

1990

The Performance of Liability Insurance in States with Different Products-Liability Statutes

W. Kip Viscusi

Follow this and additional works at: <https://scholarship.law.vanderbilt.edu/faculty-publications>



Part of the [Insurance Law Commons](#)

Recommended Citation

W. Kip Viscusi, *The Performance of Liability Insurance in States with Different Products-Liability Statutes*, 19 *The Journal of Legal Studies*. 809 (1990)

Available at: <https://scholarship.law.vanderbilt.edu/faculty-publications/133>

This Article is brought to you for free and open access by the Faculty Scholarship at Scholarship@Vanderbilt Law. It has been accepted for inclusion in Vanderbilt Law School Faculty Publications by an authorized administrator of Scholarship@Vanderbilt Law. For more information, please contact mark.j.williams@vanderbilt.edu.

HEINONLINE

Citation: 19 J. Legal Stud. 809 1990

Content downloaded/printed from
HeinOnline (<http://heinonline.org>)
Thu Aug 23 11:24:24 2012

- Your use of this HeinOnline PDF indicates your acceptance of HeinOnline's Terms and Conditions of the license agreement available at <http://heinonline.org/HOL/License>
- The search text of this PDF is generated from uncorrected OCR text.
- To obtain permission to use this article beyond the scope of your HeinOnline license, please use:

[https://www.copyright.com/ccc/basicSearch.do?
&operation=go&searchType=0
&lastSearch=simple&all=on&titleOrStdNo=0047-2530](https://www.copyright.com/ccc/basicSearch.do?&operation=go&searchType=0&lastSearch=simple&all=on&titleOrStdNo=0047-2530)



VANDERBILT
UNIVERSITY

DiscoverArchive

Retrieved from DiscoverArchive,
Vanderbilt University's Institutional Repository

Originally published as W. Kip Viscusi, The Performance of Liability Insurance in States with Different Products-liability Statutes in 19 J. Legal Stud. 809 1990.

THE PERFORMANCE OF LIABILITY INSURANCE IN STATES WITH DIFFERENT PRODUCTS-LIABILITY STATUTES

W. KIP VISCUSI*

I. INSURANCE AND TORT LAW

THE liability crisis of the mid-1980s has led to an extensive reexamination of the liability system. A number of explanations have been offered for the substantial increase in insurance premiums and, in some cases, a decline in the availability of insurance. These include stimulation of the underwriting cycle by a decline in interest rates, collusion among insurance firms, rising tort costs, and uncertainty with respect to the liability burden.¹ Most observers, however, also point to changes in tort law itself. For example, plaintiffs may now have a more favorable environment for obtaining an award and, if they are successful, they may receive a larger award than in earlier eras. In addition, changes in the legal environment may have fostered considerable uncertainty that itself increases the costs insurance companies face.

The liability crisis has led to reassessments of the state of tort law and explorations of ways in which it can be improved. A variety of legal reform groups, a Department of Justice task force, and a recent spate of

* George G. Allen Professor of Economics, Duke University, and Associate Reporter, American Law Institute Project on Compensation and Liability for Product and Process Injuries. Thomas Dunn and Sharon Tennyson provided excellent research assistance.

¹ For perspectives on the liability crisis, see Kenneth Abraham, *The Causes of the Insurance Crisis*, 37 *Proc. Acad. Pol. Sci.* 54 (1988); Kenneth Abraham, *Making Sense of the Liability Crisis*, 48 *Ohio St. L. J.* 399 (1987); George L. Priest, *The Current Insurance Crisis and Modern Tort Law*, 96 *Yale L. J.* 1521 (1987); Ralph A. Winter, *The Liability Crisis and the Dynamics of Competitive Insurance Markets*, 5 *Yale J. Reg.* 455 (1988); Alan Schwartz, *Proposals for Products Liability Reform: A Theoretical Synthesis*, 97 *Yale L. J.* 357 (1988); and Michael J. Trebilcock, *The Social Insurance-Deterrence Dilemma of Modern North American Tort Law: A Canadian Perspective on the Product Liability Insurance Crisis*, 24 *San Diego L. Rev.* 929 (1987).

conferences have all addressed aspects of the liability crisis and ways in which the law can be restructured. A wide variety of states have also begun legislative initiatives to limit tort recoveries. Among the more popular measures are caps and restrictions on punitive damages, caps on pain and suffering damages, modifications in comparative negligence standards, limits on the application of joint and several liability, changes in collateral source rules, and limits on government liability.

Most of these changes came in the late 1980s, and it is too early to assess their implications. It is, however, possible to explore the role that earlier statutory reforms have had. Not all states have products-liability statutes, and those statutes that have been enacted differ considerably. This article focuses on how the performance of products-liability insurance varies with the statutory regime by using the complete insurance files for the products-liability–bodily injury lines of the Insurance Services Office (ISO). Section II provides an overview of how the exposure of insurance companies varies under different statutory regimes. A law that increases the availability of insurance should lead to more insurance being written and, hence, to greater levels of exposure. After this overview, the article examines specific products-liability statutes, including products-liability definitions in Section III, state-of-the-art defenses in Section IV, statutes of limitation in Section V, and collateral source rules and damages rules in Section VI. Section VII contains a multivariate regression analysis of premium levels, providing a third set of tests for the effect of statutory provisions. I conclude that differences in the character of state liability statutes are associated with dramatic differences in the performance of insurance across states—differences that persist over time. The failure of the insurance market to adjust completely for differences in statutory regimes illustrates its distinct character.

II. THE CHANGING STRUCTURE OF LIABILITY

Subsequent sections will be concerned with how specific state liability statutes affect various measures of insurance market performance. It is helpful first, however, to obtain an overview of the principal ramifications of the differences in products-liability laws across states. I have divided states into a succession of sets of binary groupings based on whether they have particular products-liability statutory provisions. There are systematic differences between each pair of groups. However, several caveats are in order. First, these sets overlap to some extent. Hence, the analysis is not the equivalent of a multivariate analysis that distinguishes the magnitude of the effect of each class of influences. (Such an analysis appears in Section VII for the overall premium level.) Moreover, these statutory

provisions may simply serve as a proxy for measuring the general character of the products-liability regime across states, including a diverse set of legislative and legal factors that extend far beyond the details of the particular statutory provisions. As a consequence, using the results below to predict the absolute magnitude of the expected effects of particular liability reforms overstates the likely effects. (The multivariate results in Section VII are better suited to this purpose.)

Notwithstanding these caveats, the analysis does show systematic differences across states based on legal regimes. The differences observed are in the expected direction, and they are substantial and persistent. These phenomena tell us not only that legal regimes matter but also that actual insurance markets work differently from those in a perfectly functioning competitive market with no adjustment lags. If companies had full information regarding the expected losses, premium levels would adjust to equalize the profitability of insurance across states. The loss ratios should not differ by state. Many of the phenomena in the subsequent tables are a consequence of the long time lags before the loss history of a policy is established and can be used in setting the subsequent rate structure.

