

The Effect of 1980s Tort Reform Legislation on General Liability and Medical Malpractice Insurance

W. KIP VISCUSI

Department of Economics, Duke University, Durham, NC 27708

RICHARD J. ZECKHAUSER

Kennedy School of Government, Harvard University, Cambridge, MA 02138

PATRICIA BORN

Department of Economics, Duke University, Durham, NC 27708

GLENN BLACKMON

Delta Pacific, Olympia, WA 98501

Abstract

A large number of states adopted tort reforms in the mid-1980s to limit the dramatic surge in insurance losses and premiums. Evidence based on liability insurance data by state indicates that these reforms substantially influenced general liability insurance. The levels of losses, premiums, and loss ratios (a measure of insurance profitability) all reflected the impact of the reforms. The large-scale reform efforts in 1986 were particularly influential. Medical malpractice insurance was much less sensitive to the reform efforts.

Key words: tort reform, general liability insurance, medical malpractice

Liability insurance markets in the mid-1980s were in disarray, with rapidly escalating awards and significant company losses. Substantial pressures were exerted on state legislatures to ease the burdens imposed by liability costs, and the policy process responded in many states. In this article, we examine the effect of those reforms. In particular, we seek to discover whether the tort reforms enacted in the mid-1980s had any effect on the claims paid by insurance companies or the premiums paid by consumers.

This inquiry into the effects of the tort reforms indicates that the performance of general liability insurance was quite sensitive to the liability regime. States that adopted liability reforms experienced increases in insurance profitability, decreased levels of losses, and lower premiums. Although some specific reforms, such as modifications of joint and several liability, appear to be particularly influential, the general change in the liability climate that accompanies the reform effort also appears to be of consequence. The effects of tort reform on medical malpractice insurance proved less pronounced.

1. Insurance market performance and the impetus for liability reform

Liability insurance coverage pays claims that relate to tort litigation. In most situations, such claims are settled out of court.¹ From 1975 to 1979 the number of product liability cases in the federal courts rose fivefold, from 2,393 to 13,408. What was most impressive about this increase was not the fact that litigation increased, but rather that this increase was highly concentrated over a narrow time period. In particular, in the single year 1984 to 1985, there was an increase in litigation of 7,677 product liability cases in the federal courts to 12,507 cases.

Although litigation provides one indicator of trends in liability costs, the ultimate concern of corporations is the price tag associated with these claims. With general liability insurance, which includes liability for all injuries arising out of the property or manufacturing operations of firms, premiums rose from \$3.1 billion in 1975 to \$19.1 billion in 1988. More remarkable than this sixfold increase in premium levels over 13 years is that almost the entire increase in premiums was concentrated in a two-year period, as general liability premiums rose from \$6.5 billion in 1984 to \$11.5 billion in 1985 and \$19.4 billion in 1986. Even this explosion in premiums probably understates the real increase in liability costs, because there is widespread evidence that insurance coverage was being denied altogether to some would-be insureds.

The rise of asbestos litigation and hazard warnings cases accounted for much of the increase in general liability insurance costs, but there was also substantial cost pressure in the medical malpractice area. Medical malpractice premiums escalated by 56% from 1984 to 1985 and an additional 26% from 1985 to 1986.² Put somewhat differently, this two-year period accounted for 62% of the total growth in medical malpractice premiums from 1981 to 1990.

Other lines of insurance experienced increases as well, but not so great as in the products liability and medical malpractice area. For example, the largest single year premium increase experienced in the past decade for commercial automobile insurance was the 25.6% rise in premiums from 1985 to 1986.³

Affected firms responded to this increase in liability costs by pressuring state legislatures to pass liability reform laws that would limit their insurance costs. The majority of states responded by enacting tort reform of some kind, though states differed significantly in the measures they implemented. States responded with reform legislation, despite a general lack of understanding about how the existing liability rules affected insurance markets or how specific reforms might change their performance.

Indeed, there was some skepticism about the ability of a state to affect insurance cost and availability, and about the relevance of liability rules in a particular state to insurance cost and availability within it. For example, some legal scholars have speculated that, irrespective of the liability statutes that are adopted in the particular state, the courts may simply adjust their interpretation of the standard so that the net effect of the statutory change will be minimal. Moreover, the insurance industry has traditionally placed little emphasis on state differences. In the case of product liability coverage, for example, ratemaking is done on a national basis rather than on a state basis because state differences are believed to be less important than the more systematic industry differences.⁴

The 1980s flurry of liability reforms has, however, stimulated academic research into their likely effect. Viscusi (1990, 1991) examines the effect of state differences in liability statutes on the performance of liability insurance. The statutory provisions considered included a product liability statute, a statutory provision for a state-of-the-art defense, a statute of limitations for producer liability, collateral source rules, and damages rules. This examination of the effect of statutory provisions on losses, premiums, loss ratios, and the amount of insurance coverage written using the individual ratemaking files of the insurance industry suggested that these measures had substantial effects. In particular, both the profitability and availability of insurance were enhanced by measures that limited firms' liability, as one would expect.

Blackmon and Zeckhauser (1991) examined the performance of three lines of liability coverage—general liability, medical malpractice, and automobile insurance—in the critical period of the mid-1980s when most of the liability reform measures were enacted. Over the 1985–1988 period they studied, they found that liability reforms were particularly instrumental in influencing the performance of general liability and medical malpractice insurance, but not automobile insurance. The absence of an effect on automobile liability insurance performance is consistent with the general perception that the locus of the liability crisis has been in the general liability and malpractice areas rather than the more traditional kinds of coverage for auto accidents, which have not been much affected by the changes in liability standards.

This article extends the analysis of Blackmon and Zeckhauser (1991), which examines the natural experiment of the mid-1980s reforms and their impact on the differences in insurance performance between the years 1985 and 1988. We refine and extend their approach in several ways. First, our examination of the liability reform efforts considers reform measures enacted in 1985, 1986, and 1987, as well as the influence of the liability structures that were in place before the crisis emerged. Second, we consider not only the influence of the liability reforms, but also the role of insurance rate regulation. States differ in the degree to which they regulate the prices charged for insurance coverage. Third, we employ a number of econometric refinements that may more accurately distinguish the role of the liability reform efforts.⁵

Section 2 provides an overview by state of the various reform efforts undertaken in the mid-1980s. Section 3 describes the sample characteristics and the econometric model, and section 4 provides estimates of the influence of liability reforms on loss levels, premium amounts, and loss ratios for both general liability and medical malpractice. Some, but not all, of these reforms reduced liability costs. Premium cost reductions were accompanied by decreases in loss amounts as well as by increases in the profitability of insurance.

