

## Medical Malpractice Awards, Insurance, and Negligence: Which Are Related?

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## EXECUTIVE SUMMARY

Doctors' medical malpractice liability insurance premiums are at an all-time high. As has been widely reported in the press, escalating med-mal premiums have driven doctors to retire early, shut down their businesses, or reduce the scope of their practices. In areas of the country with particularly high premiums, there is concern that patients' access to care has been compromised.

Insurance companies and most doctors conclude that the root cause of higher insurance costs is higher tort awards. The American Medical Association, for example, says that medical liability reform is their top priority because "rapidly increasing medical liability insurance premiums caused by escalating jury awards are seriously threatening patient access to care."

On the other side of this debate are plaintiffs' attorneys and their allied consumer groups who attribute the boom and bust "insurance cycle" to investment returns and, alternatively, accuse insurance companies of "price gouging." Such claims are often picked up, uncritically, by the mainstream press.

Our study makes four contributions to this debate:

- 1. We show that medical malpractice premiums are closely related to medical malpractice tort awards.** Over the long run, premiums closely track awards, and premiums adjust to short-run award variation as well. Indeed, insurance companies' short-run reaction to award levels is the primary driver of the so-called insurance cycle. In addition, med-mal premiums are closely related to tort awards across states. The correlation in premiums and awards across the states suggests strongly that tort award levels, not investment returns, are the primary explanatory factor for changes in insurance premiums, since investment returns are unlikely to vary markedly across states.
- 2. We show that medical malpractice premiums are not explained by insurance industry price gouging.** For the price-gouging hypothesis to make sense, insurance industries must be exercising monopoly power. Looking at insurance industry 4-firm concentration ratios – a measure of market power – we find that states with more concentrated insurance industries actually have lower premiums, even when controlling for other explanatory factors.
- 3. We show that medical malpractice tort awards are related to some factors not rationally related to injuries.** For instance, states' judicial electoral systems have predictive value on the expected level of tort award.
- 4. We show that malpractice tort awards and thus insurance premiums can vary dramatically for reasons having little or nothing to do with negligence.** We reach this conclusion through a novel test of the tort system, in which we compare awards and rates of determination of negligence in the tort system with rates determined by the independent medical board review system. Although board review outcomes are imperfect, they are biased, if at all, against findings of negligence, because physicians will not allow frivolous complaints to result in disciplinary actions. The tort system shows no or even a slight negative correlation with the board review system's negligence determinations, suggesting that the system is influenced by factors not related to negligence.





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# MEDICAL MALPRACTICE AWARDS, INSURANCE, AND NEGLIGENCE: WHICH ARE RELATED?

## INTRODUCTION

Medical malpractice premiums are at an all-time high.<sup>1</sup> The American Medical Association (AMA) says that at least twenty states are experiencing full-blown liability crises, with twenty-two more showing signs of serious problems.<sup>2</sup> Under pressure from the tort system some doctors have retired early, shut down their businesses, or reduced the scope of their practices.<sup>3</sup> The U.S. Department of Health and Human Services says that the liability crisis is threatening access to care and jeopardizing patient safety.<sup>4</sup>

What is behind the recent increase in premiums? On one side of the debate are insurers and doctors, who attribute the increase to higher malpractice tort awards. On the other side are attorneys and their allied consumer groups, who typically claim that insurers are exercising monopoly power to make up for investment losses due to poor planning in the boom of the 1990s. Such claims are often picked up, uncritically, by the mainstream press. For example, writing last year in *The New York Times*, Joseph Treaster and Joel Brinkley argued that “legal costs do not seem to be at the root of the recent increase in malpractice insurance premiums,” which they attributed instead to the “nature of competition in the industry.”<sup>5</sup>

We make four contributions to this debate. First, we show that medical malpractice premiums are closely related to medical malpractice awards through time and across the states. Second, we show that premiums are not explained by insurance industry monopoly power. Third, given our findings that malpractice insurance premiums are determined by tort awards, and that such awards vary substantially across the states, we ask what factors determine award variation. For example, are states with high awards and premiums like teenagers who face high auto insurance premiums because of high accident rates, or are awards and premiums high because of factors not rationally related to underlying risks? We show that awards are related to some factors (such as judicial electoral systems) not rationally related to injuries. Finally, in a novel test of the tort system, we compare awards and rates of determination of negligence in the tort system with rates determined by the independent board review system. The test results suggest that awards and thus insurance premiums can vary dramatically for reasons having little or nothing to do with negligence.

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1. See Congressional Budget Office (2004); Medical Liability Monitor (2004).

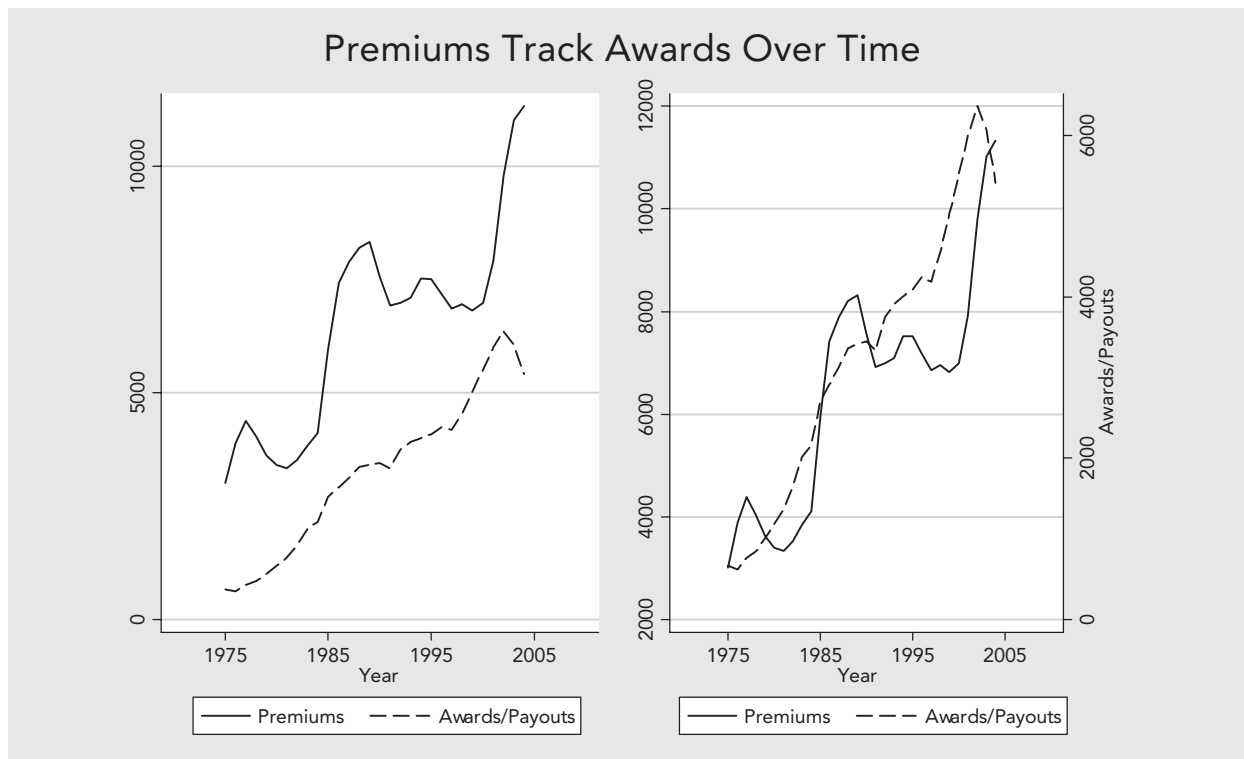
2. See American Medical Association (2006).