Much of the subsequent discussion is premised on the idea that a well-functioning insurance market is socially beneficial. This normative premise is quite different from a belief that firms' liability levels should be reduced. Higher levels of risk will simply raise the price of insurance and will not threaten the viability of the market. By contrast, volatile shifts in liability rules would affect insurance firms' willingness to provide coverage.

Denials of insurance and, more generally, the absence of a well-functioning insurance market generate efficiency losses for risk-averse firms. If there are other social objectives that will be advanced by creating a situation that leads to uninsurable risks, then these benefits should be balanced against the efficiency losses they generate. For the purposes of this article, I adopt the usual economic assumption that efficiently functioning insurance markets are desirable.

In this section, I assess the performance of the liability insurance market by seeing whether insurance coverage increases less in states that have not enacted the various statutes. A major theme of the literature on the products-liability crisis is that the crisis has been one of availability. Relative changes in insurance coverage address this issue. Other things being equal, in a world in which there is inflation, insurance coverage must increase to remain equally available. Legal regimes in which insurance coverage does not increase are likely to be the ones in which insurance becomes less available.

The data analyzed to address this issue represent the complete insurance files of the Insurance Services Office for bodily injury coverage in the products-liability insurance line. Member companies provide detailed information to this industry organization, which then pools and analyzes the information for rate-making purposes. Subsequent tables summarize computer files that have been aggregated based on interstate differences in the products-liability statutes. The time period under study is 1980–84, the period covered by available data.

This article makes five sets of distinctions with respect to the products-liability statutes in place in the various states. The breakdowns are whether there is a statute providing (1) definitions of key products-liability concepts, (2) a state-of-the-art defense, (3) a statute of limitations for producer liability, (4) collateral source rules, or (5) damages rules. (These concepts are described in greater detail in subsequent sections.) The main concern here, however, is that these various provisions should have effects that are broadly similar in character. Each should improve the liability climate for the insurance industry. The breakdowns embody broad sets of statutory distinctions identified in the literature on state differences in liability law. These breakdowns represent a systematic basis for categorizing these statutory differences and represent categorizations that are not sensitive to subjective judgments in classification.

Three aspects of these categorizations should be noted. First, there is some heterogeneity within these groups. For example, the statute of limitations provisions vary for the states with such explicit statutes. These provisions do not, however, always lend themselves to ordering and quantification, so that it is not feasible to develop a quantitative metric to capture the statutory distinctions. Thus, this article puts each state into one group or another, rather than using scaled variables. The statistical breakdowns will, consequently, reflect the average performance of the liability law category. Second, the statutory provisions are for specific products-liability statutes rather than for torts statutes of various types. If there is a correlation between torts statute provisions, or other aspects of the states' legal environments, and products-liability statutes, then the analysis would reflect these differences as well. Third, the categorizations involve overlapping groups, as, for example, states with products-liability definitions include subsets of almost all of the subsequent provisions. The intent of the analysis is not to assess the incremental effect of each liability provision but, rather, to assess whether differences in legal regimes matter. Each of the statutory provisions consequently will serve as a proxy for differences in legal environments.

State products-liability rate regulations were not a binding constraint during the time period under consideration since this was a period of

substantial price competition. It is the tort environment rather than the regulatory environment that will be the main source of variation.

The ISO data give the state in which the policy was written. For the types of smaller product operations represented in the data set, as well as the particular industry mix, it is likely that most product operations will be local rather than national. Plaintiffs are therefore likely to be injured in the state in which the policy was written and to file their lawsuits there. In particular, as a total average premium level of \$317 million over the 1980–84 period suggests, many of the largest firms self-insured rather than purchase insurance through ISO affiliates. Notable examples of firms that have self-insured, or sought special coverage not included in the data, are those firms in the pharmaceutical industry and the asbestos industry.

In addition, the industry mix of firms in the sample consists largely of firms that have construction-related activities, which will tend to be more local in character than the operations of firms that mass produce consumer goods for a national market. The top ten product groups for products-liability premiums in 1984 were the following: miscellaneous services, carpentry, general contracting, wholesalers, metalware manufacturing, lumberyards, general contracting, electrical wiring, furniture manufacturing, and machine parts. The services and construction-related product groups constitute by far the dominant portion of these groups.

The state indicators could also be unreliable if firms used out-of-state offices to get coverage written in a state that had lower rates than the state in which its products are used. There is, however, little incentive for firms to seek insurance by establishing an out-of-state office to purchase it. Not only are state insurance regulations not a binding constraint during the period being considered, but the rate-setting process is on a product basis, not a state basis. The ISO establishes manual rates on the basis of five-digit product codes, and these rates are national in scope. The insurance underwriter can make a deviation in these rates based on state differences in liability regimes, but it will be unlikely to depart from these rates on the basis of the insured's corporate headquarters, rather than, for example, the location of its principal place of business. The latter seems a more reliable index of the law that will apply. In particular, the law applied to any tort is usually the substantive law of the jurisdiction in which the suit is brought.

One should also note the direction of the bias, if any, that results from assuming the law governing the policy is the law of the state in which the policy is written. To the extent that firms in the sample market their products nationally rather than within a particular state, there will be a muting of the patterns that are observed. Random measurement error of this type will imply that the actual linkages between products-liability

TABLE 1
EXPOSURE CHANGES AND PREMIUM LEVELS FOR STATE LIABILITY LAW GROUPS

	Percentage of 1980 Premiums with Increase in Exposure, 1980-84	Percentage of Total Premiums in 1980
Products-liability definitions:		
States with	68.7	44.8
States without	54.5	55.2
State-of-the-art defense:		
States with	70.5	16.7
States without	54.3	83.3
Statute of limitations:		
States with	76.6	28.6
States without	49.4	71.4
Collateral source rules:		
States with	64.4	8.4
States without	56.0	91.6
Damages rules:		
States with	69.3	38.1
States without	53.2	61.9

statutes and insurance performance are greater than those implied by the data in the subsequent tables.

The first column of data in Table 1 summarizes the percentage of premiums for policies that experienced an increase in exposure from 1980-84. The policy unit being analyzed is the individual insurance policy written for bodily injury coverage. Each of these policies is given a five-digit industry classification code by the Insurance Services Office. The level of aggregation considered here recognizes each individual policy within these five-digit codes as a separate observation. Thus, the degree of disaggregation in the sample is as great as is possible within insurance contexts. In particular, the procedure used was to examine which policies exhibited an increase in exposure from 1980-84. Since policies involve different levels of total coverage, some weighting system was needed to establish the share of the market experiencing an increase in exposure. The weights used are the premiums for the policies, so that the entries in Table 1 are the premiums associated with policies that experienced an increase in exposure levels, divided by the total value of all policy premiums written in states with a particular liability regime. The second column in Table 1 gives the percentage of the 1980 total premium level in states with and without various provisions, to provide a sense of the difference in the prevalence of the various legal provisions—which is substantial.