2. Liability reforms, 1985–1987

Our empirical analysis focuses on the change in insurance market performance between 1985 and 1988, a particularly active time for liability reform as well as a period of substantial change in insurance markets. The liability reform measures considered are summarized in table 1. Since the emphasis of the empirical work will be on how insurance

Table 1. Definition of legal reforms

Preexisting Reforms: A dummy variable that equals 1 if the state had one of the following liability reforms prior to 1985: modification of joint and several liability rules, provisions for structured or periodic payments, modification of dram shop rules, caps on punitive damages, and modifications to statute of limitations.

Modify Joint and Several Liability: A dummy variable that equals 1 if the state either abolished or modified the statute that allows an injured plaintiff to collect his entire award from any one defendant regardless of the defendant's assigned percentage of fault.

Limits on Liability: A dummy variable that equals 1 if the state enacted limits on liability awards or established immunities.

Limits on Noneconomic Damages: A dummy variable that equals 1 if the state set caps on the amount of noneconomic damages recoverable. Noneconomic damages are compensation for pain and suffering or mental anguish.

Limits on Punitive Damages: A dummy variable that equals 1 if the state set caps on the amount of punitive damages recoverable. Punitive damages are damages awarded over and above medical expenses or lost wages, where the wrong done to the plaintiff was aggravated by willful conduct of the defendant.

Other Reforms: A dummy variable that equals 1 if the state enacted at least one of the following reforms: provide for structured or periodic payments, modification of dram shop rules, modification to statute of limitations, limit attorney contingency fees, or modify the collateral source rule.

Reforms in 1985 (1986, 1987): A dummy variable that equals 1 if the state enacted at least one of the above-mentioned reforms in 1985 (1986, 1987).

market performance in 1988 differed from that in 1985, it was necessary to construct indicators of the liability regimes over that period. The first legal reform definition in table 1 pertains to reforms before the baseline year 1985. Did the state already have on the books a reform measure that was adopted by other states during the study period?

The next four legal reform definitions listed in table 1 address specific liability reform provisions contained in a number of state liability reform laws: modifications of joint and several liability, limits on liability awards, limits on noneconomic damages, and limits on punitive damages. These measures do not exhaust all the reforms that states undertook, but they are the individual measures that economic theory suggests would be most effective in limiting insurance costs. Other reform measures, though perhaps not inconsequential, are aggregated into a single variable, in part because there were so many.⁶

Tables 2a-2d provide a summary of the reform efforts undertaken in different years.⁷ Table 2a shows the starting point in 1984, the year before the start of our study period. The most common statutory liability limitations are modifications of joint and several liability and limits on punitive damages, each of which had been adopted by roughly one fifth of all the states. Other liability limitations were much less common, with the most prevalent being the modification of dram shop rules.⁸

Table 2b summarizes the liability reforms that took place in 1985. As is indicated, very few states undertook any kind of reforms in that year; the amount of premiums affected by the liability reforms was less than 10% for all the cases listed in the table. Following the explosion in liability premiums in 1985, states became much more interested in liability reform in 1986 (table 2c). The most prominent of the 1986 measures were the modifications of joint and several liability rules adopted by 16 states, which composed more than half of all premiums for general liability and medical malpractice.⁹ Three

Table 2a. Preexisting liability reforms

Type of reform	No. of states	Percentage of liability premiums affected ^a		State list
		General liability	Medical malpractice	
Modify joint and several liability	11	22%	17%	Indiana, Iowa, Louisiana, Kansas, Nevada, New Hampshire, Ohio, Oregon, Pennsylvania, Texas, Vermont ^b
Limits on punitive damages	8	30%	36%	Georgia, Illinois, Maine, Minnesota, New Jersey, New Mexico, New York, Ohio
Other reforms:				
Provide for structured or periodic payments	10	11%	11%	Alabama, Alaska, Delaware, Florida, Kansas, New Hampshire, North Dakota, Oregon, Washington, Wisconsin
Modify dram shop rules	16	42%	44%	Alabama, Colorado, Connecticut, Delaware, Illinois, Iowa, Maine, Michigan, Minnesota, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, Vermont, Wyoming
Modify statute of limitations	14	27%	28%	Alabama, Arizona, Arkansas, Colorado, Connecticut, Florida, Idaho, Michigan, Minnesota, Nebraska, New Hampshire, Oregon, Pennsylvania, Tennessee

^aThe base year for the percentage of liability premiums affected is always 1985 to assume comparability of the results across years.

^bNew Hampshire, Ohio, and Vermont abrogated joint & several liability prior to 1985. The remaining states modified the doctrine.

Table 2b. Liability reforms in 1985

Type of reform	No. of states	Percentage of liability premiums affected ^a		State list
		General liability	Medical malpractice	
Modify joint and several liability	2	1%	2%	Colorado, Oklahoma
Cap on punitive damages	2	7%	6%	Illinois, Montana
Other reforms in 1985:				
Modify dram shop liability	6	7%	5%	Maine, Massachusetts, Missouri, South Dakota, Wisconsin, Wyoming
Limit liability, establish immunities	2	5%	5%	New Jersey, New Mexico

Table 2c. Liability reforms in 1986

Type of reform	No. of states	Percentage of liability premiums affected		State list
		General liability	Medical malpractice	
Modify joint and several liability	16	53%	55%	Alaska, California, Colorado, Connecticut, Florida, Hawaii, Illinois, Michigan, Minnesota, Missouri, New Hampshire, New York, Utah, Washington, West Virginia, Wyoming ^a
Limits on liability	13	11%	14%	Alabama, Alaska, Colorado, Connecticut, Delaware, Hawaii, Indiana, Maine, Maryland, New Hampshire, Tennessee, Utah, Wyoming
Limits on noneconomic damages	10	14%	12%	Alaska, Colorado, Florida, Kansas, Maryland, Minnesota, New Hampshire, New Mexico, Oklahoma, Washington
Limits on punitive damages	6	9%	7%	Colorado, Florida, Minnesota, New Hampshire, New Mexico, Oklahoma
Other reforms in 1986:				
Modify collateral source rule	5	13%	9%	Colorado, Connecticut, Indiana, Michigan, Minnesota
Provide for structured or periodic payments	7	12%	10%	Alaska, Connecticut, Iowa, Maine, Michigan, Utah, Washington
Modify dram shop rules	11	17%	18%	Arizona, Colorado, Connecticut, Indiana, Maryland, Michigan, Montana, New Hampshire, Tennessee, Utah, Wyoming
Modify statute of limitations	4	5%	5%	Colorado, Connecticut, Maine, Washington
Limit attorney contingency fees	4	5%	3%	Connecticut, Maine, New Hampshire, Wisconsin

^aColorado, Utah, and Wyoming abrogated joint and several liability in 1986. The remaining states modified the doctrine.

other reform measures were adopted in at least ten states: limits on liability, limits on noneconomic damages, and our catch-all "other reform" measure. Of all the years we will consider in this analysis, 1986 is the most prominent in terms of the extent of liability reform measures.

