an increase in the rate of claim filings rather than a decrease as many advocates of reform hypothesized. This increase occurred in states that enacted reform legislation that fell short of a complete abolition of joint and several liability. Those states that enacted a complete abolition experienced neither a significant increase nor decrease in the rate of claim filings. This equation also suggests that the other tort reforms enacted were not effective. Because this equation did not control for the surge in claims in the year of reform enactment, the results must be interpreted with care.

The second equation, which specifically controls for the enactment year surge in claims, indicates a positive and statistically significant increase in claims during the last year in which claims could be filed under the pre-reform liability rules. This occurred in states that enacted less than a complete abolition of joint and several liability. The surge was not significant in states that enacted a complete abolition of joint and several liability. When the surge in claims is controlled for, the effect of joint and several reform is no longer statistically significant.

In the third equation, the lagged variable indicating modification, rather than abolition, of joint and several reform is marginally significant. The lagged variable indicating abolition is not statistically significant.

In sum, the analysis provides weak evidence that state laws modifying joint and several liability rules have reduced claim filings. The reforms are found to

¹¹ The results of the analysis were not significantly different when the *maximum weekly workers' compensation disability benefit* variable was excluded.

be associated with a surge in claims during the last year in which the pre-reform rules were in effect.

Alternative Methodology

A concern with the preceding methodology is that insufficient control for factors other than tort reform may bias the results. To test the robustness of the findings, a second methodology is employed. A disadvantage of this alternative methodology is that the number of observations is reduced to 19, the number of states in the sample.

Adapting Viscusi et al.'s (1993) methodology that tested for the effect of tort reform on insurer underwriting profitability, legal claim filings in 1989 may be modeled as¹²

$$\text{Filings}_{i89} = a_0 + a_1 \text{Filings}_{i85} + a_2 (\text{GSP}_i 89/85) + a_3 \text{Reform}_i + e_i,$$

where Filings_{i89} = the number of filings in state i during 1989,

Filings_{i85} = the number of filings in state i during 1985,

$\text{GSP}_i 89/85$ = the ratio of state i 's gross state product in 1989 to its gross state product in 1985,

Reform_i = a vector of tort reform indicator variables,

a_0 = the model's intercept term,

a_1 , a_2 , and a_3 = coefficients, and

e_i = the error term.

In the first version of this model, the vector Reform_i contains five variables. Separate variables are included to indicate whether joint and several reform was enacted in 1986, 1987, 1988, or 1989. The fifth variable indicates whether any other tort reforms were enacted during this period. The second version of the model has only two tort reform variables. The first indicates whether joint and several tort reform was enacted at any time during the period 1986 through 1989; the second indicates whether any other tort reforms were enacted during this period.

The model assumes that a state's 1989 filings differ from 1985 filings by only a random error term with mean zero if the gross state product did not change between 1985 and 1989 and if no tort reform was enacted. Thus, this model tests for an income effect (growth in gross state product) and a price effect (tort reforms) on the rate of tort filings.

The estimated parameters of the two models are presented in Table 5. In both models, the logged 1985 rate of filings demonstrates a statistically significant and positive relationship with the 1989 rate of tort filings. The percentage change in gross state product shows a positive significant relationship in the second model. Reforms—either joint and several reforms or other—however,

¹² Like Viscusi et al., the analysis discussed here actually tests the relationship between the log of filings in 1989 to the log of filings in 1985, the log of the ratio of gross state product in 1989 to the gross state product in 1985, and the passage of tort reforms. Using logs allows interpretation of the reform variables in percentage terms.

generally show no relationship with the rate of tort filings. The single exception is the 1989 joint and several liability reform. However, only the state of Alaska is coded as having passed a joint and several reform in 1989. The findings are consistent with the results of the earlier analysis.

Table 5
Regressions of Logged Tort Filings with Annual and
Aggregate Joint and Several Liability Reforms

Variable	Annual		Aggregate	
	Parameter Estimate	T-Statistic	Parameter Estimate	T-Statistic
Intercept	-0.526	0.89	0.261	0.37
Log of 1985 Filings	1.128	8.27*	0.871	6.80*
Percentage Change in Aggregate Income	-0.498	0.58	1.295	2.26*
JS Reform			-0.032	0.18
JS Reform 1986	-0.086	0.52		
JS Reform 1987	0.020	0.15		
JS Reform 1988	-0.091	0.60		
JS Reform 1989	-1.159	2.73*		
Other Reforms	0.073	0.41	0.165	0.77
Adjusted R ²	0.865		0.768	

* Statistically significant at the 99 percent confidence interval, one-tailed test.