Focusing on the premiums that experienced exposure increases from 1980–84 provides a measure of insurance availability. One would have expected substantial growth in insurance coverage in these years. Prices for the economy as a whole rose by 26 percent, and the gross national product (GNP) grew by 38 percent during this period.² Failure of exposure levels to rise at all is consequently a measure of a substantial decline in expected coverage. As the subsequent sections show, premiums also declined, which may be a sign of an insurance crisis, but the premium trend could also be a reflection of declining losses and lower prices of insurance. As a result, a better single summary statistic of the presence of insurance availability is the total exposure level.

The exposure level is typically expressed in terms of dollars of coverage, although in some instances it is not. The units may be physical rather than monetary. Thus, it is not always possible to aggregate units of exposure across product groups. As a result, Table 1 focuses on the percentage of premiums representing individual insureds who experienced an increase in the total exposure amount for the coverage written over the 1980–84 period. The problem of noncomparable units of measurement can consequently be overcome. Given the substantial rise in both prices and GNP, the failure to exhibit an increase in exposure should be a signal of a substantial denial of coverage for that type of policy.

With respect to each kind of products-liability statute, exposure levels were more likely to increase for a given type of policy in states with the statutory provision. The differences involved are of considerable magnitude. The smallest difference is for collateral source rules, where there is an 8.4 percent gap in the premium percentage exhibiting an increase in exposure. The greatest difference is a 27.2 percent gap based on the presence of statute-of-limitation provisions.

By most usual standards for empirical research, the observed differences represent stunning support of the hypothesis that differences in tort law affect the availability of insurance. (Many similarly dramatic effects will be observed in subsequent sections.) Standard errors of the estimates are not reported because all reported differences are statistically significant, given the immense sample size.

The strength of these effects suggests that other forces may be at work as well. Thus, fourteen states that have adopted one particular set of statutory provisions may have undertaken other measures as well. For example, a state that has specified key definitions relating to product liability may also be likely to have other laws. Such definitions serve in part as a proxy for whether the state has a statute that addresses products-

² Economic Report of the President 308, 373 (1989).

liability issues in a comprehensive manner. Even with this broader interpretation, however, the existence of differences across states suggests that state variations in legal structure can be of substantial import. These interpretive caveats should be kept in mind when considering the subsequent results.

III. PRODUCTS-LIABILITY DEFINITIONS³

This section looks at those states that had a products-liability statute that defined some of the key terms arising in products-liability contexts and compares them with states that did not. These provisions are of several types—the most general define the character of the parties and some of the legal concepts. What attributes must one have to be classified as a “seller,” a “manufacturer,” or a “user or consumer”? Similarly, what constitutes a “product,” or a “harm,” a “state-of-the-art” design, a “reasonably foreseeable alteration,” or “reasonably anticipated conduct”?

Twenty-five of the fifty states have statutes that include such definitions. The definitions are usually a part of a products-liability statute. All states have statutory provisions relating to tort law more generally, and all but one state (Wyoming) has a statute that relates to specific doctrines that may arise in products-liability contexts such as strict liability. The presence of products-liability definitions thus serves in part as a proxy for whether a state has specific statutory provisions that articulate the character of the products-liability law in that state, rather than of tort law more generally.

Moreover, definitions tend to be restrictive in nature. By defining principles such as “state of the art,” the legislature inhibits the leeway of the courts in these areas. Although definitions are, to some extent, neutral, in practice they limit the scope of product liability. In the short run, these statutory provisions may temporarily increase ambiguity because courts must interpret them. In the long run, however, definitions reduce ambiguity, and it is this ambiguity that some observers believe has contributed to the liability crisis.

Complications could arise if states added to or repealed their products-liability statutes during the period I am studying. For the most part, however, the groupings changed very little. One can view the liability-doctrine categories as being predetermined, rather than as a simultaneously determined factor. Of the twenty-five states with products-liabil-

³ The characterization of products-liability definitions below is based in part on the state summaries prepared by the National Conference of State Legislatures, *Summary of State Statutes on Products Liability 2* (Robert Boerman comp. 1988).

ity definitions, twenty-two did not have any changes in the statutes from 1980–84. Of the three states with any changes, one (Idaho) involved the addition of a subsection to the existing definitions in 1980, and two states (Washington and Kansas) added a set of products-liability definition provisions in 1981. Overall, there was very little change in the mix of states with products-liability definitions or in the nature of these definitions from 1980–84. Moreover, from 1981–84 there were no changes whatsoever.

The data in Table 2 illustrate the connection between these liability definitions and products-liability insurance. The main insurance measure included is the loss ratio by year. In general, the loss ratio is defined as the ratio of losses paid to premiums in any given year. The inverse of the loss ratio consequently serves as a measure of the effective price of insurance. If the loss ratio were 1.0, then insurance would be actuarially fair if we ignore the lag time before the losses are filed with the insurer. Administrative costs and the need for a reasonable rate of return will lead to loss ratios below 1.0 if an insurance company is to be viable in the long run, if, again, we ignore the effect of the time lag. If refined data were available on the temporal distribution of the losses, it would be the present value of the losses, plus the administrative costs that should not exceed the premiums, plus any return on the premiums if a policy is to earn a profit. Because of these complications, the discussion below focuses primarily on differences and changes in loss ratios rather than on their level.

The loss-ratio data in Table 2 reflect a matchup between the losses experienced and the year the policy was written. Thus, a loss that is paid in 1987 on a policy written in 1980 is charged against the loss ratio in the original insurance year, 1980. Several factors drive the length of the delay between the time when policies are written and the date the losses are recorded. First, the loss may not occur in the year the policy is written. There may be a lag before the accidental event occurs (for example, a part breaks) or before the ramifications of an adverse product effect become apparent (for example, deferred health effects). Delays also arise because of the nature of the claim settlement process. There is typically some lag between the time of the accident and the filing of a claim, after which there may be a period of prolonged negotiation and perhaps litigation as well.

Because of these lags, the losses that appear in the loss ratio generally occur at a later time period than the premiums. Insurance firms can invest the premiums and earn a return before the losses must be paid, so that the estimated loss ratios in Table 2 overstate the present value of the loss ratio. Moreover, the longer the tail involved in the insurance line, the more these estimated loss ratios will understate the profitability of insurance.