As table 2d shows, liability reforms in 1987 were again dominated by modifications in joint and several liability rules, which were adopted in an additional 16 states. Beyond this, 15 states representing two-fifths of all premiums imposed caps on punitive damages in an effort to limit liability costs. Other liability measures such as modifications in the collateral source rule also were widely adopted.¹⁰

The classification of state reform legislation into the categories shown in table 2 somewhat obscures the differences among states in particular reform measures. Limits on

Table 2d. Liability reforms in 1987

Type of reform	No. of states	Percentage of liability premiums affected		State list
		General liability	Medical malpractice	
Modify joint and several liability	16	28%	24%	Arizona, Colorado, Connecticut, Georgia, Idaho, Louisiana, Missouri, Montana, Nevada, New Jersey, New Mexico, North Dakota, Ohio, Oregon, South Dakota, Texas
Limit liability and establish immunities	1	0.4%	0.1%	New Mexico
Limits on noneconomic damages	5	3%	3%	Alabama, Idaho, Kansas, Montana, Oregon
Cap on punitive damages	15	39%	37%	Alabama, Colorado, Florida, Georgia, Hawaii, Indiana, Iowa, Kansas, Missouri, Montana, North Dakota, Ohio, Oregon, Texas, Virginia
Other reforms in 1987:				
Modify collateral source rule	11	19%	22%	Alabama, Connecticut, Georgia, Iowa, Maryland, Missouri, Montana, New Jersey, North Dakota, Ohio, Oregon
Provide for structured or periodic payments	6	6%	6%	Alabama, Idaho, Montana, North Dakota, Ohio, Rhode Island
Modify dram shop rules	6	16%	13%	Missouri, New Jersey, North Dakota, Ohio, Texas, Vermont
Limit attorney contingency fees	4	8%	9%	Connecticut, Ohio, Oregon, Washington

noneconomic damages, for example, differ among those states enacting this reform. Reforms must be classified if they are to be compared across states, but one consequence is that only the average effect of a particular reform type is measured.¹¹

3. Sample characteristics and model description

How did the performance of insurance markets change between 1985 and 1988? That there were significant changes is apparent from the overall insurance market trend information that appears in table 3.¹² For the two lines of insurance considered here—general liability coverage and medical malpractice insurance—the profitability of insurers over the study period experienced a substantial change. Premiums rose, and losses diminished so that overall insurer profitability increased. This profitability is reflected in the loss ratio (i.e., the ratio of losses to premiums), which changed dramatically over the 1985–1988 period for these two lines of insurance. Losses exceeded premiums for both

Table 3. Change in real total annual insurer loss and premiums, by line, 1985-1988 (in \$ millions)

	Losses	Premiums	Loss Ratio 85	Loss Ratio 88
General liability	\$ -4871	\$ 5678	1.12	0.62
Medical malpractice	\$ -531	\$ 1256	1.22	0.79
Automobile	\$ 7924	\$14201	0.75	0.71

Table 4. Definitions of insurance rating laws

Prior Approval	Rates must be filed with and approved by the state insurance department before they can be used. Approval can be by means of a deemer provision, which indicates approval if rates are not denied within a specified number of days.
Modified Prior Approval	Rate revision involving change in expense ratio or rate relativity require prior approval. Rate revisions based on experience only are subject to "file and use" laws.
Flex Rating	Prior approval of rates required only if they exceed a certain percentage above (and sometimes below) the previously filed rates.
File and Use	Rates must be filed with the state insurance department prior to their use. Specific approval is not required, but the department retains the right of subsequent disapproval.
Use and File	Rates must be filed with the state insurance department within a specified period after they have been placed in use.
No File	Rates are not required to be filed with or approved by the state insurance department. However, the company must maintain records of experience and other information used in developing the rates and make these available to the commissioner upon his request.

lines of insurance in 1985, when insurers were incurring more claim costs than they were earning in premiums. By 1988, loss ratios had dropped by 40 percentage points or more, and insurers were once again paying less in claims than they were earning in premiums.

This dramatic change in loss ratio was not common to every line of insurance. Table 3 provides an example of automobile insurance. Both losses and premiums increased for this line, and loss ratios remained below 1.0 and relatively unchanged over the period. The experience of automobile insurance and other lines is consistent with the general perception that the liability reform measures were directed primarily at controlling the emerging liability crisis, which was concentrated in the lines of general liability and medical malpractice.

While the focus of this study is on the effects of liability reform measures, it also is important to take account of the differences among states in the stringency of their insurance regulation. The range of different kinds of insurance regulation is summarized in table 4, where these regulations are listed in an order that roughly corresponds to decreasing stringency.¹³ These insurance regulations are intended, at least in part, to restrain insurance prices. The most common forms of regulation are "file and use" and the less stringent "use and file." Strict prior approval regulation is, however, used in approximately one fourth of all the states.

Table 5 summarizes the sample characteristics for the data set that will be analyzed. Our approach will be to assess the change in insurance market performance by state

Table 5. Sample characteristics

	Mean	Standard Deviation
<i>General Liability</i>		
Losses 85	369723.0	588309.9
Losses 88	272997.8	411076.0
Premiums 85	329192.7	449420.3
Premiums 88	441847.6	595447.3
Loss Ratio 85	1.017	0.248
Loss Ratio 88	0.569	0.142
<i>Medical Malpractice</i>		
Losses 85	86102.5	142093.2
Losses 88	75726.1	179104.1
Premiums 85	70944.7	111103.8
Premiums 88	95969.3	154137.4
Loss Ratio 85	1.155	0.587
Loss Ratio 88	0.584	0.317
<i>Explanatory Variables for Both Lines</i>		
Percentage change in aggregate income	0.097	0.073
Prior approval rating law	0.280	0.454
Modified prior approval	0.020	0.141
Flex rating	0.100	0.303
File and use system	0.420	0.499
Use and file system	0.120	0.328
No file	0.060	0.240
Preexisting reforms	0.700	0.463
Modify joint and several liability:		
in 1985:	0.040	0.198
in 1986:	0.320	0.471
in 1987:	0.320	0.471
Limits on liability	0.300	0.463
Limits on noneconomic damages	0.280	0.454
Limits on punitive damages	0.420	0.499
Other reforms	0.380	0.490

between 1985 and 1988. All variables in the table are in real (inflation-adjusted) terms using 1987 as the reference point for adjusting the value of losses, premiums, and income levels.¹⁴ For both general liability and medical malpractice, real losses and premiums declined over the period.¹⁵ Losses declined more than premiums, producing a reduction in the loss ratio. In 1985, insurers paid \$1.02 to \$1.16 in claims for every \$1.00 of premiums. In 1988, they paid about \$0.58 in claims for every \$1.00 of premiums.¹⁶

The independent variables that will be used to explain variations in 1988 premiums, losses, and loss ratios are also listed in table 5. The percentage change in aggregate income in a state is included to account for the increases in insurance markets that can be

expected as a state's economy grows.¹⁷ The various insurance market regulation variables, listed next, are set equal to 1 if a state uses that regulatory regime and to 0 otherwise. The mean value indicates the percentage of states employing each method of regulation.

