VARIABILITY IN MEDICAL MALPRACTICE PAYMENTS: IS THE COMPENSATION FAIR?

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This study uses a framework in which disputants' litigation decisions are based on optimizing expected returns and minimizing losses to analyze outcomes of medical malpractice disputes—the probability of payment, stage of resolution, and amounts paid, based on closed medical malpractice claims from Florida and jury verdict reporter abstracts from five jurisdictions. Using judgments of an expert panel and other indicators, the analysis reveals that cases are more likely to result in paid claims when the defendant appears to be liable. By contrast, cases brought to satisfy a claimant motive of vindication are less likely to result in payment; such cases have a higher probability of being tried. Claimants with more serious injuries tend to receive higher payments. Payment appears equitable vertically, but there is appreciable variability in payment for similar injuries which may reflect horizontal inequities.

I. INTRODUCTION

Our system of tort law is charged with many responsibilities: to provide an optimal level of injury deterrence; to punish wrongdoers; and to compensate victims (Coleman, 1989; Trebilcock, 1989). Critics in growing numbers claim that these responsibilities are not being met. Some argue that the system leads to overdeterrence (Trebilcock, 1989). Some claim that victims are over- or undercompensated or that determination of liability and damages is haphazard. Some focus on asymmetric power between claimants and defendants, even though there is considerable debate about which side now has the upper hand (Litan *et al.,* 1988). Some point to the fact that the defense's case is managed by insurers and experienced attorneys while the injured party lacks experience in

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claiming and dispute resolution (Galanter, 1974; Rosenthal, 1974; Ross, 1980; Genn, 1987). The claimant, lacking the resources of a corporation or an insurer in particular, may be risk averse[1] and thus forced to settle for less than his or her "just" compensation, and/or the claimant may lack pertinent information and access to professional legal counsel. Others maintain that liability law has become too plaintiff-oriented in its doctrine and juries too compensation-minded in their findings for sympathetic claimants (e.g., Huber, 1988). Further, say the critics, juries are only too eager to dig into a defendant's "deep pockets" (for some empirical support, see Chin and Peterson, 1985).

Rather than being biased in favor of one side or the other, courts may simply make errors because they simply lack pertinent information, such as on the cost of treating specific injuries. Most cases are settled out of court. Many cases decided at verdict may reach that stage because parties, too, make errors in failing to accurately predict the likely outcome at verdict. The quality of legal representation varies, and some lawyers appear to be better than others at predicting outcomes and representing their clients (Ross, 1980).

All the complaints about tort law apply to medical malpractice.[2] If anything, the stakes are higher than for most other cases of personal injury and the tail—the delay from the date of incident to the date of closure—is generally longer. The defendants, health care providers, are well organized politically and have brought the "malpractice insurance crisis" to the attention of the public at large and the public's elected representatives. Not only are the injuries frequent and often expensive (California Medical Association and California Hospital Association, 1977; Harvard Medical Malpractice Study, 1990), but given the special nature of health care, the public is particularly concerned about ensuring a high quality of care by deterring negligent medical practice.[3]

Following an injury, the immediate task of the tort system is to determine liability and, on finding liability, to compensate the victim. This study focuses on determinants of the probability that the claimant receives compensation in medical malpractice cases, amount of compensation received, and the stage at which the dispute was resolved. Our empirical analysis is limited to resolution

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[1] Viscusi (1988) described how risk aversion affects litigants' decisions in dispute resolution.

[2] For general overviews, see Danzon, 1985a, 1988, and Nye *et al.*, 1988. The wide diversity of views concerning medical malpractice is discussed in U.S. General Accounting Office, 1986: 22–37.

[3] There are frequent accounts of overdeterrence in the medical field, commonly termed "defensive medicine." See American Medical Association Special Task Force on Professional Liability and Insurance, 1984: 16. Estimates of defensive medicine cost, however, are subject to several criticisms. See Sloan and Bovbjerg, 1989.

of a filed claim. The data do not capture the genesis of the claim (Felstiner *et al.*, 1980–81).[4]