TABLE 2
LOSS RATIOS BASED ON STATE PRODUCTS-LIABILITY DEFINITIONS

	1980	1981	1982	1983	1984	1980-84 Average	Percentage Change, 1980-84
States with products- liability definitions:							
Loss ratio	.76	.67	.87	.97	.77	.81	.74
Premiums (\$millions)	152.14	128.54	108.58	106.45	126.91	124.52	-16.59
States without products- liability definitions:							
Loss ratio	.97	.96	.98	1.07	.88	.97	-9.75
Premiums (\$millions)	209.03	194.73	171.50	178.50	206.37	192.02	-1.27
Ratio of states with/ states without:							
Loss ratio	.78	.70	.89	.91	.88	.84	12.82
Premiums (\$millions)	.73	.66	.63	.60	.62	.65	-15.07

The net effect of such factors is that the observed losses to date do not fully capture the losses that will be ultimately experienced. To adjust for these lags, the losses that constitute the numerators of the loss ratios in Table 2 consist of two components—the actual loss to date plus the additional amount expected to occur. These projections are obtained using the loss-projection factors developed by the Insurance Services Office based on past claims histories. The second insurance component in Table 2—premium levels—involves no such projection.

For both loss ratios and premiums, Table 2 summarizes the pertinent trends from 1980–84, the five-year average, and the five-year percentage change. Whereas Section II focused on policies in different categories, using the premium values as weights, Table 2 focuses on premiums directly since policies are not being distinguished according to measures of performance such as a change in exposure level. Although the number of states with and without statutory definitions for products liability are equal, the division of the premium income is not. States without such definitions write about half again as much insurance, a result that reflects the presence of some very large states, such as California and New York, in this group.

Wholly apart from the distinctions being made across states in terms of the presence of statutory provisions pertaining to products liability, there are several quite striking aspects of the table. One would expect a smoothly functioning insurance market to behave differently. Assuming that the temporal distribution of claims does not change greatly from year to year, with a large sample of products-liability policies in the companies' portfolios, these losses should be relatively uniform over time, leading to reasonably stable loss ratios.

The data in Table 2 provide quite a different picture of this segment of the insurance industry. First, the loss ratios are quite unstable, particularly for the states with products-liability definitions, where they fluctuate from 0.76 to 0.97. For more narrowly defined categories, such as particular product groups, this pattern becomes even more volatile. Second, the source of the industry's complaints about a products-liability crisis is apparent, as the profitability of insurance is much lower in states that have not adopted statutes with limiting definitions.

Perhaps the most surprising result, from an economic perspective, is the persistence of different levels of loss ratios across the two state groups. States with statutory products-liability definitions tend to exhibit consistently lower loss ratios than those without such definitions. Although the presence of some effect is expected, it should not persist over a long period of time. Assuming similar temporal distributions of claims, competitively priced insurance policies should have the same expected

loss ratios across such groups of states, as insurance companies in states that have undertaken successful reform efforts would be forced by price competition to have relatively lower rates. Thus, in the long run, the terms of the policies should adjust so that the marginal policy offered in each state is equally profitable.

If one views the loss ratio as the principal measure of the viability of an insurance market, then the implications of Table 2 are clear. States that have statutes that include products-liability definitions have a consistently lower loss ratio than those that do not. Over the five-year period analyzed, the gap has been narrowing, as one would expect. The loss ratios for the states with products-liability definitions were relatively invariant from 1980–84, but there was a decline in the loss ratios for the states without such statutory definitions.

The comparisons that appear at the bottom of Table 2 are perhaps the most telling. The loss ratio in states with products-liability definitions relative to states without such definitions was quite low in 1980 and 1981, but for the 1982–84 period was roughly 0.9 on average. These ratios provide a more stable pattern than the figures in the first two panels of Table 2 because they control, at least in part, for factors that affect loss ratios in all states similarly—such as changes in insurance market competition or fluctuations in interest rates. Premium information is less relevant since it reflects other economic factors such as the growth in the industries in the affected states. In the case of both state groups, premiums fell in the middle time period and rose by 1984, which parallels the general economic trends.

These data suggest that states with statutes including products-liability definitions provide a consistently more profitable context for product risk insurance. It would be an oversimplification to conclude that it is the definitions themselves driving this result. Because such definitions tend to be an integral part of the statutory treatment of liability, a more reasonable interpretation is that the definitions variable serves as a proxy for statutory provisions that, on balance, foster a more profitable environment for the insurer.

IV. STATE-OF-THE-ART DEFENSES

Less prevalent than the products-liability definitions are statutory provisions that relate to the state-of-the-art defense.⁴ Fourteen states have

⁴ Thomas V. Harris, *Enhanced Injury Theory: An Analytical Framework*, 8 J. Prod. Liab. 246–74 (1985) is the source of the state-by-state categorizations of the state-of-the-art defense provisions.

products-liability statutes dealing with the state-of-the-art concept, where twelve of this group also had statutory products-liability definitions. Thus, treatment of the state-of-the-art issue is roughly a subset of our earlier categorization.

A precise definition of the state-of-the-art concept has proved elusive. What constitutes a state-of-the-art design? Is it sufficient for a manufacturer to comply with standard industry practice at the time of the product's manufacture? Must it take advantage of other technologies that are available when it is feasible to do so, and if so, what yardstick should be used to assess feasibility? These generic issues arise in regulatory contexts as well, and they are very hard to resolve. Indeed, the Model Uniform Products Liability Act notes the ambiguity of the state-of-the-art concept and only clarifies it to the extent that it implies that "all post-manufacturing change is excluded from evidence."⁵

Actual state-of-the-art statutory provisions reflect this uncertainty. In some states, such as Indiana and Kentucky, a firm is not responsible for incorporating technical advancement in the design of a product.⁶ There is not a similar exemption for warnings. However, a producer may be obliged to disseminate warning information to consumers subsequent to their purchase of the product even if the product risk became known only after the sale. A second form of state-of-the-art provision appearing in several state statutes (including Tennessee and Washington) is that a rebuttable presumption is established that the product is not unreasonably dangerous if it is in compliance with government standards.⁷

Only one of the fourteen states with statutory provisions including state-of-the-art defenses introduced these provisions in the 1980–84 period. That state, Washington, did so in 1981. One other state (Idaho) made a minor modification—a change in one subsection. Overall, the set of state-of-the-art provisions and the states with them were completely unchanged from 1982–84 and exhibited very little change in 1980–81. The ISO data consequently allow us to compare two fairly stable sets of legal regimes.

To assess the effect of such provisions, consider the data in Table 3, which summarizes several of the key series of insurance data for states with and without products-liability statutes that have provisions relating to the state-of-the-art defense. The rather infrequent adoption of such

⁵ Model Uniform Products Liability Act § 107, 44 Fed. Reg. 62,714, 62,728–29 (1979).

⁶ Ind. Code § 33-1-1.5-4 (1988), and Ky. Rev. Stat. Ann. (Cum. Supp.) § 411.310(2) (Michie, 1988).

⁷ Tenn. Code Ann. § 29-28-105(b) (1980), and Wash. Rev. Code Ann. § 7.72.050(1) (1989).