3. For some anecdotal evidence, see U.S. Dept. of Health and Human Services (2002). Baker (2005) offers a contrary but balanced discussion. Kessler *et al.* (2005), Encinosa and Hellinger (2005), Helland and Showalter (2006), and Klick and Stratmann (2005) estimate the effect of liability on physician entry and exit decisions.

4. See U.S. Dept. of Health and Human Services (2002), pp. 2-4.

5. Treaster and Brinkley (2005); see also Americans for Insurance Reform (2002). Baicker and Chandra (2005) say, “[I]ncreases in malpractice payments do not seem to be the driving force behind increases in premiums” (p. 31).

FIGURE ONE



### MALPRACTICE PREMIUMS AND AWARDS ACROSS TIME

In their *New York Times* article, Treaster and Brinkley (2005) use a graph, shown as the left graph in Figure One, that they claim supports their position that medical malpractice premiums have “outpaced the rise in payments for claims.” The graph does indeed show that premiums are more variable than awards/payouts and thus may increase (or decrease) in some periods faster than awards. But this fact is not inconsistent with the idea that awards drive premiums. We can demonstrate the latter point most easily by rescaling the axes to overlay the two lines, as shown in the right graph. The rescaling has two virtues. First, the graph used in *The New York Times* encourages a naïve interpretation that the distance between the premiums and awards line represents profits. In fact, the graph does not show the administrative and legal costs of settling claims and defending cases that do not win, so one cannot draw any conclusions about profits from the graph. Second, and more important, the rescaled graph makes it easier to see that premiums oscillate around awards: sometimes the premium line is above the award line and sometimes it is below; but over time, the two lines move in tandem.

To test the proposition that malpractice premiums followed awards over time, we performed a “cointegration test” on the data used to create the *New York Times* graph, which came from the insurance rating agency A.M. Best. This statistical analysis demonstrated that premiums and awards are “cointegrated,” that is, linked in a stable long-run relationship.<sup>6</sup> We also note that the data confirm that variations in awards drive premiums. The reason is that whenever two variables are cointegrated,

6. The cointegration test formally demonstrates the stable long-run relationship between premiums and awards, which exists although neither premiums nor awards show any tendency to return to their own means over time.

there is an associated error-correction mechanism that determines what happens when the two variables depart from their long-run relationship. In this case, the theoretical error-correction mechanism is easy to see: if premiums in the insurance industry long exceed awards (plus expenses), competition will drive premiums down; and if premiums long fall below awards (plus expenses), bankruptcy, exit, and survival behavior will drive premiums up. Thus, premiums should adjust to awards. And because awards are determined by tort law and judge and jury behavior, there is little reason to believe that awards will adjust to premiums. Looking at the data, we see exactly this result in the error-correction mechanism: premiums respond rapidly to changes in awards but awards do not respond to changes in premiums.<sup>7</sup>

Premiums track awards in the long run but may depart from awards in the short run. This variation does not necessarily imply that factors other than awards are important determinants of premiums in the short run. Today's premiums must cover future awards, which are unknown. As a result, insurance firms set today's premiums based upon their forecast of future awards. The cointegration test mentioned above showed that there is no tendency for medical malpractice awards to fluctuate around a fixed mean, so past awards are not very useful for predicting future awards. Awards from a decade ago, for example, probably tell us very little about awards in the next decade. The most useful awards for predicting future awards are the most recent ones, especially if these suggest a permanent change in the level of awards. By definition, there aren't many recent awards. Thus, insurance companies have a very difficult job: they must forecast future awards using only a few data points. Forecasts under these conditions can be highly variable, even more variable than the series being forecast.<sup>8</sup> Short-term departures of premiums from awards, therefore, should be expected even when awards drive premiums.

Plaintiffs' lawyers and "consumer advocacy" groups often blame periodic liability crises on the "insurance cycle" rather than on changes in tort awards. A group called Americans for Insurance Reform (AIR) is representative of this line of thinking:

Not only has there been no real increase [in] lawsuits, jury awards or any tort system costs at any time during the last three decades, but the astronomical premium increases that some doctors have been charged during periodic insurance "crises" over this time period are in exact sync with the economic cycle of the insurance industry, driven by interest rates and investments. In other words, insurance companies raise rates when they are seeking ways to make up for declining interest rates and market-based investment losses.<sup>9</sup>

But tort awards and the insurance cycle are not competing explanations for increases in premiums. As described above, the insurance cycle itself is a consequence of the unpredictability of tort awards.<sup>10</sup> Thus, trying to dampen premiums by regulating other things — J. Robert Hunter, director of Insurance for the Consumer Federation of America, urges state regulators to "enforce the ratings laws in order to end the boom and bust swing" — is likely to be futile.<sup>11</sup> The best way to reduce the volatility of premiums is to reduce the volatility of awards. The more predictable future tort awards are, the more predictable insurance premiums will be.