In section II, we describe the framework widely used in the law and economics literature for analysis of dispute resolution. We relax some of the assumptions of the basic model and synthesize recent work on case selection, which provides the basis for hypotheses to be tested empirically. Section III describes the two data bases used in the analysis, and section IV presents descriptive evidence on frequency of resolution by stage, the claimant "win" rate, and payments obtained by stage, unadjusted for payment determinants other than severity of injury. In section V, we present specifications of three equations—the probability of receiving payment, the probability of resolution at verdict, and the amount of indemnity paid as well as details of the econometric approach used. One major contribution of this study is the use of explanatory variables based on physicians' expert judgments about the likelihood that the injury was avoidable. Section VI discusses our estimated equations, showing a relatively orderly structure in the way that claims are resolved. We find that cases in which, based on information on the closed claim form, the defendant appears to be liable are more likely to result in payments to claimants. Cases in which claimants appear to have had a nonpecuniary motive, such as vindication, were more likely to be resolved at trial, and claimants had a lower probability of receiving money in such cases. In general, plaintiffs with more serious injuries were more likely to go to trial and to receive higher compensation. Finally, in section VII, we address the question raised by the study's title. Our results suggest that compensation tends in general to be equitable vertically, but there may be inequities horizontally—persons with seemingly similar injuries received vastly different amounts of compensation.

II. THEORY

A. Standard Framework

The now-standard conceptual framework developed in the law and economics literature is based on assumptions that both parties to the dispute are risk neutral, and that claimants' decisions are guided by maximizing the net return or defendants' by minimizing their total loss given that a claim has been filed.[5] The parties do not engage in strategic behavior.[6] Nor are there any principal-

[4] There is virtually no empirical evidence on the decision to file a medical malpractice claim. An important exception is a recent analysis of 240 dissatisfied patients in Wisconsin, which contrasted suers with nonsuers (May and Stengel, 1990).

[5] For an excellent discussion of economic models of the litigation process, see Cooter and Rubinfeld (1989). Although our empirical analysis is based on an economic model of dispute resolution, many of the underlying concepts may also be found in other literatures. See, e.g., Ross, 1980.

[6] The parties, for example, do not make higher than acceptable demands

agent problems; attorneys act in their clients' interests. Insurers act to minimize loss in the specific case. There is no moral hazard on the part of insureds, at least once the claim has been filed.[7] The model is for one period. Insureds do not consider the effects of the decision on future insurance premiums. Insurance companies and defendants do not consider effects of the case outcome on future claiming behavior or on awards. All returns and losses are pecuniary. That is, such motives for claiming, such as vindication and learning why the injury occurred, and for defending the case, such as future reputation of the individual defendant or a class of defendants, are not considered. There is complete information or, at least, there are no information asymmetries between the parties to the dispute. While this framework allows for differences in bargaining power, it provides no indication as to sources of differences in such power or how it is exercised.

Claimants' decisions are guided by the expected payment net of claiming or "litigation cost," as we shall call it. Claimants pursue a claim as long as this net return is positive. If, for any reason (such as new information), the net return becomes negative, the claimant drops the case. This net return defines the claimant's minimum asking price for accepting a settlement. This minimum asking price increases with (1) increases in the probability of winning at trial and the anticipated award conditional on winning (both components of expected payment) and (2) decreases in the cost of bringing the case to trial.

Defendants want to minimize their total loss—the sum of the expected payment and litigation cost. This sum defines the maximum offer the defendant is willing to make to settle the case. The maximum offer increases with increases in (1) the probability of the plaintiff winning at trial, (2) the award conditional on winning, and (3) litigation cost.

The dispute is settled when the maximum offer is greater than or equal to the minimum asking price. Otherwise, the dispute is resolved in court. The payment amount in out-of-court settlements is determined by the relative bargaining strength of the two parties. Unless the defendant has little bargaining power, payment at settlement should be less than payment at verdict.

Although the standard economic model does not specify the determinants of bargaining strength, such power is likely to depend on the relative financial resources of the parties and/or on their relative experience in litigation (Galanter, 1974; Viscusi, 1986). The vast majority of disputes are settled, implying that, at

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or lower than acceptable offers in order to achieve the desired result. Cooter and Rubinfeld, 1989, provide an excellent review of studies of legal disputes that incorporate strategic behavior. The added realism of such models comes at a cost in terms of their limited ability to predict behavior.

[7] For example, being insured will not affect the effort mounted on the defendant's behalf.

some point in the dispute before the cases reach verdict and sometimes after verdict, the defense is willing to offer at least as much as the claimant requires. To the extent that maximum offers greatly exceed minimum asking prices, there is a substantial amount of indeterminacy in payment determination.

B. Alternative Assumptions About Disputant Behavior

Each of the above assumptions may be relaxed but at the cost of increasing the ambiguity of the model's predictive ability. One or more parties may be risk averse (Viscusi, 1988), but in the absence of direct information on disputants' risk preferences, almost any outcome can be explained by differential risk aversion.