Liability reform measures are the final set of variables appearing in table 5. A variable is set equal to 1 if a state adopted that reform and to 0 otherwise. The first four variables are for specific reform policies; the "other reforms" variable is a catch-all category for the other reform types. Since joint and several liability reforms were the most influential of the legal reform measures, an effort was made to distinguish these reforms by year. As can be seen, most states that reformed the joint and several doctrine did so in 1986 or 1987.

These data were used to explain state-to-state variations in losses, premiums, and loss ratios in 1988. In the economic model, the 1988 value is a function of its 1985 value, economic growth, insurance regulation, and liability reforms.¹⁸ To estimate this relationship, we estimate the following models for each insurance line, where we allow for an autoregressive component:

$$\begin{aligned} \ln(\text{Loss}_{88}) = & \alpha_1 + \beta_1 \ln(\text{Loss}_{85}) + \gamma_1 \ln\left(\frac{\text{Income}_{88}}{\text{Income}_{85}}\right) \\ & + \sum_{i=1}^5 \psi_{1i} \text{Regulation}_i + \sum_{k=1}^n \xi_{1k} \text{Reform}_k + \epsilon_1, \end{aligned} \quad (1)$$

$$\begin{aligned} \ln(\text{Premiums}_{88}) = & \alpha_2 + \beta_2 \ln(\text{Loss}_{85}) + \gamma_2 \ln\left(\frac{\text{Income}_{88}}{\text{Income}_{85}}\right) \\ & + \sum_{i=1}^5 \psi_{2i} \text{Regulation}_i + \sum_{k=1}^n \xi_{2k} \text{Reform}_k + \epsilon_2, \end{aligned} \quad (2)$$

$$\begin{aligned} \ln(\text{Loss Ratio}_{88}) = & \alpha_3 + \beta_3 \ln(\text{Loss Ratio}_{85}) + \gamma_3 \ln\left(\frac{\text{Income}_{88}}{\text{Income}_{85}}\right) \\ & + \sum_{i=1}^5 \psi_{3i} \text{Regulation}_i + \sum_{k=1}^n \xi_{3k} \text{Reform}_k + \epsilon_3. \end{aligned} \quad (3)$$

By expressing variables in log forms, the equations measure the effect of regulation and reform variables in percentage terms. This is useful, since a liability reform adopted in a large state would be expected to have much larger effects in total dollars than the same reform in a small state. The number of liability variables n varied depending on the particular specification.

Although the specifications of each of the equations are similar, the empirical predictions differ, and it is useful to consider each of these equations in turn. Equation (1) indicates that the value of losses in a particular state should be related to the losses experienced in that state in 1985, where the lagged dependent variable serves as a proxy for the size and underlying composition of the insurance market and the losses that are generated by the insurance that is purchased. If the losses experienced in a state are

constant over time, then the coefficient β_2 would equal 1.0. This unitary value of β_2 can be viewed as a reference point for the degree of stability in the state's loss structure. Similarly, lagged dependent variables are included in equations (2) and (3) as well.

The second variable, the percentage change in the state's annual income, should have a positive sign for two reasons. First, increases in the income in the state generally imply a larger insurance market in terms of the volume of potential claims. Second, the primary component of compensation for bodily injury cases is the present value of lost earnings of the injured party, and this amount is going to be quite specifically linked to income levels within a state. However, we would expect no effect from this variable on the loss ratio, since growth in the economy should increase both losses and premiums in roughly the same proportions.

The regulation variables test for the effect of each regulatory regime, compared to the least stringent "no file" regime. Insurance regulation is intended to affect prices of insurance rather than losses or premiums.¹⁹ Thus we would not expect the coefficients on these variables to differ from zero in the losses equation (1). If these regulations lower the price and profitability of insurance, as is often their stated intent, then premiums should be lower (equation (2)) and loss ratios should be higher (equation (3)) in regulated states.

Of greatest interest are the liability reform measures. Liability reform is not necessarily synonymous with decreasing losses, but the reforms in the mid-1980s had that character. We examine here not whether liability reform was socially optimal but instead whether it accomplished the objectives of its proponents, those who argued that the level of tort liability had become excessive and that some level of losses below the 1985 level was the socially desirable amount. Because of the small sample of firms that undertook liability reforms in any one year, it may be difficult to estimate statistically significant effects with available data.

The reforms represented an attempt to bring insurance costs under control, primarily by reducing the number and size of judgments against insureds. The reforms clearly were intended to reduce insurer losses; it is less clear whether the reforms were intended to reduce premiums. Insurers may have favored tort reform to increase profitability, while insureds may have expected the reduction in losses to be passed through in premium reductions. If there is considerable price competition within a state, the effect of reform measures on losses should be ultimately passed through to consumers. Thus, one would expect liability reforms, if successful, to have a negative effect on premium levels.

The expected effect of liability reform variables on loss ratio (equation (3)) is even less clear. If reforms reduced losses and premiums by the same proportion, the loss ratio would be unaffected. The loss ratio represents the inverse of the price of insurance, and one would expect that in the long run, competitive market forces would lead insurance companies to make adjustments that would equalize the marginal profitability of insurance coverage across companies and states. Thus, one would not necessarily expect to observe persistent differences in average loss ratios across states, although there might be short-run differences that occur in response to market shocks.

As a consequence, in equation (3) none of the variables other than the lagged loss ratio should have a long-run effect on the loss ratio observed in the market. However, in the short run, effects clearly could arise.