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7. See the Regression Appendix for details.

8. For a formal proof of this proposition, see Kleidon (1986). Industry forecasts of losses are often incorrect, illustrating the difficulty in forecasting.

9. AIR (2002). For a critique of AIR's statements and studies, see Frank and Grace (2006).

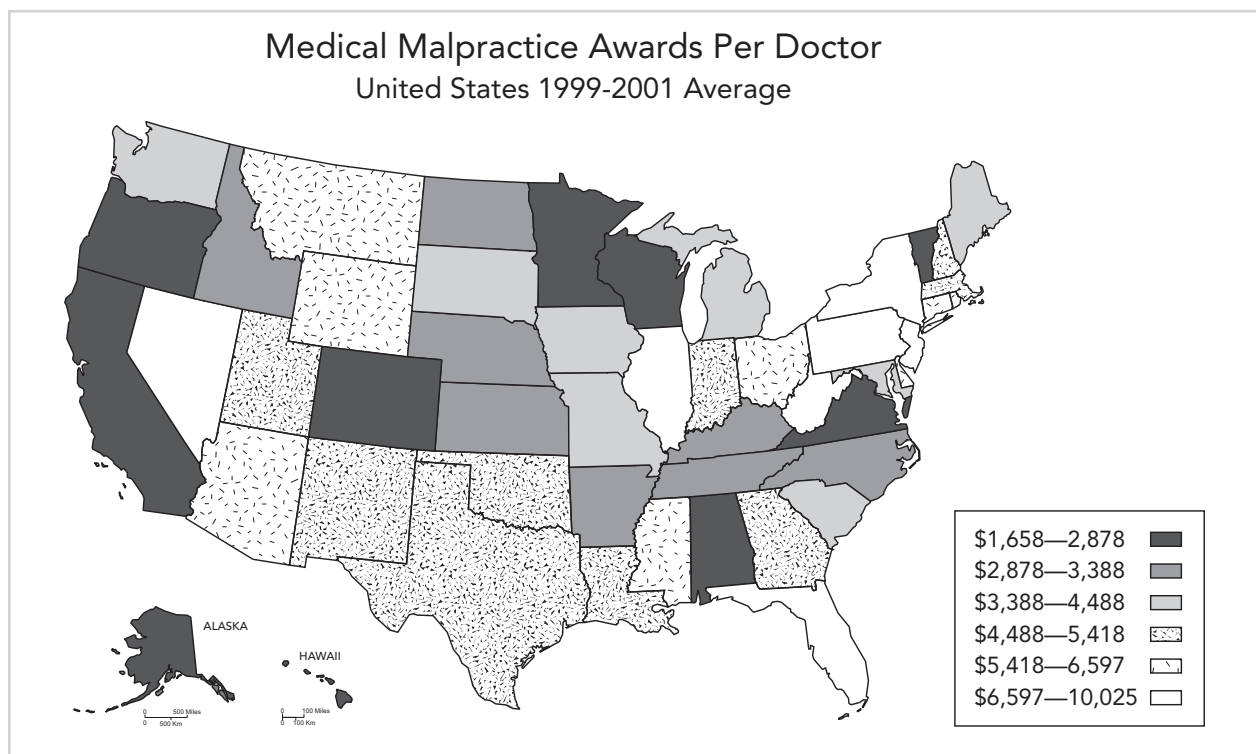
10. Other factors, such as changes in interest rates and the long time lag between premiums and payouts, amplify the cycle, but it is the underlying uncertainty in awards that is the driver of the cycle.

11. J. Robert Hunter, quoted in AIR (2006).

**MEDICAL MALPRACTICE AWARDS AND PREMIUMS ACROSS THE STATES**

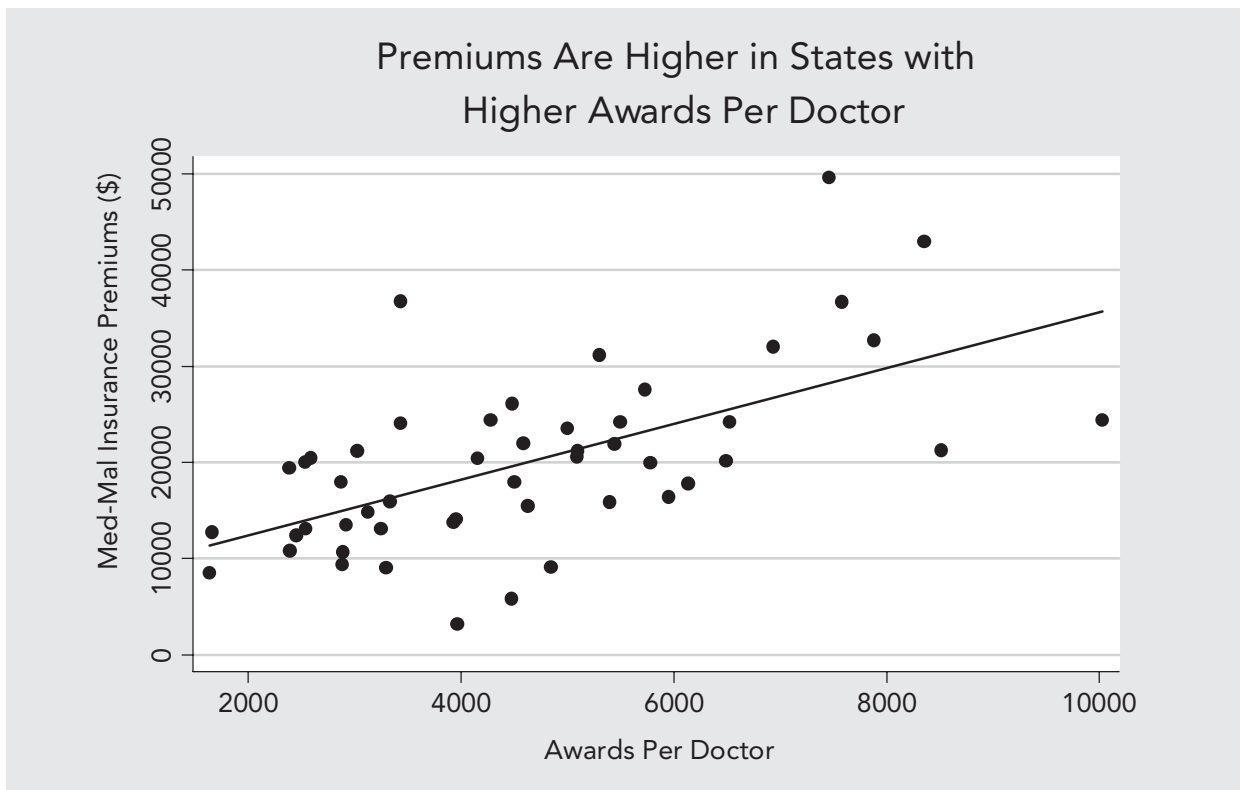
We can factor out much of the short-run variability in premiums and awards across time by looking at the relationship across the states at a single point in time. Figure Two is a map of mean malpractice awards per doctor per year (averaged over 1999-2001). States with high mean awards are in green, and states with low awards are in gray. The variation in the average award per doctor is surprisingly large: mean awards range from a low of \$1,688 in Wisconsin to a high of \$10,025 in Pennsylvania.<sup>12</sup> It is highly doubtful that medical errors and malpractice are six times more common and egregious in Pennsylvania than in Wisconsin. Later we examine whether factors related to patients or physicians can explain these striking differences.