TABLE 3
LOSS RATIOS AND NUMBER OF CLAIMS AS A FUNCTION OF STATE-OF-THE-ART DEFENSES

	1980	1981	1982	1983	1984	1980-84 Average	Percentage Change, 1980-84
States with state-of-the-art defenses:							
Loss ratio	.67	.83	.93	.84	.69	.79	3.14
Number of claims (thousands)	2.89	2.88	2.85	2.73	2.51	2.77	-13.05
Premiums (\$millions)	58.96	49.50	43.90	45.07	54.58	50.38	-7.60
States without state-of-the-art defenses:							
Loss ratio	.93	.85	.94	1.07	.86	.93	-6.64
Number of claims (thousands)	17.35	18.34	16.33	17.51	16.02	17.11	-7.66
Premiums (\$millions)	302.21	273.76	236.19	239.88	278.79	266.17	-7.75
Ratio of states with/states without:							
Loss ratio	.72	.98	.99	.79	.80	.85	11.11
Number of claims (thousands)	.17	.16	.17	.16	.16	.16	-5.88
Premiums (\$millions)	.20	.18	.19	.19	.20	.19	.00

provisions is reflected in the premium levels, as states with such provisions averaged only 16 percent of premiums from 1980–84.

Nevertheless, the distinctions across the states with and without such provision are both dramatic and consistent with the earlier results for products-liability definitions. Over the 1980–84 period, the loss ratio averaged 0.79 for states with state-of-the-art provisions, as compared with a 0.93 average for states without such provisions. The patterns appear to be quite volatile, however. Although the loss ratios for the two groupings are almost identical in 1981 and 1982, for 1980 and the 1983–84 period, a gap remains that appears to be reasonably persistent. Over the entire 1980–84 period, the loss ratio for states with state-of-the-art defenses displays a somewhat modest 3 percent increase, and the loss ratios for the other states are declining, so that there is some narrowing of the loss-ratio gap. This narrowing is expected, but what is striking is that there appears to be a large and persistent spread. The loss ratios in the group with state-of-the-art defense are .26 lower in 1980 and .17 lower in 1984. As the bottom panel indicates, the loss ratio in these states, relative to states without such provisions, is roughly 0.8 in 1983–84. The major economic issue raised by this disparity is how such substantial differences could persist over the long run.

The trend in the number of claims summarized in Table 3 is also instructive. State-of-the-art provisions presumably affect the plaintiff's prospects of success more than they influence the amount of damages. Thus, they are primarily relevant to determining whether a claim will be successful, and if these provisions diminish the prospects for success, they will also dampen the incentive to file a claim. Over the 1980–84 period, the total amount of premiums paid declined by almost 8 percent for both state groups. One would have expected a similar decline in claims levels in the two groups, but it is somewhat surprising that the drop in the number of claims is 1.7 times as large in the states with state-of-the-art statutory provisions.

As in the case of the loss ratios, these data suggest two sets of conclusions. First, differences in state torts statutes have a strong effect on the performance of insurance markets in these jurisdictions. The extent to which this is a causal relationship rather than a simple correlation will be distinguished in the regression analysis in Section VII. Regardless, the correlations and the extent of the differences are of independent interest. Second, the observed differences suggest the presence of a liability environment that is more favorable to insurance firms in states with liability statutes. To the extent the exposure results in Section II indicate a decrease in denials of coverage, this relationship has normative significance as well.

V. STATUTES OF LIMITATION

Fifteen states have special statutes of limitation for products-liability cases.⁸ Eleven of these fifteen also have products-liability statutes that have the definitions discussed in Section III—there continues to be substantial overlap with this group. The fifteen states represented account for 27 percent of all products-liability premiums. The set of states with statutes of limitation specified in products-liability statutes remained almost invariant over the 1980–84 period. One state introduced such a provision in 1980, but otherwise there was substantial stability. Statutes of limitation are particularly pertinent with respect to older products that were developed with earlier technologies, and that may develop defects over time. The difficulties posed by older products have long been noted, as the Department of Commerce viewed this as a major area in need of liability reform.⁹

The character of the statutes of limitation provisions in products-liability statutes varies across states. In some instances, there is a time limit for filing a claim after an injury occurs, as in the case of Alabama, where this limit is one year.¹⁰ A second form of limitation focuses on the useful life of the product, as in Idaho.¹¹ A third variant is a limit based on the time after which the original purchaser of the product parted with possession or control of the product, as in the case of Connecticut, where this limit is ten years.¹² Similarly, there may be a time limit imposed after the original delivery to the consumer, such as that imposed in Indiana.¹³ Although the character and nuances of the liability provisions vary considerably, the essential thrust of these provisions is similar. In each case, the imposition of a time limit for potential liability should enhance the ability of the insurer to limit the potential losses associated with the policies that have been written.

The data in Table 4, however, do not provide the sharp contrasts we saw earlier. Perhaps the main reason for this difference is that some of the key long-tail lines are not included in the sample. Chief among these omitted products is asbestos, which is the product with by far the largest number of claims for which statutes of limitation are relevant. The loss

⁸ Report of the Committees of the Section of Tort and Insurance Practice, ABA, 1979–80, Appendix A, Overview, 16 F. 438–43 (1981) is the source of the statutes of limitation breakdown.

⁹ U.S. Dep't Comm., Draft Unif. Prod. Liab. Law, 44 Fed. Reg. 2,996, 3,008 (1979).

¹⁰ Ala. Code 1975 (Cum. Supp. 1989) § 6-5-502 (Michie, 1989).

¹¹ Idaho Code Cum. Supp. § [6-1403]6-1303 (1989).

¹² Conn. Gen. Stat. Ann. (West Supp. 1980) § 52-577(a).

¹³ Ind. Code, *supra* note 6, § 33-1-1.5-5.

TABLE 4
TRENDS IN LOSS RATIOS AND LOSS/CLAIM AS A FUNCTION OF STATUTES OF LIMITATIONS

	1980	1981	1982	1983	1984	1980-84 Average	Percentage Change, 1980-84
States with statutes of limitations:							
Loss ratio	.93	.87	.99	1.02	.85	.93	-8.21
Loss/claim (\$thousands)	19.40	12.76	13.41	14.13	15.25	14.99	-21.39
Premiums (\$millions)	99.97	85.97	76.04	77.46	94.72	86.83	-5.25
States without statutes of limitations:							
Loss ratio	.86	.84	.92	1.04	.83	.90	-4.32
Loss/claim (\$thousands)	14.61	12.88	13.85	14.68	14.91	14.19	2.01
Premiums (\$millions)	261.20	237.30	204.04	207.49	238.55	229.72	-8.67
Ratio of states with/states without:							
Loss ratio	1.12	1.04	1.08	.98	1.02	1.03	-.09
Loss/claim	1.32	.99	.97	.96	1.02	1.06	-.23
Premiums	.38	.36	.37	.37	.40	.38	+.05

ratios are somewhat higher in the states with products-liability statutes that include statutes of limitation provisions. The states' relative loss ratios in Table 4 illustrate this relationship most clearly. This minor difference may not represent an adverse influence but instead may be a consequence of the claims mix. The severity of the losses is greater in states with these provisions, at least in part because of differences in the product mix. For the 1980–84 period, the loss ratio was 3 percent higher for states with statutes of limitation, but the loss per claim was 6 percent greater. Statutes of limitation may be effective in limiting the number of successful claims, but they are not so influential that they offset the influence of the difference in loss severity. The trend in the loss ratio is, however, favorable for states with statutes of limitation so that the provisions may be influential in terms of limiting any decrease in the viability of insurance.