The liability reform variables are in some respects the counterpart of insurance regulation. Whereas insurance regulation is intended to reduce premiums and to raise the loss ratio, liability reforms are intended to lower losses and to decrease the value of the loss ratio. As in the case of insurance regulation, this influence should not have a permanent effect on the profitability of insurance, and consequently on the loss ratio, assuming companies achieve equilibrium profitability of their insurance coverage across different states. The time needed for the market to reach equilibrium, however, may be substantial. Given that most of the reforms were concentrated in 1986, and loss ratios are being observed in 1988, it would be quite surprising if one observed a substantial response to the shift in liability regimes. By 1987, firms would only have begun to experience the impact of the liability reform measures, since both medical malpractice and general liability lines have much longer tails on the distribution of claims than does automobile insurance. Until this loss experience occurs, firms have generally displayed a reluctance to change their rates based on a kind of Bayesian assessment of what loss levels might prevail, since ratemaking is governed by classical statistical principles.²⁰

4. Empirical results

4.1. *General liability*

The estimates of the three different insurance equations for general liability coverage appear in tables 6a and 6b. Table 6a presents the results in which the reform variables are restricted to measures of whether reforms were undertaken in particular years. That is, taking account of the presence of preexisting reforms, did a state undertake reforms in 1985, 1986, or 1987? In contrast, table 6b focuses not so much on the timing of the reform but on its character. For example, did the state adopt a liability reform relating to joint and several liability? Focusing on the year-by-year reform index may be instructive if the specific reform measure is not of consequence, but rather the state undertook measures to curb liability costs. Should this situation apply, reform bills may serve as a proxy for a shift in the state's attitude towards liability costs more generally. Table 6b, by contrast, addresses the role of specific reform policies as opposed to the more general issue of whether the existence of a reform package is of consequence.

The role of the lagged insurance variable is similar in both tables 6a and 6b. The lagged value of the log of losses has a strong effect on the log value of 1988 loss losses; the coefficients are not statistically different from 1.0, indicating that losses experienced in a state are fairly constant over time. Similarly, the coefficient on the lagged log value of premiums indicates stability in premiums over time.

Table 6a. General liability regressions for losses, premiums, and loss ratios, with detailed liability variables

Dependent variable	Coefficients (standard errors)		
	Log of losses 1988	Log of premiums 1988	Log of loss ratio 1988
Intercept	-0.30 (0.421)	0.330 ^a (0.182)	-0.244 (0.189)
Log of 1985 value of dependent variable	1.013 ^b (0.030)	0.995 ^b (0.013)	0.686 ^b (0.145)
Percentage change in aggregate income	0.922 (0.750)	1.932 ^b (0.294)	-0.742 (0.630)
<i>Insurance regulation variables</i>			
Prior approval	-0.295 (0.176)	-0.049 (0.069)	-0.151 (0.162)
Modified prior approval	0.029 (0.263)	0.136 (0.102)	-0.192 (0.230)
Flex	-0.221 (0.162)	-0.028 (0.063)	-0.129 (0.147)
File and use	-0.118 (0.177)	-0.023 (0.069)	-0.105 (0.153)
Use and file	0.001 (0.176)	-0.062 (0.069)	0.014 (0.152)
<i>Reform variables</i>			
Preexisting reforms	-0.062 (0.072)	-0.016 (0.028)	-0.017 (0.064)
Reforms in 1985	-0.206 ^a (0.093)	0.004 (0.036)	-0.169 ^a (0.085)
Reforms in 1986	-0.296 ^b (0.069)	-0.133 ^b (0.027)	-0.109 ^a (0.066)
Reforms in 1987	-0.134 ^a (0.069)	-0.062 ^a (0.027)	-0.034 (0.062)
R-square	0.978	0.996	0.468

^aCoefficients are statistically significant at the 95% confidence interval, one-tailed test.

^bCoefficients are statistically significant at the 99% confidence interval, one-tailed test.

The linkage between the log value of loss ratios in 1985 and the log of the loss ratios in 1988 diverges much more from a proportional relationship. The lagged loss value coefficient is .69 in table 6a and .59 in table 6b. The link between loss ratios over time is relatively weak. The profitability of insurance as reflected in the loss ratio exhibits much less consistency over time because losses and premiums are volatile, and they have conflicting effects on the loss ratio.

The role of percentage change in aggregate income generally follows one's expectations, since it has a statistically significant positive effect on premiums. This reflects the role of expanding insurance markets in states with increasing levels of income. However, loss levels and loss ratios are not significantly related to income changes. Although one would not have expected an effect on insurance profitability, the level of losses should have been expected to rise in an expanding market.

Table 6b. General liability regressions for losses, premiums, and loss ratios

Dependent variable	Coefficients (standard errors)		
	Log of losses 1988	Log of premiums 1988	Log of loss ratio 1988
Intercept	-0.202 (0.496)	0.263 (0.187)	-0.552 ^b (0.190)
Log of 1985 value of dependent variable	1.005 ^b (0.039)	1.007 ^b (0.015)	0.592 ^b (0.170)
Log (aggregate income 1988/ aggregate income 1985)	0.853 (0.950)	1.619 ^b (0.322)	-0.732 (0.791)
<i>Insurance regulation variables</i>			
Prior approval	-0.105 (0.169)	-0.117 ^a (0.057)	0.084 (0.145)
Modified prior approval	-0.134 (0.298)	-0.090 (0.100)	-0.028 (0.256)
Flex	-0.065 (0.194)	-0.077 (0.065)	0.026 (0.165)
File and use	0.066 (0.189)	-0.082 (0.064)	0.136 (0.163)
Use and file	0.059 (0.220)	-0.169 ^a (0.074)	0.186 (0.189)
<i>Reform variables</i>			
Preexisting reforms	0.026 (0.089)	-0.034 (0.030)	0.047 (0.074)
Modify joint and several liability			
in 1985:	-0.042 (0.250)	-0.141 ^a (0.084)	0.111 (0.215)
in 1986:	-0.201 ^a (0.096)	-0.114 ^b (0.032)	0.019 ^a (0.087)
in 1987:	-0.080 (0.105)	0.006 (0.035)	-0.022 (0.094)
Limits on liability	0.017 (0.117)	0.072 ^a (0.040)	-0.041 (0.100)
Limits on noneconomic damages	-0.232 ^a (0.121)	-0.052 (0.042)	-0.130 (0.102)
Limits on punitive damages	-0.095 (0.113)	-0.085 ^a (0.038)	-0.036 (0.097)
Other reforms	-0.103 (0.118)	-0.055 (0.040)	-0.052 (0.101)
R-square	0.990	0.997	0.493

^aCoefficients are statistically significant at the 95% confidence interval, one-tailed test.

^bCoefficients are statistically significant at the 99% confidence interval, one-tailed test.

The performance of the insurance regulation variables suggests that these regulations have no significant effect on the profitability of insurance or on restraining insurance prices.

Prior approval and use and file regulation have significant negative effects on premiums in table 6a; they account for a 7.9% and 11.7% reduction in premiums, respectively.

The parallel results in table 6b are potentially more instructive, since the variable list controls in greater detail for the mix of liability reform measures, enabling the results to better distinguish the role of insurance regulation from the specific character of the liability reform efforts. The negative effect of the prior approval and use and file regulation variables on premiums is consistent with the public-interest intent of insurance regulation. The usual objective of regulation is to restrain insurance prices seeking to keep insurers from earning excessive profits. This objective is, however, less prominent for general liability insurance, which tends to be purchased by corporations, than for automobile insurance, most of which is purchased by consumers.