**FIGURE TWO**



12. The effect of interest rates on the so-called insurance cycle is a national-level phenomenon, so the fact that awards vary significantly across the states is strong evidence that the insurance cycle alone, as interpreted by consumer groups, leaves much variation in awards to be explained.

FIGURE THREE



The large variation in awards lets us test whether variation in awards is associated with variation in premiums. Figure Three graphs awards per doctor against premiums and finds a strong positive association.<sup>13</sup>

States with higher awards per doctor, simply put, have higher insurance premiums. This positive relationship remains even after we control for other variables that may affect insurance premiums in a given state, such as the 4-firm concentration ratio, the number of medical malpractice cases per doctor, and whether a state has a patient compensation fund (see Regression Appendix, Table A4).

13. Data on medical malpractice premiums are usually calculated on a state level. In some states, the *Medical Liability Monitor* breaks the data down into somewhat finer geographic regions. Where this is done, one also often finds a strong relationship between awards and rates. Bovbjerg and Bartow (2003) take a detailed look at Pennsylvania, for example, and note: "The highest Pennsylvania rates (usually in Philadelphia) are about double the lowest rates for any given insurer" (p.14). They also examine tort awards and note "the special case of Philadelphia," where "24% of verdicts awarded [are] in excess of \$1 million." (p.32). Note also that Philadelphia has the highest poverty rate of any county in Pennsylvania; see Helland and Tabarrok (2003) and below for the importance of this fact.

## PROFITEERING, GREED, AND GOUGING?

In addition to blaming recent spikes in medical malpractice premiums on the “insurance cycle,” trial lawyers and their advocates are wont to accuse medical malpractice insurers of “illegal pricing.” Connecticut attorney general Richard Blumenthal calls for “more aggressive oversight to prevent and punish profiteering”:

Federal and state regulators should thoroughly scrutinize recent rate increases and take appropriate corrective action. Affordable medical malpractice insurance is critical to public health. Expensive insurance rates become a matter of life and death when they drive doctors out of business—as is happening in Connecticut ... Insurance company greed can be hazardous to our health.<sup>14</sup>

Echoing Blumenthal, AIR’s J. Robert Hunter argues that “insurance companies are price-gouging their doctors.”<sup>15</sup>

A necessary condition for so-called price gouging is lack of competition.<sup>16</sup> If price gouging is a problem, therefore, we should find that prices are higher when there is less competition. To test the price-gouging hypothesis, we calculated a measure of competition by state, the “4-firm concentration ratio.” A 4-firm concentration ratio of 60 percent, for example, means that together the largest four firms have a 60 percent market share. If lack of competition is driving up rates, we should find a positive relationship between medical malpractice premiums and the concentration ratio.

Figure Four on the following page shows that, in contrast to the prediction of the price-gouging hypothesis, medical malpractice premiums decrease as the concentration ratio increases. Although the negative relationship is not strong, we certainly do not find the positive relationship that we would expect from the price-gouging hypothesis. Again, this negative relationship between medical malpractice premiums and the insurance industry concentration ratio holds, even after controlling for awards and patient compensation funds (see Regression Appendix, Table A4).

## WHAT’S DRIVING AWARDS?

If medical malpractice awards are the major source of changes in insurance premiums, it is important to understand the factors that drive awards. If awards are primarily driven by factors that bear a rational relationship to medical malpractice, the fact that awards are higher in some states than in others may simply show that the tort system is functioning properly. But if awards are higher in some states than in others for reasons having little to do with medical malpractice, we may question whether the tort system is doing its job. If awards vary for reasons other than malpractice, for example, they cannot be acting as a deterrent, nor can they be providing just compensation.

We test whether awards vary due to variations in true malpractice rates in two ways. First, we look directly at whether variation can be explained by variables such as income per capita or infant mortality, variables that might plausibly be related to malpractice awards or rates, or whether awards are more affected by factors that are less plausibly related to true malpractice. Second, we conduct a novel test of the tort system by comparing it with the medical review system.

Medical malpractice awards per doctor can be high for two reasons: either the average award per claim is very high; or there are many claims per doctor (or both). Breaking medical malpractice awards