VI. COLLATERAL SOURCE RULES AND DAMAGES RULES

The size of the payoffs that insurance companies must make will decline if there are collateral source rules or other damages provisions that prevent plaintiffs from obtaining multiple recoveries for a particular injury.¹⁴ The character of these provisions is fairly similar, and I consider each of them in turn. Collateral source rules are included in products-liability statutes infrequently. Only seven states, representing 8 percent of the premiums, have such provisions. Other damages provisions, which often are quite similar in character to collateral source rules, are more prevalent. They are present in fifteen states that have 28 percent of the total insurance premiums.

Of the seven states with collateral source statutory provisions in their products-liability codes, none experienced a change in the provisions from 1980–84. Collateral source provisions tend to be fairly limited in terms of their scope. For example, Alabama limits the plaintiff's recovery of medical and hospital expenses to only one source.¹⁵ The rationale for this restriction is to avoid double-dipping: "It is the intent of the legislature that plaintiffs be compensated fully for any medical or hospital expenses incurred as a result of injuries sustained from a breach of product liability laws, but that plaintiffs not receive compensation more than once for the same medical and hospital expenses."¹⁶

The damages provisions are often similar in character to the collateral

¹⁴ The source of the state breakdowns for collateral source rules and damages is the National Conference on State Legislatures, *supra* note 3.

¹⁵ Ala. Code Cum. Supp. 1989 § 6-5-520 (Michie, 1989).

¹⁶ *Id.*

source rules even though they are not designated as such. Of the fifteen states with damages provisions, two underwent some change in the 1980–84 period. For example, in addition to its collateral source rules, Alabama’s products-liability statutes also provide that “evidence of medical expenses reimbursement mitigates damages.”¹⁷ In some states, the damages provisions in the statute arise in the context of joint torts. Under these, the liability of each party is tied to the percentage of the fault attributable to each. The ramifications of the frequently complex damages provisions often are not clear since they may improve the legal environment of the plaintiff.¹⁸ This cautionary observation will be borne out in the character of the supporting empirical results. Damages limitations were introduced in Idaho in 1980 and in Illinois in 1982. For the most part, these changes do not affect the composition of the statutory reference group samples since the states altered the provisions in 1980–82.

Examination of insurance rate trends in Table 5 provides a detailed perspective on the character of the liability crisis that emerged in the mid-1980s and on the role of collateral source provisions. A rise in loss ratios leading to loss ratios that are, in some instances, at or close to 1.0 will reduce the profitability of insurance. The drop in coverage is consistent with explanations that cite an availability crisis, but it should also be noted that, even without quantity rationing, a quantity decline would also be observed in response to higher prices. Explanations of the liability crisis that attribute the phenomenon to collusion among firms do not appear to be consistent with the data, particularly given the unfavorable implications of high and volatile loss ratios on insurance firms’ profitability. Increased costs associated with changes in tort liability are certainly influential, but perhaps the most critical factor is that these higher costs have been coupled with long tails for these loss distributions. Thus, there will be a substantial time lag before losses under a policy occur and can be incorporated into the premium structure for subsequent years.

The loss ratio in states with collateral source rules is substantially below that in those without them. Although the 1980 loss-ratio difference of .20 had narrowed to .13 by 1984, the discrepancy was still substantial and difficult to reconcile with efficient insurance pricing. The statistics in Table 5, which give the relative loss ratios in the two groups of states, indicate consistently lower loss ratios in the states with collateral source provisions, except in 1981. Over the 1980–84 period, the loss-per-claim amount was 7 percent lower in states with collateral source rules, which is

¹⁷ *Id.*

¹⁸ 1973 Colo. Rev. Stat. § 13-21-406 (1987).

TABLE 5
TRENDS IN LOSS/CLAIM AND LOSS RATIO AS A FUNCTION OF COLLATERAL SOURCE RULES

	1980	1981	1982	1983	1984	1980-84 Average	Percentage Change, 1980-84
States with collateral source rules:							
Loss/claim (\$thousands)	12.21	13.26	12.80	14.48	14.74	13.50	20.67
Loss ratio	.70	.91	.78	.82	.72	.79	2.60
Premiums (\$millions)	30.08	26.79	24.05	23.86	27.21	26.40	-9.52
States without collateral source rules:							
Loss/claim (\$thousands)	16.08	12.81	13.80	14.53	15.03	14.45	-6.52
Loss ratio	.90	.84	.95	1.05	.85	.92	-6.03
Premiums (\$millions)	331.09	296.48	256.03	261.09	306.06	290.15	-7.56
Ratio of states with/states without:							
Loss/claim	.76	1.04	.93	1.00	.98	.93	.29
Loss ratio	.78	1.08	.82	.78	.85	.86	.09
Premiums	.09	.09	.09	.09	.09	.09	.00

also consistent with the expected effect. Most of this difference stems from the loss per claim difference in 1982, and particularly in 1980. It is especially remarkable that premium trends are identical in both sets of states, at least for the 1980 and 1984 reference years. The difference in the percentage of premiums experiencing an increase in the exposure level was also narrowest in the case of the collateral source rule (see Table 2).

In the case of the damages provisions, there is also a substantial discrepancy in the loss ratio between the state groups with and without these statutory provisions. The loss ratios reported in Table 6 average .07 lower in the states with damages rules, so that once again the existence of specific statutory provisions relating to damages enhances the profitability of the insurance. Although the loss per claim amount is somewhat greater in states with damages rules, over the 1981–84 period, this difference is dramatically reduced, as there is a 26 percent drop in the loss per claim amount in the states with damages rules. Indeed, the early high loss/claim amounts may have served in part as the impetus for adopting damages limits. Two states adopted damages limits in the early 1980s and others did so in the 1970s, so there may be a lag before their full effect can be generated.

VII. REGRESSION ANALYSIS OF INSURANCE PREMIUMS

As a final perspective on the potential influence of state differences in products-liability statutory provisions, I will consider the effect of these statutory variables once included in a regression analysis of the determinants of premiums. Two equations will be estimated to provide alternative perspectives on the factors that influence premiums. In the first case, economic and legal variables will be included, where all of these variables pertain to current factors influencing premiums. In particular, this equation will be of the form

$$\begin{aligned} \text{Premiums}_i = & \alpha + \sum_{j=1}^2 \beta_j \text{Coverage}_{ij} + \sum_{j=1}^3 \gamma_j \text{Economic Conditions}_{ij} \\ & + \sum_{j=1}^5 \psi_j \text{Statutory Provision}_{ij} + \epsilon_i, \end{aligned} \quad (1)$$

or premiums for any policy i will be driven by the character of the insurance coverage written, economic conditions that affect the costs of prospective claims and the performance of the insurer's portfolio, statutory provisions pertaining to products liability, and a random error term.