There may be asymmetric information between the parties. In the context of medical malpractice, a physician may know whether he has committed an error for which he could be found to be liable;[8] by contrast, initially, all the claimant may be able to observe is an adverse outcome. Claims may be dropped not necessarily because they are "frivolous," but rather because additional information reveals that they are not worth pursuing from the claimant's perspective.

In the framework outlined earlier, a dollar lost by the defendant is a dollar gained by the claimant. In fact, there may be asymmetric payoffs to the parties. Some claimants may pursue claims for reasons of vindication or revenge or to let a third party uncover the "truth" and decide that the injury was wrong (Miller and Sarat, 1980–81; Merry and Silbey, 1984).

Defendants may be concerned about consequences of adverse publicity for their reputations. Publicity about a large award at verdict or even a downstream settlement may be embarrassing and/or be taken by others as an indicator of the physician's quality. Insurers sponsored by medical societies may be concerned about potential effects on physicians' reputations more generally. In general, insurers may be expected to consider the effects of a large award on the frequency of suits and later payments (see, e.g., Ross, 1980).

In some disputes, claimants may realize that the expected payments to them if their cases were to go to trial are negative, but they may file suits anyway to extract settlement offers from the defendants (Bebchuk, 1988). The offers themselves may provide signals of the disputants' intentions.[9] Although introducing strategic behavior adds an element of realism, it also adds indeterminacy to the predictions, and sufficient empirical evidence to motivate

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[8] See Danzon, 1985b. Other studies that consider asymmetric information in the litigation process include P'ng, 1983, 1987; Bebchuk, 1984; Reinganum and Wilde, 1986; Nalebuff, 1987; and Cooter and Rubinfeld, 1989.

[9] Nalebuff (1987) analyzed situations in which the credibility of the plaintiff's threat to go to trial depended on the size of the settlement demand.

theoretical discussions of strategic behavior in this context is not now available.

C. Selection of Cases by Stage of Resolution

The probability and size of the payment to claimants is plausibly related to the stage at which the dispute is resolved.[10] Although there is some controversy in the literature, three sources of selection of cases for trial emerge. We present empirical evidence on the first two sources below.

First, large random errors in estimating the outcome at verdict decrease the probability of a settlement. The error in predicting the probability of plaintiff winning is plausibly greater for cases in which this probability is around 0.5 (Priest and Klein, 1984). The errors both parties make in estimating the award at verdict are plausibly larger for cases with larger potential awards. Since the parties form their predictions independently, larger errors should increase the difference in each party's estimate of the payoff to the plaintiff if he is victorious in court. To the extent that the minimum asking price rises relative to the maximum offer, there is less room for settling.

Second, when there are asymmetric payoffs to the disputants, the case is more or less likely to go to trial, depending on the specifics of the payoffs. The claimant seeking vindication and/or wanting to discover the factors causing the injury will, other factors constant, have a higher minimum for settling. Such nonpecuniary motives should increase the likelihood that the dispute will be resolved at court. Defendants fearing reputational loss, however, should be willing to offer more to settle. Cases in which one or both parties are risk averse should be more likely to settle.

Third, when there is asymmetric information, the dispute is more likely to be resolved at trial. In medical malpractice, the defendant may be uniquely positioned to know about the extent of liability. Asymmetric information creates a possible divergence between the estimated likelihood of the plaintiff's prevailing in a trial for both parties (Bebchuk, 1984). Hence, to the extent that ignorance about defendant liability creates a sense of optimism on the claimant's part, this should widen the gap between the claimant's minimum asking price and the defendant's maximum offer. In such situations, the likelihood of trial should increase as the extent of asymmetric information increases.

Priest and Klein (1984) hypothesized that, of the cases decided at verdict, the proportions of cases won by plaintiffs and defendants should approach 50–50. Their hypothesis rests on several restrictive assumptions, among them that stakes in the case are sym-

[10] Studies that have explicitly considered the selection phenomenon in legal disputes include Danzon and Lillard, 1983; Priest and Klein, 1984; Priest, 1985; and Wittman, 1985, 1988.

metric between the parties. Although Priest and Klein found some evidence in favor of the 50–50 split from jury verdict data from Cook County, Illinois, estimates of the percentage of cases won by plaintiffs at trial from national samples of product liability and medical malpractice cases are appreciably less than this.[11] We shall reexamine this issue again in this article.