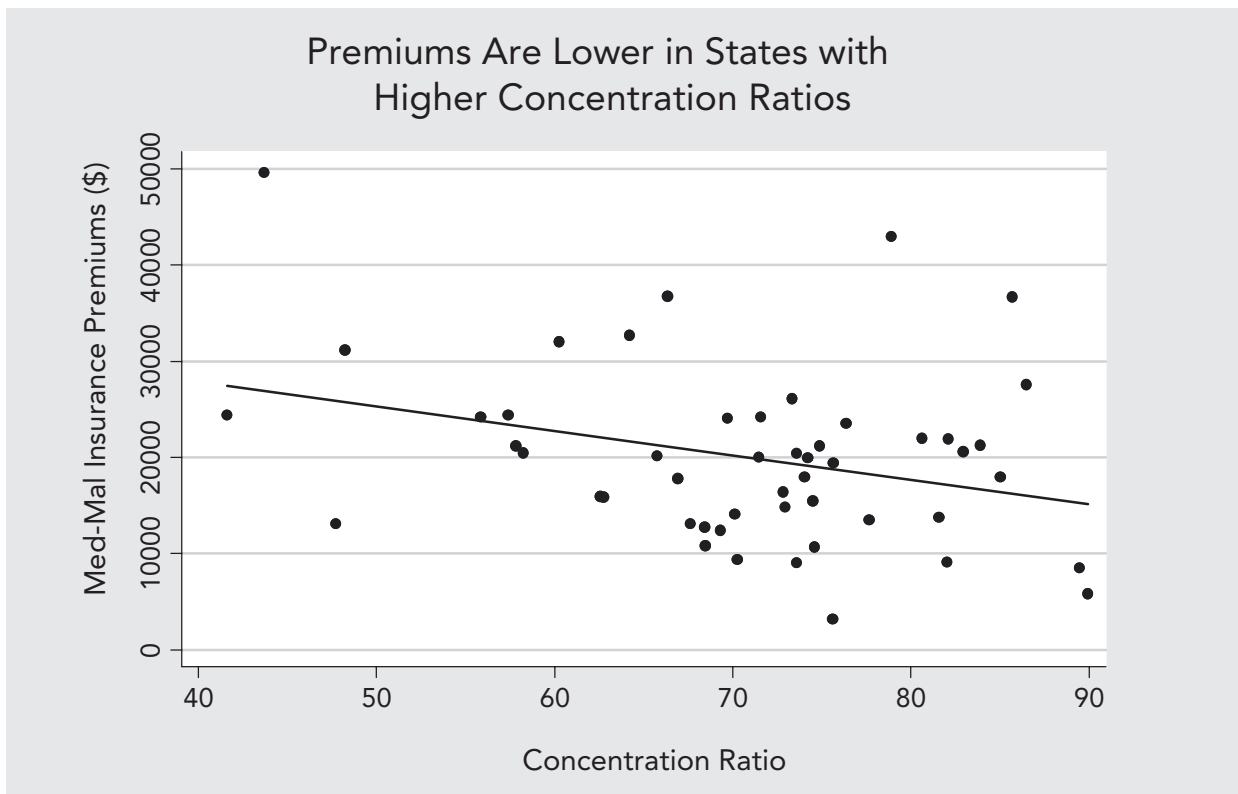
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14. Quoted in Center for Justice and Democracy (2005).

15. *Id.*

16. In a competitive market, sellers have no pricing power but must accept the market price, which equals long-run average cost. If prices exceed long-run average cost, new entrants will compete away excess profits until prices are driven back to that level.

FIGURE FOUR



per doctor into two components, the award per claim and the number of claims per doctor, is useful: some variables may affect awards and others the number of claims.<sup>17</sup>

With only fifty states, the number of variables that we can examine is limited (because the number of data points limits what statisticians call “degrees of freedom”). Thus, we focus on the few that we think are most likely to be important or that have previously been shown to be important in the literature. We include the death rate and the infant mortality rate in our data. Although deaths are not necessarily indicative of malpractice, it is likely that awards will be higher in cases involving death—and deaths may, in themselves, encourage litigation. We include the percentage of people below the poverty level because Helland and Tabarrok (2003, 2006) find that awards increase dramatically in relation to county poverty rates. As county poverty rates increase from 0-5 percent to 20-25 percent, for example, Helland and Tabarrok find that the average award triples from \$400,000 to \$1.2 million.<sup>18</sup> Similarly, Helland and Tabarrok (2002, 2006) find that awards are higher against out-of-state defendants in states using partisan judicial elections, so we include partisan elections as a potentially important variable.<sup>19</sup> (Both of the latter effects will be harder to pick up in state data than in the more disaggregated data used in

17. Let  $MMPerDoc$  denote the mean malpractice award per doctor then  $MMPerDoc = Awards/Doctors = Awards/Claims * Claims/Doctors$ .

18. One can see the same effect within states. See note 11 and Bovbjerg and Bartow (2003), for example.

19. Helland and Tabarrok argue that elected judges are likely to be biased towards plaintiffs when the defendant is an out-of-state corporation because the plaintiff is a constituent while the defendant is not.



the cited papers.) Finally, awards are likely to be higher in states with higher per-capita income, for the simple reason that economic damages will by definition be higher, all else being equal. The results are presented in Table 1.

TABLE 1: EXPLAINING VARIATION IN AWARDS AND CLAIMS PER DOCTOR		
	Award Per Claim	Claims Per Doctor
Death Rate Per 1,000	10,399 (5,636)*	0.001 (0.001)
Infant Mortality (Deaths Per 1,000 Live Births)	895 (5,321)	-0.0003 (0.001)
Percent Below Poverty Level	-20 (3,141)	0.0014 (0.0006)**
Partisan Electoral System for Judges	35,905 (18,691)*	-0.003 (0.003)
Personal Income Per Capita	9.2 (2.3)***	0.0004 (0.0004)
Constant	-146,581 (101,312)	-0.006 (0.019)
Observations	50	50
R-squared	0.43	0.16

*Standard errors in parentheses*  
 \* significant at 10%  
 \*\* significant at 5%  
 \*\*\* significant at 1%

Focusing first on the mean award per claim, we find that an increase in the death rate of one per 1,000 (slightly smaller than one standard deviation) increases the mean award by \$10,000. The infant mortality rate appears to have no effect on the mean award per claim, nor does the percentage of the population living below the poverty level. States that use partisan elections to select their judges, however, have awards per claim on average \$35,000 higher (about 18 percent) than states using other methods to select their judges. As expected, awards also increase in relation to per-capita income. An increase of \$4,000 in per-capita income (just over one standard deviation) increases awards by approximately \$36,000.

Turning to claims per doctor, we find that the only statistically significant relationship is that increases in the percentage of the population living below the poverty level are correlated with increases in the number of claims per doctor. The effect is surprisingly large: an increase of one percentage point in the poverty rate (one-third of one standard deviation) increases the number of claims per doctor by approximately 6 percent.<sup>20</sup>

The regression results are a mixed bag for our perspective on the tort system. Some of the variation in awards per claim can be explained by factors that rationally relate to awards, such as income per

20. An increase of .0014 claims per doctor compared to the mean claims per doctor of .024 is approximately 6 percent. (Running claims per doctor in logs produces a coefficient of 6.6 percent.)



capita and the death rate. But factors bearing little relationship to malpractice — such as whether a state uses partisan elections to select its judges — appear to be at least as important. The R-squared statistic indicates that the variables in the regression can explain only 43 percent of the variation in awards per claim, so a majority of the variation in awards remains unexplained, which is even more the case in the claims per doctor regression, where we can explain only 16 percent of the variation.