Conclusion

Thirty-three states enacted laws modifying joint and several liability between 1985 and 1990 as part of a continuing movement to decrease litigation through reform of the tort system. Evidence from state court statistics provides weak evidence that joint and several liability reform has decreased the rate of claim filings. One would expect reduced filings to indicate a closer link between fault and responsibility, less compensation to injured parties, and ambiguous effects on safety (deterrence).

The current study finds a statistically significant association between changes in joint and several liability rules and a surge in claims during the year of enactment. No claim surge was found in states that abolished joint and several liability. The surge may indicate a response in claiming behavior to the reform. Additional research on this question is warranted, especially because the rapid rise and fall in claims was not statistically associated with the group of other reforms passed during this time period.

Several possible explanations exist for why joint and several liability reform is not more strongly associated with reduced case filings. First, the joint and several reforms have been in effect for only a few years. The full effect of the reforms may emerge over time. Second, despite the findings of Barker (1991) and Viscusi et al., (1993) of some impact of joint and several liability on insurer outcomes, the number of joint and several liability claims is only a por-

tion of total claims. The effect of the reforms on the total number of claim filings may therefore be muted. Third, the laws may be too weak to affect filings in any significant way; or perhaps courts are applying the laws in a manner favorable to plaintiffs. Fourth, these reforms may diminish the deterrence effect of the tort system and lead to an increase in injuries and an offsetting increase in claim filings. Fifth, joint and several reform may in some situations lead to an increase in the number of filings. As a result of joint and several reform, injured parties may need to file several claims to be fully compensated rather than one against a deep pocket.

This analysis suggests that the other tort reforms, which were controlled for as a group, may have an effect on the rate of claim filings. Analysis of the individual effects of these tort reforms is a worthwhile topic for future research. Because this analysis was limited to 19 states and six years of data, future research that can expand the size of the data set to include more states and more years would be of great value.

References

- Abraham, Kenneth S., 1992, What Is a Tort Claim? An Interpretation of Contemporary Tort Reform, *Maryland Law Review*, 51: 172-204.
- Alexander and Alexander, 1989, *1989 National Risk Management Survey*, Volume 3 (New York: Alexander and Alexander).
- American Bar Association, 1985 and 1988, *Lawyer Statistical Report: A Statistical Profile of the U.S. Legal Profession in the 1980s* (Chicago: ABA).
- American Bar Association, 1991, *Supplement to the Lawyer Statistical Report: The U.S. Legal Profession in 1988* (Chicago: ABA).
- American Hospital Association, 1985-1989, *Hospital Statistics* (Chicago: AHA).
- American Tort Reform Association, 1991, *Tort Reform Record* (Washington, D.C.: ATRA).
- Barker, Drucilla K., 1991, An Empirical Analysis of the Effects of Product Liability Laws on Underwriting Risk, *Journal of Risk and Insurance*, 58: 63-79.
- Bebchuk, Lucian Arye, 1988, Suing Solely to Extract a Settlement Offer, *Journal of Legal Studies*, 17: 437-450.
- Belsley, David A., Edwin Kuh, and Roy E. Welsch, 1980, *Regression Diagnostics* (New York: John Wiley).
- Birnbaum, Sheila L. and Gary E. Crawford, 1993, Market-Share Acceptance Is Still Limited, *National Law Journal*, September 20: 22.
- Childs, Blair, 1989, Are Torts Destroying Our Courts? *Business and Society Review*, Winter (68): 38-42.
- Cooter, Robert D. and Daniel L. Rubinfeld, 1989, Economic Analysis of Legal Disputes and Their Resolution, *Journal of Economic Literature*, 27: 1067-1097.
- Coyte, Peter C., Donald N. Dewees, and Michael J. Trebilcock, 1991, Canadian Medical Malpractice Liability: An Empirical Analysis of Recent Trends, *Journal of Health Economics*, 10: 143-168.
- Cummins, J. David and Sharon Tennyson, 1994, The Tort System Lottery and Insurance Fraud: Theory and Evidence from Automobile Insurance, Working Paper, University of Pennsylvania, Philadelphia.
- Danzon, Patricia M., 1986a, New Evidence on the Frequency and Severity of Medical Malpractice Claims, *Rand Corp. Report R-3410-ICJ* (Santa Monica, Cal.: RAND).
- Danzon, Patricia M., 1986b, The Frequency and Severity of Medical Malpractice Claims: New Evidence, *Law and Contemporary Problems*, 49: 57-84.
- Danzon, Patricia M. and L. Lillard, 1983, Settlement Out of Court: The Disposition of Medical Malpractice Claims, *Journal of Legal Studies*, 12: 345-377.
- Feldman, Roger, 1979, Determinants of Medical Malpractice Incidents: Theory of Contingency Fees and Empirical Evidence, *Atlantic Economic Journal*, 7 (July): 59-65.