III. DATA

A. Florida Closed Claims

The first data base we analyzed was a file containing all medical malpractice claims closed in Florida from October 1985 through March 1988. Florida requires that each insurer, joint underwriting association providing coverage to health care providers, or medical malpractice self-insurer file reports on all closed medical malpractice claims with the Florida Department of Insurance on a closed claims form developed by the Department and that the reports be made publicly available (Fla. Stat. § 627.912 (1984)). Some information was not provided in machine-readable form, in particular the description of the injury and the circumstances leading to the injury. The closed claims form was greatly expanded for claims closing in October 1985 and thereafter. For this reason, we confined our analysis to claims closing in this and later months. The expanded form requests detailed information on the injury, some characteristics of the claimant, and the names of the defendant and the insurer.

Using the original closed claim forms, we classified the allegations against the defendant according to a scheme developed by the Risk Management Foundation of the Harvard Medical Institutions.[12] Physicians at the Health Science Center, University of Texas–Houston, classified a subsample of obstetrical, general surgical, and orthopedic surgical cases according to the extent to which the injury was avoidable.[13]

Since there are often multiple defendants, there were often several closed claims form per case. For purposes of our analysis, we aggregated forms to obtain information on a per case basis. When there were differences in information among claim forms for a particular case, we used the information for the defendant who paid the highest indemnity.

We eliminated cases which closed at pre-suit stage and for which there was no indemnity, associated loss expense (LAE), or an attorney involved. Sometimes a health care provider believes

[11] Plaintiffs at trial won 37 percent of cases in product liability cases (Viscusi, 1986) and 28 percent in medical malpractice cases (Danzon and Lillard, 1983). Both of these studies used data from closed claims files.

[12] See U.S. General Accounting Office (1987: App. III, 74–75) for a description of the classification scheme.

[13] The concept of "avoidability" is described in sec. V.B.1.

Table 1. Severity of Injury Scale

Severity of Injury	Examples
1. Emotional only	Fright, no physical damage.
2. Temporary insignificant	Lacerations, contusions, minor scars, rash. No delay.
3. Temporary minor	Infections, misset fracture, fall in hospital. Recovery delayed.
4. Temporary major	Burns, surgical material left, drug side-effect, brain damage. Recovery delayed.
5. Permanent minor	Loss of fingers, loss or damage to organs. Include nondisabling injuries.
6. Permanent significant	Deafness, loss of limb, loss of eye, loss of one kidney or lung.
7. Permanent major	Paraplegia, blindness, loss of two limbs, brain damage.
8. Permanent grave	Quadriplegia, severe brain damage, lifelong care or fatal prognosis.
9. Death	

SOURCE: National Association of Insurance Commissioners, 1980: 10.

that a patient may file a claim, but the patient never files. By dropping such cases (or "incident" files) which are often closed at no cost to the insurer, we undoubtedly also lost some claims that were dropped by the claimant before the insurer incurred any expense specifically attributable to the case. The resulting data base contained 6,612 cases.

The Department of Insurance does not appear to check the quality of the data. Nor, to our knowledge, have other groups previously conducted in-depth analysis of the data. We recently completed 187 interviews with subsamples of Florida claimants who alleged birth injuries and emergency room injuries. There was general agreement between the information from individual cases from the closed claims forms and from the interviews. A form is filed for each defendant at the time the claim is closed against the defendant. The interviews revealed a few cases with claims pending or closed against defendants that were not included in the closed claims form data. Some of these probably will eventually be reported to the state. We found a few cases in the jury verdict reporters and in county court records for which no closed claim forms existed.

B. Jury Verdict Reporters

We also drew samples of jury cases from jury verdict reporters in California, Illinois, Florida, Missouri, and Kansas. In a few cases, claims settled during the trial were reported. The RAND Corporation provided the data on medical malpractice cases for California and Chicago (Cook County). We used RAND's data collection instrument with one key item added, severity of injury, to abstract data from two jury verdict reporters in Florida (*Trials and Tribulations* and *The Florida Jury Verdict Reporter*) and one in Kansas City, Missouri and Kansas (*Greater Kansas City Jury*

Verdict Service) for 1973 through 1987. The severity of injury scale varied from 1 to 9 (Table 1).

In total, we abstracted 416 cases from Kansas City and Florida which, when added to the cases from RAND, yielded a sample of medical malpractice jury verdicts of 1,355.[14] Although the jury verdict data contained some items not available on closed claims data—most important, estimates of economic loss and the percentage of plaintiff negligence—the jury verdict data had the distinct disadvantage of being limited to one stage in the dispute resolution process.