In a second equation, I also include the lagged value of the premium

TABLE 6
TRENDS IN LOSS RATIOS AND LOSS/CLAIM AS A FUNCTION OF DAMAGES RULES

	1980	1981	1982	1983	1984	1980-84 Average	Percentage Change, 1980-84
States with damages rules:							
Loss ratio	.86	.70	.90	.97	.86	.86	-.59
Loss/claim (\$thousands)	21.85	12.26	14.56	14.89	16.12	15.94	-26.22
Premiums (\$millions)	108.91	92.22	77.41	75.04	90.87	88.89	-16.57
States without damages rules:							
Loss ratio	.89	.90	.96	1.06	.83	.93	-7.32
Loss/claim (\$thousands)	14.10	13.04	13.44	14.41	14.61	13.92	3.63
Premiums (\$millions)	252.26	231.05	202.67	209.91	242.40	227.66	-3.91
Ratio of states with/states without:							
Loss ratio	.97	.78	.94	.92	1.04	.92	+.07
Loss/claim	1.55	.94	1.08	1.03	1.10	1.15	-.29
Premiums	.43	.40	.38	.36	.37	.39	-.14

level so that the regression coefficients for the legal variables in effect will be capturing factors that influence the change in premiums rather than the level. Equation 2 is of the form

$$\begin{aligned} \text{Premiums}_{it} = & \alpha_i + \sum_{j=1}^2 \beta_j \text{Coverage}_{ij} + \sum_{j=1}^3 \gamma_j \text{Economic Conditions}_{ij} \\ & + \sum_{j=1}^5 \psi_j \text{Statutory Provision}_{ij} + \xi_i \text{Premiums}_{it-1} + \epsilon_i, \end{aligned} \quad (2)$$

where Premiums_{it} is the current year premium and Premiums_{it-1} is the previous year's premium level. Together the estimates of equations (1) and (2) provide insight into the factors that drive both the levels of insurance premiums as well as the change in these premiums over time.

The specific explanatory variables included in the analysis are listed in Table 7. The first substantive variables are the level of exposure and the square of insurance exposure. These variables capture the extent of insurance coverage since one would expect the premium to be charged to increase positively with the exposure level. The lag of the exposure is included to capture potential nonlinearities in this relationship.

The next set of three variables capture economic factors that are likely to influence insurance premium rates. The first of these is the wage rate, which is the average weekly earnings in the particular state in which the insurance policy is written. This wage variable captures the likely costs associated with insurance since it should be positively related both to earnings losses due to injury as well as to possible costs of ameliorating the injury.¹⁹ The next variable is the consumer price index (CPI), which is a measure of prices in the various years.²⁰ Price levels should be positively related to insurance premiums. Unlike the wage variable, this variable is not state specific. Thus it serves as little more than an economic trend variable. It may capture broader cyclical influences, not just the effect of changing price levels.

The final economic variable, and one that is of greatest pertinence to the insurance industry, is the estimated beta coefficient for property/casualty insurers. This beta coefficient is a measure of the financial risk associated with the portfolio of insurance firms.²¹ Higher measures of beta

¹⁹ Weekly earnings data are from the U.S. Bureau of Labor Statistics, Employment and Earnings (1981-86).

²⁰ Price data are from the Economic Report to the President 373 (1987).

²¹ Beta coefficients were calculated using data from Standard and Poor's Security Price Index Record 102 (1986).

TABLE 7
REGRESSION ANALYSIS OF DETERMINANTS OF BODILY INJURY INSURANCE PREMIUMS

INDEPENDENT VARIABLE	COEFFICIENT	
	1	2
Intercept	$3.12 \times 10^{4*}$ (.26 $\times 10^4$)	-5,812.0* (3,517.0)
Exposure	$8.74 \times 10^{-4*}$ (.50 $\times 10^{-4}$)	$3.89 \times 10^{-4*}$ (.69 $\times 10^{-4}$)
(Exposure) ²	$5.24 \times 10^{-13*}$ (1.13 $\times 10^{-13}$)	-1.13×10^{-12} (7.52 $\times 10^{-13}$)
Wage	36.10* (3.04)	2.14 (1.39)
CPI	-116.8* (8.5)	-3.12 (20.86)
Beta	1,593.6* (870.6)	8,012.8* (2,904.6)
Definitions	-478.7 (378.0)	-381.5* (174.7)
State of the art	-5,254.0* (448.8)	-523.3* (207.7)
Statute of limitations	-3,205.8* (449.7)	-352.1* (203.7)
Collateral source rule	-1,859.2* (458.0)	-107.4 (211.6)
Damages provisions	5,114.1* (439.3)	349.9* (203.7)
Premiums _{t-1}776 (.002)
\bar{R}^2	.04	.79

NOTE.—Standard errors are in parentheses.

* Coefficients that are statistically significant at the 5 percent level, one-tailed test.

represent a larger premium associated with the risk of the insurance industry's portfolio, and this higher premium, in turn, should be reflected in higher insurance premiums charged to the companies purchasing insurance from these firms.

The next set of variables are dummy variables for each of the statutory provisions relating to products liability, discussed in the previous sections. These variables are definitions relating to products liability, state-of-the-art provisions, statute of limitations, collateral source rules, and damages provisions.

The regression analysis measures the effect of each kind of statute, even though some states had more than one of the various kinds of products-liability provisions. Thus, the estimates of equations (1) and (2) can be used to assess the partial influence of each of the statutory provisions, whereas the earlier average results reported in the overall assess-

ments could not be used in making such refined distinctions. Each type of statute proves to be important.

The final variable included in the second equation is the lagged value of insurance premiums. In the absence of this variable, equation (1) captures the influence of the other variables on the overall level of premiums; but once it is included, all factors that drive the previous premium rates will be taken into account so that, in effect, the regression coefficients will be reflecting influences that drive the change in premium levels over time. As expected, inclusion of the lagged premium value greatly increases the explanatory power of the equation, but our main interest is in testing specific hypotheses relating to the performance of legal variables, rather than in establishing a forecasting equation for premium levels.

Most of the control variables perform as expected. Insurance premiums are positively related to the exposure levels, the wage rate, and the lagged premium value (in eq. [2]). The negative influence of the consumer price index in equation (1) is more difficult to explain because rising prices should drive up premiums. The time period being considered included an aberrationally high rate of inflation in 1980 due to the oil and farm price shocks. The high inflation rates were accompanied by a weak performance of the economy in the early 1980s, so that the inflation variable may be capturing these cyclical effects as well.

A quite striking result is the strong performance of the insurance industry's beta coefficient variable. Increases in financial risk to insurance companies are transmitted into higher premium levels in both equations (1) and (2). These effects are quite powerful and substantial in terms of magnitude.