### AN ALTERNATIVE METHOD FOR DETERMINING MALPRACTICE

To further test the efficacy of the tort system, we examine a parallel, independent, much less studied system for determining whether medical malpractice has been committed. Every state has a medical review board that investigates and disciplines physicians who have allegedly violated professional codes of conduct or the law. Patients and others can make a complaint to the board alleging medical negligence or conduct potentially leading to negligence (such as being under the influence of alcohol or drugs). Patients and others, including coworkers and employees, can also report physicians to the board for sexual misconduct, excessive or improper drug prescriptions, and billing fraud.<sup>21</sup>

After a complaint is filed to the medical review board, it is investigated; the exact procedure varies by state, but most follow a similar process. Complaints are assigned to a trained professional who investigates the case, determines the facts, and (for cases with sufficient merit) prepares material for a panel to judge. Medical board investigators, unlike attorneys in medical malpractice lawsuits, do not represent the patient or the physician but are intended to be impartial. Should the case pass the initial review, it is forwarded to a committee made up of physicians and laypeople for a decision regarding disciplinary action.

The medical board has significant authority to discipline physicians, including the authority to suspend, revoke, or limit a physician's license to practice medicine. Under threat of revocation, the board can require physicians to submit to a competency exam that may lead to probation, monitoring, and mandatory retraining. Medical boards can also issue fines. In extreme cases, a medical board will refer cases to the local district attorney for criminal review.

Complaints to medical review boards that lead to disciplinary action must be reported to the National Practitioner Data Bank, where these types of reports are known as "adverse actions." Between 1999 and 2001, almost 12,000 adverse actions were reported to the NPDB. Censure, probation, suspension, and revocation of license or clinical privileges constituted just over 50 percent of the disciplinary actions taken. We will use these data to compare the review system with the tort system.

The medical review board system for determining negligence differs in a number of ways from the tort system. In two respects, the medical review system may be an inferior method of determining negligence:

- Even if investigators are trained to be independent, the medical review system is dominated by physicians, who may be reluctant to penalize other physicians.
- Medical boards do not have the authority to award damages to the victim. They can only discipline physicians. As a result, injured patients have fewer monetary incentives to complain than to sue.

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21. In Virginia, for example, the most common allegations include "substandard care, diversion of prescription drugs for illegal purposes, improper prescribing, sexual misconduct, improper advertising, inadequate record keeping, unsanitary conditions and unprofessional conduct." For more information, see the website for the medical board of Virginia: [http://www.dhp.state.va.us/Enforcement/enf\\_DisciplineProcess](http://www.dhp.state.va.us/Enforcement/enf_DisciplineProcess); for New York: <http://www.health.state.ny.us/nysdoh/opmc/understd2.htm>; and for California: [http://www.medbd.ca.gov/Complaint\\_Info.htm](http://www.medbd.ca.gov/Complaint_Info.htm).

These potential problems, however, must be evaluated alongside several advantages of the review system:

- Complaints are cheap, and lawsuits are expensive. As a result, the review system may capture more negligent actions than the tort system.
- It's difficult to sue if there is no injury. Complaints, however, can occur without injuries. A physician who abuses alcohol, for example, may have his license revoked even if no injury has yet occurred.
- Medical boards can take very serious disciplinary action, such as revoking a physician's license. Such actions can be more serious than even a multimillion-dollar tort award, especially given that physicians can insure against a tort award but not license revocation.
- Since suits are expensive, they are only brought for the most serious injuries. The medical review system may be especially likely, therefore, to discover problems before they lead to serious injury.
- In the tort system, only the affected parties may sue, but complaints against physicians can come from parties other than the patient, including concerned citizens, employers and employees, and other health-care professionals. In fact, health-care professionals are usually required to report physicians whom they suspect to be guilty of misconduct.

When the above factors are balanced, it is not obvious that the medical review system will understate malpractice. Further research on that issue would be valuable. For our purposes, we do not need to make this determination; what we are interested in is how well the review system correlates with true malpractice.

The medical review system might, in theory, understate malpractice. But, by the same reasoning, when a physician is disciplined by a review board, we can be confident that the offending action was serious. As a result, malpractice as determined by the medical review system ought to correlate well with true malpractice—even if it understates the level of malpractice. Assume, for example, that the medical review system uncovers only one out of every three serious cases of malpractice. Nevertheless, states with a great deal of malpractice as determined by review boards will also be states with a great deal of true malpractice—just at a higher absolute level.<sup>22</sup> This argument suggests a test of the tort system.