- Friedland, Ellen, 1984, Pollution Share Liability: A New Remedy for Plaintiffs Injured by Air Pollutants, Note, *Columbia Journal of Environmental Law*, 9: 297-320.
- Gould, John, 1973, The Economics of Legal Conflicts, *Journal of Legal Studies*, 2: 279-300.
- Hensler, Deborah R., Mary E. Vaiana, James S. Kakalik, and Mark A. Peterson, 1987, Trends in Tort Litigation: The Story Behind the Statistics, *Rand Corp. Special Report R-3583-ICJ* (Santa Monica, Cal.: RAND).
- Hensler, Deborah R., M. Susan Marquis, Allan F. Abrahamse, Sandra H. Berry, Patricia A. Ebener, Elizabeth G. Lewis, E. Allan Lind, Robert J. MacCoun, Willard G. Manning, Jeannette A. Rogowski, Mary E. Vaiana, 1991, *Compensation for Accidental Injuries in the United States*, Rand Corp. Report R-3999-HHS/ICJ (Santa Monica, Cal.: RAND).
- Hsiao, Cheng, 1986, *Analysis of Panel Data*, Econometric Society Monographs, No. 11 (Cambridge: Cambridge University Press).
- Hughes, James W. and Edward A. Snyder, 1989, Evaluating Medical Malpractice Reforms, *Contemporary Policy Issues*, 7: 83-98.
- Insurance Information Institute, 1989-1990, *Property/Casualty Insurance Facts* (New York: III).
- Insurance Services Office, 1988, *Claim File Data Analysis* (New York: ISO).
- Judge, George G., W. E. Griffiths, R. Carter Hull, Helmut Lutkepohl, and Tsoung-Chao Lee, 1985, *The Theory of Econometrics* (New York: John Wiley).
- Katzman, Martin T., 1988, Joinder of Defendants and Induced Innovation in Environmental Torts, *Environmental Law*, 19: 37-57.
- Landes, William M., 1971, An Economic Analysis of the Courts, *Journal of Law and Economics*, 14: 61-107.
- Landes, William M. and Richard A. Posner, 1980, Joint and Multiple Tortfeasors: An Economic Analysis, *Journal of Legal Studies*, 9: 517-555.
- Miller, Anthony H., 1983, Extending the Fairness Principle of *Li* and *American Motorcycle*: Adoption of the Uniform Comparative Fault Act, *Pacific Law Journal*, 14: 835-867.
- Munger, Frank W., 1987, Social Change and Tort Litigation: Industrialization, Accidents, and Trial Courts in Southern West Virginia, 1872 to 1940, *Buffalo Law Review*, 36: 75-118.
- National Center for State Courts, 1991, *Court Statistics Project, State Court Caseload Statistics: Annual Report 1981* (Williamsburg, Va.: NCSC in cooperation with the Conference of State Court Administrators), 163-165.
- Posner, Richard A., 1973, An Economic Approach to Legal Procedure and Judicial Administration, *Journal of Legal Studies*, 2: 399-458.
- Priest, George L., 1987, The Current Insurance Crisis and Modern Tort Law, *Yale Law Journal*, 96: 1521-1590.
- Robinson, Glen O., 1986, The Medical Malpractice Crisis of the 1970s: A Retrospective, *Law and Contemporary Problems*, 49: 5-35.
- Salop, Steven C. and Lawrence J. White, 1986, Economic Analysis of Private Antitrust Litigation, *Georgetown Law Journal*, 74: 1001-1064.