In no case, it should be noted, is there any significant effect of the insurance regulation variables on loss ratios. The profitability of insurance—or, put somewhat differently, the price that is actually charged for insurance (as measured by the inverse of the loss ratio)—is unaffected by insurance regulation. This is what one would expect in a situation in which the insurance market has reached equilibrium.

Liability reform measures, the final set of variables in these tables, represent the primary matters of interest. In each case, the presence of preexisting liability reform measures does not have a statistically significant effect on the 1988 value of the insurance variable.

Table 6a reports results for the year-by-year reform measures. Reforms had a strong significant effect in reducing general liability losses in 1986 and in 1987. The magnitude of these effects is also substantial, since these variables suggest that the 1986 reforms lowered losses by an amount that was equal to 10.1% of the average loss level for the sample in 1985, and reforms in 1987 lowered losses by an amount equal to 4.6% of the average 1985 losses.

In a competitive market, one would also expect lower loss levels to lead to reduced premiums. The linkage may not be a one-for-one relationship, since loss ratios were unsustainably in excess of 1.0 in 1985. Excluding all administrative costs and the potential for earning interest on premiums, the business of running insurance was at best a break-even proposition. One would expect insurance rates to return to more profitable, long-run loss ratios below 1.0. Premium levels dropped by a significant amount in states that adopted liability reforms in both 1986 and 1987; these decreases were substantial, but somewhat less than the amount by which losses dropped in those two years. The effect of the 1986 reforms was to reduce premium levels by 9.1% of their 1985 levels and to reduce losses by 10.1% of their 1985 levels. The 1987 reforms led to a premium drop that was 4.3% of the 1985 levels and a loss decrease that was 4.6% of the 1985 level.

The results in table 6a also indicate that in both 1985 and 1986 insurance reform measures were successful in increasing the profitability of insurance by decreasing the loss ratio. As indicated by the estimates above, the reform effects for 1987 affect losses and premiums similarly, implying that the net effect on the loss ratio is not statistically significant.

The examination of the specific reform measures in table 6b suggests that the reform efforts that had a significant effect in reducing losses were modifications of joint and several liability in 1986, and limits on noneconomic damages. Each of these effects is quite substantial, since they imply a reduction in the losses from their 1985 levels of 8% for limits on noneconomic damages and 6.9% for modifications of joint and several liability.

One should be careful, however, in extrapolating these results. For example, it is unlikely that a state can simply adopt a joint and several liability reform and reduce its general liability insurance losses by 6.9%. Rather, what these variables suggest is that states with a joint and several liability provision in the product liability reform package (and that possibly undertook other efforts to control liability costs) experienced these effects. The role of the liability provision variables may be to capture changes in the liability climate that are correlated with the adoption of such measures.

To the extent that these loss reductions are passed through to consumers, there should also be an effect on premium levels. Such effects are evident in the results of the middle column of table 6b, since there is a significant negative effect on premiums from both the 1985 and 1986 modifications of joint and several liability, as well as a significant negative effect of limits on punitive damages and limits on liability. The results in the final column of table 6b indicate that, as a net effect, all these efforts on both premiums and losses appear to offset one another, since there are no statistically significant effects on loss ratios. (Nevertheless, 5 of the 7 liability reform variable coefficients are negative; none is statistically significant at the usual confidence levels.) Because of the refined nature of these variables, the results in table 6a, which are designed to capture the more aggregative influence of liability reforms, probably provide a better measure of the effect on loss ratios over this period.

4.2. *Medical malpractice*

The findings for medical malpractice reported in tables 7a and 7b are somewhat similar to those for general liability. The lagged log value of the loss ratio and the lagged log value of premiums each affect the current amounts of these variables in 1988, and the coefficients are not significantly different from 1.0. Rather, both losses and premiums are transmitted in a manner that suggests that \$1.00 in losses or premiums in 1985 leads to \$1.00 in premiums or losses in 1988, which is consistent with a situation in which both losses and premiums are stable over time.

As in the case of the general liability results, the loss ratio is not very stable over this period. Instead of a one-for-one relationship between the loss ratio in 1985 and 1988, a 1% increase in the 1985 loss ratio translates into a .34% increase in the loss ratio in 1988. The profitability of insurance in a state in 1985 is consequently a very weak predictor of the profitability of insurance in 1988.

Insurance regulation variables have little apparent effect on medical malpractice insurance prices. Indeed, there is no statistically significant effect of any of these variables on losses or loss ratios in tables 7a or 7b, and only one statistically significant effect on premiums. The use and file variable is significant in the premium equation in table 7a, but this relationship is not robust; the coefficient on use and file regulation in table 7b is not statistically significant. These are the measures that should be affected by insurance regulations if they act to restrain prices and the profitability of insurance.

The role of the liability reform variables in each set of results for medical malpractice is similar to that for general liability, but the effects appear to be less pronounced. No

Table 6a. Medical malpractice regressions for losses, premiums, and loss ratios with detailed liability variables

Dependent variable	Coefficients (standard errors)		
	Log of losses 1988	Log of premiums 1988	Log of loss ratio 1988
Intercept	-1.113 (0.946)	0.899 ^a (0.511)	-0.615 (0.391)
Log of 1985 value of dependent variable	1.102 ^b (0.075)	0.983 ^b (0.041)	0.348 ^a (0.193)
Percentage change in aggregate income	-2.103 (2.054)	0.259 (1.034)	0.506 (1.464)
<i>Insurance regulation variables</i>			
Prior approval	0.007 (0.484)	-0.352 (0.257)	0.059 (0.377)
Modified prior approval	0.201 (0.714)	-0.495 (0.385)	-0.036 (0.530)
Flex	0.341 (0.473)	-0.302 (0.241)	0.294 (0.369)
File and use	0.130 (0.521)	-0.427 (0.274)	-0.061 (0.388)
Use and file	0.153 (0.471)	-0.424 ^a (0.250)	2.6E-4 (0.359)
<i>Reform variables</i>			
Preexisting reforms	-0.113 (0.181)	0.048 (0.092)	0.205 (0.145)
Reforms in 1985	-0.208 (0.324)	-0.277 ^a (0.165)	0.116 (0.255)
Reforms in 1986	-0.227 (0.170)	-0.214 ^a (0.092)	-0.065 (0.132)
Reforms in 1987	0.063 (0.175)	0.106 (0.098)	-0.043 (0.135)
R-square	0.920	0.964	0.363

^aCoefficients are statistically significant at the 95% confidence interval, one-tailed test.

^bCoefficients are statistically significant at the 99% confidence interval, one-tailed test.

statistically significant effects appear on losses, which one would expect to be the main mechanism by which liability reforms would exert their influence. Only one measure, limits on noneconomic damages (table 7b), significantly depresses losses, resulting in a 14.7% decrease in 1985 loss levels.