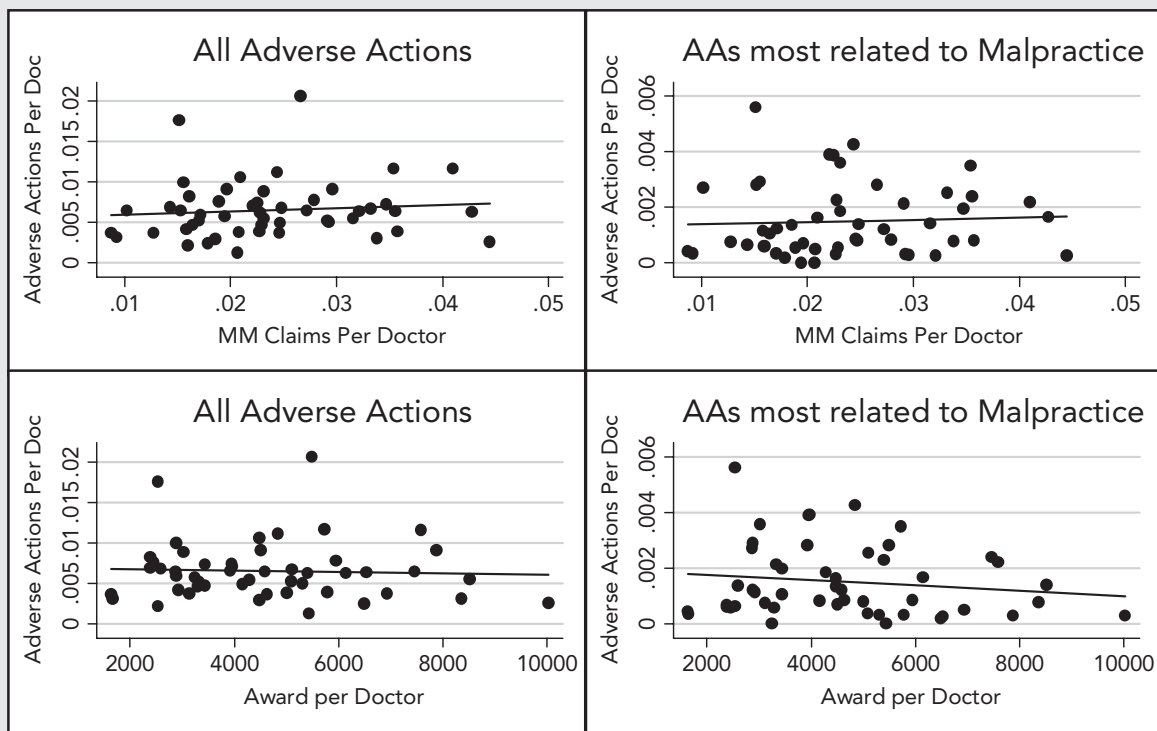
The review system is likely to correlate well with true malpractice (because physicians will not allow frivolous complaints to result in disciplinary actions); if the tort system works well, it will also correlate with true malpractice and thus with the review system. If the tort system works poorly, however, it will not correlate with true malpractice or with the review system. Thus, we can test the quality of the tort system by examining whether states with high levels of review-board-determined malpractice also

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22. We acknowledge that states may vary in the vigor with which they enforce review board claims. As such, high malpractice levels as measured by review boards may reflect different enforcement levels and, over time, lower actual malpractice. To capture fully the interplay between malpractice levels and board outcomes would require further study, such as a cross-sectional, time-series look at review board outcomes. For our present purposes, it is sufficient to note that at any given point in time, we would expect that high levels of malpractice actions enforced by state review boards should correlate with higher tort claims or awards, particularly for the most serious malpractice findings, if the tort system's outcomes are consistent with true malpractice.

FIGURE FIVE

### The Tort System and the Review System Are Not Highly Correlated



play host to large numbers of malpractice torts.

Our test finds that the tort system and review system do not correlate. Figure Five shows that adverse actions per doctor in the medical review board system do not correlate with the number of medical malpractice cases per doctor in the tort system, nor do they correlate with the average award per doctor. Because not all adverse actions necessarily imply substandard care—billing fraud, for example, is not directly causative of poor care, even if one suspects that there might be a behavioral link—we conduct separate analyses for all review board adverse actions and those most likely to be associated with malpractice.<sup>23</sup> Column 1 of Figure Five looks at the correlation between all adverse actions and medical malpractice cases (row 1) and awards (row 2); and column 2 looks at the correlation between those adverse actions most likely to affect actual medical performance and malpractice claims (row 1) and awards (row 2).

23. Adverse actions most likely to be associated with malpractice include alcohol abuse, narcotics violations, unprofessional conduct, incompetence, negligence, patient abuse or neglect, and allowing unlicensed persons to practice.

In no case is the correlation large; in some cases, it is actually slightly negative. What these results indicate is that the two systems we have for determining malpractice, the tort system and the medical review system, result in very different determinations of malpractice. Surely, one of them is wrong!

One suggestive finding comparing the two systems is that adverse actions per doctor do not correlate at all with any of the political factors such as partisan elections or the percent of persons living below the poverty level that do correlate with tort awards.<sup>24</sup> Determining in greater detail the relative errors and faults of the two systems, however, is an important area for future research.

## CONCLUSION

The recent spike in medical malpractice premiums has generated many claims about the cause, ranging from insurance cycles to price gouging. A common theme seems to pervade these claims: the idea that premiums are reacting to something other than awards. Our results, in contrast, support the common sense idea that premiums are driven primarily by awards. The cointegration test shows that premiums track awards in the long run. Premiums also track tort awards across the states; premiums are higher in states that have higher awards. Other theories do not fit the facts: medical malpractice premiums, for example, are actually slightly lower in states with higher concentration ratios, which would not hold true if price gouging were the problem.

If awards are a major influence on premiums, it is important to understand what drives awards. Our analysis showed that some factors plausibly related to the incidence, extent, or cost of medical malpractice are related to awards — awards increase in states with higher income per capita and higher death rates, for example. But awards also appear to be related to factors not plausibly related to malpractice, such as partisan judicial elections. Even accounting for all these variables leaves a large amount of unexplained variation across states in average medical malpractice awards.

As a further test of the medical liability system's effectiveness, we also compared the tort system with the medical review board system for determining medical malpractice. While both systems help determine medical malpractice, they have different methods of doing so. Regardless of their differences, if the tort system were working well, we would expect that the number of adverse actions would be correlated with the number of medical malpractice claims. We find, quite to the contrary, that there is little correlation between the two, and what correlation exists is slightly negative. Whether the medical review board system could or should substitute for the tort system is a question for further research.

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24. See the Regression Appendix for details.

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## REGRESSION APPENDIX

### COINTEGRATION

The cointegrating equation is Awards (DLP) - .859 Premiums (DPW) (.103) with details as shown in the following table.

TABLE A1						
Equation	Parms	chi2	P>chi2			
_ce1	1	69.00807	0.0000			
Identification:	beta is exactly identified Johansen normalization restriction imposed					
beta	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
_ce1						
DLP	1	.	.	.	.	.
DPW	-.8596209	.1034802	-8.31	0.000	-1.062438	-.6568036
_cons	2492.02	.	.	.	.	.

The key terms in the error-correction representation (not shown) are .08 Awards (.054) and .4077 Premiums (.112) (standard errors in parentheses). The larger coefficient on the latter relative to the former indicates that it is premiums that adjust to awards. There are also lags of each term in the ECM. Details are available upon request.