- Schmit, Joan T., 1989, Historical Development and Use of Joint and Several Liability, *CPCU Journal*, 42 (September): 144-151.
- Schmit, Joan T., Dan R. Anderson, and Timothy K. Oleszczuk, 1991, An Analysis of Litigation Claiming Joint and Several Liability, *Journal of Risk and Insurance*, 58: 397-417.
- Schwartz, Victor E., 1986, Tort Reform and the Liability Crisis, *The Legal System Assault on the Economy The Insurance Crisis, Tort Reform, and Alternative Solutions*, Volume 3 (Washington, D.C.: National Legal Center for the Public Interest).
- Shavell, Steven, 1982, Suit, Settlement, and Trials: A Theoretical Analysis Under Alternative Methods for the Allocation of Legal Costs, *Journal of Legal Studies*, 11: 55-81.
- Sloan, Frank A., 1985, State Responses to the Malpractice Insurance "Crisis" of the 1970s: An Empirical Assessment, *Journal of Health Politics, Policy and Law*, 9 (Winter): 629-646.
- Smith, Brian, W., 1989, Reexamining the Cost Benefits of No-Fault, *CPCU Journal*, 42 (March): 28-36.
- U.S. Bureau of Economic Analysis, 1988, 1991, *Survey of Current Business* (Washington, D.C.: U.S. Department of Commerce).
- U.S. Bureau of Labor Statistics, annual, *Geographic Profile of Employment and Unemployment* (Washington, D.C.: U.S. Government Printing Office).
- U.S. Chamber of Commerce, 1985-1991, *Analysis of Workers' Compensation Laws* (Washington, D.C.: U.S. Government Printing Office).
- U.S. Department of Commerce, various years 1986-1993, *Statistical Abstract of the United States* (Washington, D.C.: U.S. Government Printing Office).
- U.S. Department of Justice, 1986, Tort Policy Working Group, *Report of the Tort Policy Working Group on Causes, Extents and Policy Implications of the Current Crisis in Insurance Availability and Affordability* (Washington, D.C.: U.S. Government Printing Office).
- U.S. Department of Justice, 1987, Tort Policy Working Group, *An Update on the Liability Crisis* (Washington, D.C.: U.S. Government Printing Office).
- U.S. Federal Highway Administration, 1984-1990, *Highway Statistics* (Washington, D.C.: U.S. Government Printing Office).
- Viscusi, W. Kip, 1986, The Determinants of the Disposition of Product Liability Claims and Compensation for Bodily Injury, *Journal of Legal Studies*, 15: 321-346.
- Viscusi, W. Kip, 1991, The Dimensions of the Product Liability Crises, *Journal of Legal Studies*, 20: 147-177.
- Viscusi, W. Kip, Richard J. Zeckhauser, Patricia Born, and Glenn Blackmon, 1993, The Effect of 1980s Tort Reform Legislation on General Liability and Medical Malpractice Insurance, *Journal of Risk and Uncertainty*, 6: 165-186.
- Weisberg, Herbert and Richard A. Derrig, 1991, Fraud and Automobile Insurance: A Report on Bodily Injury Liability Claims in Massachusetts, *Journal of Insurance Regulation*, 9: 497-541.

- Witt, Robert C. and Jorge Urrutia, 1983, A Comparative Economic Analysis of Tort Liability and No-Fault Compensation Systems in Automobile Insurance, *Journal of Risk and Insurance*, 50: 631-669.
- Wojcik, Joanne, 1993, Florida Rulings Cap Liability, *Business Insurance*, 27 (September 6): 2, 43-44.
- Zuckerman, Stephen, Randall R. Bovbjerg, and Frank Sloan, 1990, Effects of Tort Reforms and Other Factors on Medical Malpractice Insurance Premiums, *Inquiry*, 27: 167-182.