The 1985 and 1986 reforms both led to drops in premiums. Although the absolute magnitude of these premium effects are quite large, with reductions of 17.3% and 13.4% of 1985 premium levels, respectively, these reforms have no influence on insurance market profitability. The specific reform components listed in table 7b show, however, that there was a reduction in premiums due to the modifications of joint and several liability in 1985, but this reduction did not translate into any decrease in the 1988 loss ratio.

Table 7b. Medical malpractice regressions for losses, premiums, and loss ratios

Dependent variable	Coefficients (standard errors)		
	Log of losses 1988	Log of premiums 1988	Log of loss ratio 1988
Intercept	-0.382 (0.928)	1.204 ^b (0.483)	-0.512 (0.364)
Log of 1985 value of dependent variable	1.017 ^b (0.081)	0.929 ^b (0.044)	0.396 ^a (0.193)
Log (aggregate income 1988/ aggregate income 1985)	-1.542 (2.128)	-0.196 (1.070)	-0.127 (1.552)
<i>Insurance regulation variables</i>			
Prior approval	0.193 (0.340)	0.026 (0.185)	-0.004 (0.274)
Modified prior approval	0.109 (0.622)	-0.085 (0.331)	-0.151 (0.480)
Flex	0.398 (0.399)	-0.026 (0.215)	0.102 (0.322)
File and use	0.405 (0.390)	0.033 (0.209)	0.017 (0.325)
Use and file	0.408 (0.448)	0.011 (0.244)	0.047 (0.372)
<i>Reform variables</i>			
Preexisting reforms	-0.023 (0.190)	0.003 (0.098)	0.209 (0.146)
Modify joint and several liability in 1985:	-0.450 (0.667)	-0.640 ^a (0.276)	-0.362 (0.514)
in 1986:	0.068 (0.208)	0.067 (0.104)	0.166 (0.147)
in 1987:	0.116 (0.225)	0.158 (0.116)	0.106 (0.176)
Limits on liability	0.028 (0.250)	-0.087 (0.128)	0.140 (0.194)
Limits on noneconomic damages	-0.451* (0.246)	-0.132 (0.135)	-0.294 (0.188)
Limits on punitive damages	-0.098 (0.236)	-0.090 (0.124)	-0.205 (0.190)
Other reforms	-0.332 (0.259)	-0.214 (0.132)	-0.286 (0.194)
R-square	0.935	0.972	0.490

^aCoefficients are statistically significant at the 95% confidence interval, one-tailed test.

^bCoefficients are statistically significant at the 99% confidence interval, one-tailed test.

This pattern of results for medical malpractice is somewhat puzzling. Tort reforms intended to constrain costs and enhance profitability did neither. Yet, these results suggest that premiums were dampened by the introduction of a reform measure.

Two explanations, beyond the possibility of spurious results, appear plausible. First, if liability reforms stabilized insurance companies' expectations about the losses that would be experienced for policies currently being written, this could restrain premiums even though current losses are unaffected. Future expected losses may have been influenced, which may be of consequence for medical malpractice coverage, whose claims have a long tail.

Second, the reform measures were correlated with states in crisis; there is the possibility that insurance was being rationed in these states. Anecdotal evidence regarding denials of insurance coverage in the mid-1980s is abundant. A decrease in premiums could arise from a decrease in prices or a decrease in the quantity of insurance sold. If premiums decreased because the amount of coverage written declined, a drop in premiums does not necessarily signal a favorable development in the operation of insurance markets. The available data do not permit us to distinguish among these possible explanations.

5. Conclusion

The mid-1980s was probably the most tumultuous time in recent insurance market history. There have been other periods, of course, in which premiums escalated rapidly. Indeed, a large literature is devoted to analyzing underwriting cycles in the insurance industry. However, because the dramatic increase in premiums in the mid-1980s was concentrated in such a small period and was accompanied by evidence of insurance rationing, this became a matter of prominent policy concern.

The main implication of this article is that the performance of insurance markets is something that is to a substantial extent within our policy control. States that enacted tort reforms between 1985 and 1988, and particularly the flurry of states that adopted such measures in 1986, were able to restrain the growth in liability costs. A substantial negative effect on the level of losses was observed. These restraining effects were much more pronounced and robust for general liability insurance than for medical malpractice.

The specific reform measures alone may not, however, account for all the significant drop in losses associated with them. Our results are consistent with the possibility that a state's undertaking of comprehensive effort to reform its liability laws may be more consequential than the specific components of the measures. Thus, the general shift in the liability climate generated by liability reform efforts may contribute to the effect of tort reform efforts. The role of these measures was captured by our yearly liability reform variables.

Although the impetus for the reforms we studied came largely from firms, the benefits spread much more broadly. In addition to reducing costs and lowering the loss ratio, liability reform measures also lower premiums. The relationship between the decline in premiums and the decline in losses is not exact, quite apart from the role of administrative costs, since the markets were out of equilibrium in 1985. Loss ratios were aberrationally high, and one would expect some long-run adjustment in such ratios to ensure that insurance companies could earn a normal rate of return.

Although the role of liability reforms appears to have been instrumental in stabilizing the performance of insurance markets, one should be cautious in ascribing any broader value judgments to the desirability of these "reforms." The fact that states undertook measures to control liability costs and that these measures were designated "reforms" does not imply that they led to improvements in the structure of liability. Making such judgments requires that one investigate the structure of the reform effort and determine whether the decrease in costs achieved by these reform measures is beneficial. Since reductions in costs typically imply decreased compensation of accident victims, the desirability of cost reductions is not always clear-cut. Indeed, if all cost reductions were desirable, one could achieve the optimal level of reform by eliminating all liability whatsoever.

Wholly apart from the concern with whether the stringency of the present liability system is optimal, it is, however, clear that the liability reform efforts in the mid-1980s did serve a constructive function. Before these reform efforts were enacted, liability markets were in substantial disarray. Insurance was too unprofitable to be offered at these rates over the long run. Many insurance companies denied coverage to parties seeking insurance. During this disruptive period, motels closed swimming pools, municipalities shut down playgrounds, and many firms withheld innovative but potentially risky products from the market.

Insurance, like any other factor of production, should have a ready supply sold at a price that reflects its long-run cost. The liability reform efforts of the mid-1980s did more than constrain the spiraling costs of insurance. They stabilized insurance markets, and thereby fostered the sound functioning of the economy.