### PREMIUMS AND AWARDS

Table A2 is the regression represented in Figure Three. It shows that higher medical malpractice awards are associated with higher medical malpractice premiums, just as we would expect from basic economic analysis. A one-dollar increase in awards is associated with an increase in insurance premiums of \$2.89. In the long run we expect a one-to-one relationship between awards and premiums, which is exactly what we found in the cointegration analysis. The greater than one-to-one relationship we found here could be due to unmodeled factors or factors specific to the 1999-2001 period. Using data on individual-level physician malpractice premiums and an estimated measure of individual liability, Helland and Showalter (2006) show that premiums increase one-to-one with awards.

**TABLE A2: PREMIUMS ARE HIGHER IN STATES WITH HIGHER AWARDS PER DOCTORS**

	Insurance Premiums
Awards Per Doctor	2.897 (0.555)**
Constant	6,640.557 (2,769.690)*
Observations	50
R-squared	0.36

*Standard errors in parentheses*  
 \* significant at 5%; \*\* significant at 1%

**PREMIUMS AND CONCENTRATION RATIOS**

Table A3 is the regression represented in Figure Four. It shows, contrary to the price-gouging hypothesis, that states with higher concentration ratios tend to have lower insurance premiums. A ten-percent-age-point increase in the concentration ratio is associated with a decrease in insurance premiums of \$2,540, or about a 13 percent decrease evaluated at the mean insurance premium. The negative relationship between prices and the concentration ratio is consistent with Demsetz’s (1973) argument that efficient firms lower prices and increase their market shares. Wal-Mart, for example, dominates many markets because of its lower prices. Although the relationship is consistent with Demsetz’s efficiency argument, our goal here is merely to point out that this relationship is prima facie evidence against the price-gouging hypothesis.

**TABLE A3: HIGHER CONCENTRATION RATES LOWER INSURANCE PREMIUMS**

	Insurance Premiums
4-Firm Concentration Ratio	-254.537 (112.647)*
Constant	38,017.323 (8,070.791)**
Observations	50
R-squared	0.10

*Standard errors in parentheses*  
 \* significant at 5%; \*\* significant at 1%



**MULTIPLE REGRESSION: PREMIUMS, AWARDS, CONCENTRATION RATIOS AND PCFS**

Table A4 demonstrates that we get similar results to those graphed when we include awards per doctor, the 4-firm concentration ratio, and whether a state has a patient compensation fund (PCF) together in a multiple regression.

Four states have mandatory PCFs: Pennsylvania, Indiana, Kansas, and New Mexico. For a fee, these funds provide excess professional liability insurance to those in the medical profession. The fees were added to the rates reported by various insurance companies in the *MLM* data so that we are comparing what physicians pay in total for \$1m/\$3m worth of liability insurance in each state. The negative coefficient on the variable indicates that total fees are lower in states with PCFs. One explanation is that fees in states with PCFs are underpriced. Pennsylvania long underpriced insurance, for example, and then had to catch up with surcharges and, more recently, through subsidization of rates by taxpayers. In New Mexico there is no current subsidy, but in 2003 the Department of Insurance issued a report indicating that the PCF was underfunded, thus suggesting that taxpayers could be called upon to take up some of the burden in the future.<sup>25</sup> (See Sloan *et al.* (2005) for more on PCFs.)

TABLE A4: PREMIUMS ARE HIGHER IN STATES WITH HIGHER AWARDS PER DOCTORS, MULTIPLE REGRESSION	
	Insurance Premiums
Awards Per Doctor	2.801 (0.515)**
4-Firm Concentration Ratio	-220.714 (87.807)*
Patient Compensation Fund	-5,278.284 (2,657.307)
Constant	23,548.193 (6,907.875)**
Observations	50
R-squared	0.48
Standard errors in parentheses significant at 5%; ** significant at 1%	

25. Another potential explanation is that we have underestimated average PCF fees. In the *MLM* price data, rates are broken down into internal medicine, general surgery, and OB/Gyn. PCF fee charges are broken down much more specifically, with many more specialties. We chose the fee rate that best matched either internal medicine, general surgery, or OB/Gyn, and made sure that these fees would follow the trend that internists pay the least and OB/Gyns the most.

**ADVERSE ACTIONS PER DOCTOR**

Table A5 presents the results mentioned in the text, that unlike tort awards adverse actions per doctor do not correlate with political factors such as partisan elections or the percent below the poverty level.

TABLE A5: VARIATION IN ADVERSE ACTIONS PER DOCTOR IS NOT ASSOCIATED WITH PERCENT BELOW POVERTY LEVEL OR PARTISAN JUDICIAL ELECTIONS	
	Adverse Actions Per Doctor
Personal Income Per Capita 1998	-2.55e-07 (1.84e-07)
Death Rate Per 1,000 in 2000	-0.00022 (0.00045)
Infant Mortality, Deaths Per 1000 Live Births 2002	-0.00023 (0.00042)
Percent Below Poverty Level	0.00015 (0.00025)
Partisan Electoral System	-0.0018 (0.0014)
Constant	0.015 (0.008)*
Observations	50
R-squared	0.13
<i>Standard errors in parentheses</i> <i>* significant at 10%; ** significant at 5%; *** significant at 1%</i>	

**TABLE A6: MEANS AND STANDARD DEVIATIONS**

	Mean	Standard Deviation
Medical Malpractice Claims (1999-2001)	1,046.6	1,467.3
Medical Malpractice Insurance Premium (1999-2001)	20,001.9	9,226.9
Internal Medicine	8,145.9	4,482.4
General Surgery	27,019.8	1,3242.1
OB/Gyn	44,672.9	21,537.6
Award Per Doctor (1999-2001)	4,612.0	1,915.6
Award Per Claim (1999-2001)	198,759.1	55,946.9
Claims Per Doctor (1999-2001)	0.024	0.009
Adverse Actions (1999-2001)	236.4	269.6
Concentration Ratio	70.8	11.2
Death Rate Per 1,000 (2000)	8.9	1.3
Infant Mortality (Deaths Per 1,000 live births) (2000)	7.0	1.5
Percent Below Poverty Level (1999)	11.9	0.1
Personal Income Per Capita (1998)	26,030.3	3,776.6
Patient Compensation Fund	0.16	
Partisan Electoral System for Judges	0.2	

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