The results for the five legal provision variables are very powerful, particularly given the extent to which they overlap. In addition, most of these variables have the expected sign. Products-liability definitions reduce premium levels (eq. [2]), although this effect seems to be more significant with respect to changes in premiums than in terms of the overall premium level. Moreover, there are statistically significant negative effects in both equations for state-of-the-art provisions as well as statute of limitations variables. As expected, the magnitude of these influences is less in equation (2). The effect of these variables on a change in premiums is less than their overall effect on premium levels. The collateral source rule variable likewise has a significant negative effect on premium levels (eq. [1]) but not on changes in premiums, which suggests that the influence of this variable is captured largely through the lagged premium variable included in equation (2). Finally, the damages provision variable has a positive effect in both equations, although the magnitude of the effect is dramatically less in equation (2). The different sign of this variable is

consistent with the earlier results in Section VI, which may be traced to the higher loss-per-claim amounts that have generally prevailed in the states that have adopted damages provisions. Moreover, the effect also reflects the character of some of the damages statutes that are enacted at the same time that the doctrine of contributory negligence is eliminated, hence expanding liability.

Overall, the regression analysis provides strong evidence that legal doctrines affect the insurance market for products liability. In four of the five cases considered, negative and statistically significant effects were observed. In addition, unlike the earlier results, these factors controlled for insurance exposure levels as well as for a variety of other economic factors that are likely to influence insurance rates. The extent of the factors recognized is likely to be particularly great in equation (2) since the lagged premium value captures the whole set of economic factors that drive premium levels, so that the only remaining influences left to be included are those that determine the changes in premiums from year to year. These effects remain statistically significant, even taking into account other determinants of premium levels.

VIII. CONCLUSION

The influence of broad differences in the structure of state statutes pertaining to products liability was surprisingly great. One might have hypothesized that state products-liability laws would have simply formalized recent developments in common law so that these provisions would not have been a binding constraint. Alternatively, one might have expected only minor effects because the states studied did not include the recent wave of products-liability reform that the liability crisis of the mid-1980s stimulated. Thus, the existence and the structure of a products-liability statute might matter, but the early statutes analyzed might not be viewed as being sufficiently constraining to have an effect.

The results reflected in the performance of products-liability insurance over the 1980–84 period show a strong effect. The structure of the products-liability statutes is of major consequence in influencing the performance of liability insurance. Moreover, the direction of the influence follows the expected pattern. The most persuasive of the state comparisons is the discrepancy in the growth of exposure levels in states with various products-liability statutes. In every instance, the fraction of the market exhibiting an increase in the exposure amount is greater for states with products-liability statutory provisions. To the extent that the products-liability crisis has been reflected primarily in terms of denial of insurance coverage, this measure may be the most useful index of the success of the liability law provisions in preventing the emergence of a

crisis. The more detailed analysis of other measures of insurance performance reinforces this view. In particular, the main measure of insurance profitability—the loss ratio—tends to be considerably lower in states with statutory provisions pertaining to various aspects of products liability.

Regression analysis of premium levels, which addresses the separate influence of each of these statutory provisions controlling for a variety of legal and economic factors that drive insurance premium rates, also shows the powerful influence of legal rules on insurance markets. The statutory provision variables have a generally stronger effect on premium levels than on the change in premiums. Except in one case, there are strong and significantly negative influences of the statutory provisions in the expected direction.

All three kinds of evidence suggest a similar pattern of influence. In particular, the role of statutory provisions relating to products liability has comparable effects whether one analyzes insurance availability, trends in loss ratios, or the effect on premium levels. Although these measures are not unrelated, they do represent three alternative perspectives on the performance of insurance markets and, by any standard of empirical analysis, represent very robust evidence in support of the influence of the statutory provisions.

Differences in liability rules have clear-cut effects on both the profitability of insurance as well as its availability. To the extent that one uses an effective insurance market as the normative reference point, these changes enhance economic welfare by increasing the efficiency with which risks are spread in the economy. These rules have important distributional effects as well, which may explain why more states have not adopted them. No more than half of the states have adopted any of the statutory provisions considered.

States with products-liability statutes may differ in terms of their political constituencies. Improvements in the indices of insurance market performance may not be the objective of all parties within a state. Consumer groups and corporations, for example, have quite different legal policy reform objectives, and it should not be surprising that reforms that are desirable based on one criterion are not widely embraced. Limits on damages amounts, for example, would be opposed by the plaintiff's bar and by consumer organizations. Another factor that may contribute to the absence of universal adoption is that states with such statutes may differ in some other fundamental way in their liability climate.

The statistics examined also have broader ramifications with respect to whether there is a liability crisis. Premium growth has not kept pace with inflation, loss ratios have been extremely volatile, even for large groups of states that have been aggregated, and the loss ratios have been surprisingly high. The rising loss ratios—in some cases reaching levels above

1.0—suggest that, in some instances, there may be substantial pressures on the economic viability of the liability insurance industry that, no doubt, contributed to the escalation in premiums in 1985–86.

Perhaps the most surprising economic ramification of the results is that the influences across state groups were so apparent. If products-liability statutes are effective in reducing costs, then these cost savings should ultimately be reflected in lower premiums. Thus, in the long run, there should be no difference in the loss ratios across state groups, as the insurance industry should equalize the price of insurance, which is given by the inverse of the loss ratio.

Rather than observing equalization of loss ratios, there is evidence of substantial discrepancies across state groups. As predicted by economic theory, these differences are narrowing over time, but the pace of this change is slow. It would be an oversimplification to attribute this sluggishness to bureaucratic inertia, although this may be the case. The premium structure is generally revised based on the observed pattern of losses, rather than on the basis of loss expectations formed on a subjective basis, taking into consideration changes in the liability law. Awaiting actual events introduces a response lag because the pattern of losses that can be linked to premiums in a given year may not be known for many years. Thus, shifts in the liability regime are not reflected in the insurance rates in a rapid fashion.

These results and the findings regarding the efficacy of statutory provisions enable us to make some predictions regarding the influence of the many reform efforts undertaken in the mid-1980s and thereafter. If these efforts are, in fact, constraining and do not simply formalize prevailing doctrines, one would expect there to be a beneficial effect on the insurance market. These benefits, in turn, will be evidenced through lower prices for insurance, but such adjustments will tend to be apparent only in the long run. In the immediate period after introducing the reforms, the purchasers of insurance in the reforming states will not be able to internalize fully the savings that result, given the lagged response. The profits of insurance companies should consequently rise.

These lags also suggest that one should be cautious in one's expectations and assessments of products-liability reform efforts. These policies are not well suited to providing a short-term quick fix to temporary crises. If, however, there are long-run difficulties, then a change in the statutory structure may make a difference. Similarly, one should be cautious in making evaluations of the effect of products-liability reform efforts. It may take a long time to see the effect of such changes on insurance market performance.