Notes

1. The material in this paragraph and the subsequent discussion of trends in general liability premiums is drawn from Viscusi (1991).
2. These statistics are drawn from the Insurance Information Institute (1992), p. 29.
3. See page 23 of the Insurance Information Institute (1992).
4. See Casualty Actuarial Society (1990).
5. These refinements include a more flexible econometric specification, conversion of the dollar amounts to real (inflation-adjusted) terms, and much more detailed and comprehensive specification of the liability and insurance regimes in different states.
6. Blackmon and Zeckhauser (1991) found that most of the other provisions included in reform legislation had no effect on insurance costs. Examples include limits on attorney fees, measures to encourage alternative insurance supply and self-insurance, limits on mid-term policy cancellations, changes in dram shop laws, and reduction of liability awards for collateral sources.
7. State liability reform data for 1985-1987 were obtained from the Alliance of American Insurers, Civil Justice Enactments Bulletins, 1985-1987. Preexisting legislation variables were obtained from various sources. See Seman (1984) for states with limits on recovering punitive damages, Bagby and Whitman (1983) for states with provisions for structured or periodic payments, Smith (1984) for states with specific statutes of limitation for products liability, Brake (1984) for states with dram shop provisions, and Thofner (19??) for states with joint and several liability statutes.
8. Dram shop rules pertain to drinking establishments and accidents arising from activities at bars or saloons.

9. This statement and other characterizations of the role of different liability reform measures can be verified using Table 2b.
10. The collateral source rule requires that liability awards be reduced by the amount of compensation received by the victim from other sources, such as workers' compensation.
11. This grouping of reforms also reduces the accuracy of the econometric analysis. Such errors in independent variables, assuming random errors, causes the estimated coefficient to be smaller (closer to zero) than the actual effect of a variable.
12. State-level data on insurer direct premiums and adjusted loss ratios are compiled from annual data published in Best's Review. Losses are calculated by multiplying the adjusted loss ratio by direct premiums. Since the loss ratios reflect losses incurred relative to earned premiums, our measure of losses is accurate only to the extent that premiums written are equal to premiums earned.
13. Insurer rate filing regulation data and corresponding descriptions were obtained from the National Association of Insurance Commissioners.
14. Implicit price deflators for gross domestic product were obtained from Council of Economic Advisors, *Economic Report of the President* (Washington: U.S. Government Printing Office, 1992).
15. Premium amounts are based on premiums written. Blackmon and Zeckhauser (1991) adjusted these values to account for the fact that losses are stated in proportion to premiums earned, not written. With this model specification, however, an adjustment using the U.S. ratio of earned to written premiums exerts only a scale effect and does not affect any of the significance tests.
16. The value of the loss ratio provides an important index of the overall profitability and price of insurance. For example, it is possible for the insurance market to be in substantial disarray even though losses and premiums are declining. Such declines may be observed if there is quantity rationing, so that a decrease in losses and premiums does not necessarily imply that the insurance market is thriving. The difficulty is that the standard insurance statistics pertain to revenues (i.e., premiums) so that the specific quantity of insurance purchased and its price cannot be distinguished. This compounding of the role of quantity and price requires that one be careful interpreting the results and that one also examine loss ratios as well as get a better sense of the insurance pricing practices.
17. State-level aggregate personal income data are published in the U.S. Department of Commerce *Survey of Current Business*.
18. Letting the subscript i denote state i , subscript t denote year t , e_{it} be insurance expenses in year t for state i , and r_{it} be the competitive return (as a proportion of expected premiums), then in a competitive equilibrium

$$\text{Premium}_{it} = \text{Losses}_{it} + (e_{it} + r_{it})P_{it},$$

or

$$\text{Premium}_{it} = \frac{\text{Losses}_{it}}{1 - e_{it} - r_{it}}.$$

The value of the loss ratio will be given by

$$\text{Loss Ratio}_{it} = \frac{\text{Losses}_{it}}{\text{Premiums}_{it}} = 1 - e_{it} - r_{it},$$

The absolute loss level and premium level will not affect the loss ratio, since competition will work to equalize the marginal loss ratio value $1 - e_{it} - r_{it}$ across states. The unit price of insurance is the inverse of the loss ratio, or $1/(1 - e_{it} - r_{it})$.

19. Although the stated intent of regulation is to limit prices, the performance of insurance regulation in practice has been more mixed. For example, over the 1974-1981 period, automobile insurance regulation did decrease the price (as measured by the inverse of the loss ratios), but there was also a substantial price decrease experienced in the states that moved from a regulated to a deregulated situation. Deregulation served to foster more price competition than would have otherwise occurred under a regulatory regime. For discussion of these results, see Grabowski, Viscusi, and Evans (1989).
20. See the Casualty Actuarial Society (1990).

References

- Bagby, John W., and Douglas Whitman. (1983). "Future Income Losses in Products Liability Awards: Reducing Damages to Present Value," *Journal of Product Liability* 6, 237-251.
- Blackmon, Glenn, and Richard Zeckhauser. (1991). "State Reform Legislation: Assessing Our Control of Risks." In Peter H. Schuck (ed.), *Tort Law and the Public Interest: Competition, Innovation, and Consumer Welfare*. New York: W.W. Norton, pp. 272-300.
- Brake, David R. (1984). "Putney v. Haskins: A Strict Construction of the Michigan Dramshop Act's 'Name and Retain Provision'," *University of Toledo Law Review* 15, 200-220.
- Casualty Actuarial Society. (1990). *Foundations of Casualty Actuarial Science*. New York: Casualty Actuarial Society.
- Grabowski, Henry, W. Kip Viscusi, and William Evans. (1989). "Price and Availability Tradeoffs of Automobile Insurance Regulation," *Journal of Risk and Insurance* 56(2), 275-299.
- Harrington, S.E. (1984). "The Impact of Rate Regulation on Automobile Insurance Loss Ratios: Some New Empirical Evidence," *Journal of Risk and Insurance* 51, 577-623.
- Insurance Information Institute. (1992). *1992 Property/Casualty Fact Book*. New York: Insurance Information Institute.
- Joskow, P. (1973). "Cartels, Competition and Regulation in the Property-Liability Insurance Industry," *Bell Journal of Economics and Management* 4, 375-427.
- Seman, Anne E. (1984). "Pecuniary Injuries under the Illinois Wrongful Death Act," *Loyola University of Chicago Law Review* 15, 595-622.
- Smith, Leland G. (1984). "Williams v. West Penn Power Co.," *Duquesne Law Review* 23, 279-288.
- Thofner, Nancy. (1984). "The Modification of Joint and Several Liability: Consideration of the Uniform Comparative Fault Act," *University of Florida Law Review* 36, 288-309.
- Viscusi, W. Kip. (1990). "The Performance of Liability Insurance in States with Different Products Liability Statutes," *Journal of Legal Studies* 19(2), part 2, 809-836.
- Viscusi, W. Kip. (1991). *Reforming Products Liability*. Cambridge: Harvard University Press.

Copyright of Journal of Risk & Uncertainty is the property of Kluwer Academic Publishing / Business and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.