IV. DESCRIPTION OF CASES AND OUTCOMES

A. Stage of Dispute Resolution

Of the 6,612 closed claims in the Florida file, 16.5 percent of claims were closed before a suit was filed and another 72.0 percent were settled before the case reached the verdict stage (Table 2). Only 11.5 percent of claims were decided at verdict or on appeal.[15] Thus, it appears that, in the vast majority of cases, defendants' maximum offers exceed claimants' minimum asking price.[16]

Table 2. Mean Indemnity Payment, by Severity of Injury and Stage of Disposition (All payments in $0,000s—1987 dollars)

Severity of Injury	No. of Claims	% of Claims Paid	Mean Indemnity Payment	Expected Payment[a]
	Florida Claims Closed Pre-Suit			
Missing	8	37	$ 15	$ 6
Level 1	85	64	5	3
Level 2	151	90	5	5
Level 3	390	87	12	10
Level 4	126	84	41	34
Level 5	113	82	47	39
Level 6	67	58	115	67
Level 7	16	56	115	64
Level 8	6	67	297	199
Level 9	129	67	144	97
Total	1,091	80	$ 38	$ 30

[14] All medical malpractice cases reported by the reporters in these jurisdictions were abstracted, as were all product liability and government (as defendant) cases and a random sample of automobile liability cases.

[15] On appeal includes settlements reached during the appeals process.

[16] Nothing was paid in 20 percent of the cases that ended pre-suit and 57 percent of those that ended pre-verdict but after a suit began. Thus, for a significant number of claimants the cost of pursuing the suit exceeded the expected return after trial so that the claimant's minimum asking price was zero.

Table 2. (Continued)

Severity of Injury	No. of Claims	% of Claims Paid	Mean Indemnity Payment	Expected Payment[a]
		Florida Claims Closed Pre-Verdict		
Missing	35	14	$ 26	$ 4
Level 1	284	18	41	7
Level 2	430	30	17	5
Level 3	1,077	41	31	13
Level 4	476	49	64	31
Level 5	522	47	80	37
Level 6	504	52	174	91
Level 7	189	49	366	179
Level 8	189	62	824	511
Level 9	1,053	47	193	91
Total	4,759	43	$ 157	$ 67
		Florida Claims Closed After Verdict		
Missing	9	0	$ 0	$ 0
Level 1	63	6	44	27
Level 2	57	5	20	1
Level 3	139	19	77	15
Level 4	41	37	168	62
Level 5	77	19	231	44
Level 6	87	31	315	97
Level 7	57	32	1,210	387
Level 8	27	33	1,762	581
Level 9	139	25	314	79
Total	696	22	$ 430	$ 95
		Florida Claims Closed After Appeal		
Missing	0	0	$ 0	$ 0
Level 1	9	11	70	8
Level 2	1	0	0	0
Level 3	11	27	18	5
Level 4	4	50	280	140
Level 5	7	57	546	311
Level 6	12	50	549	275
Level 7	5	60	1,898	1,139
Level 8	4	50	1,702	851
Level 9	13	62	419	260
Total	66	44	$ 642	$ 282
		Florida-Kansas City Jury Verdicts		
Missing	3	0	$ 0	$ 0
Level 1	4	25	37	9
Level 2	12	25	116	29
Level 3	55	42	114	48
Level 4	37	57	330	188
Level 5	135	49	301	147
Level 6	47	72	639	460
Level 7	32	50	1,689	844
Level 8	15	80	5,675	4,540
Level 9	76	57	910	519
Total	416	53	$ 848	$ 449

SOURCE: Florida closed claims, Oct. 1985–March 1988, and Florida–Kansas City jury verdict data, 1973–87.

[a] The expected payment is equal to the fraction of paid claims times the mean indemnity payment.

B. Plaintiff Win Rate

Only 22 percent of the Florida closed claims decided at verdict and not appealed were decided in favor of the plaintiff; 44 percent of claims decided at verdict and appealed were won by plaintiffs. The plaintiff win rate was thus substantially lower than predicted by Priest and Klein. The percentage of plaintiff wins at verdict tended to increase with severity of injury. For low severity levels, the plaintiff win rate was quite low. This pattern is plausible since, to establish liability, the plaintiff must prove that he/she was harmed. This is likely to be much more difficult to do when the injury was minor and temporary.

The plaintiff win rate reported by the Florida jury verdict reporters was much higher, 66 percent (not shown separately in Table 2); the rate for the Kansas City verdicts at 34 percent was much closer to the rate from Florida closed claims.[17] Since the closed claims file is (nearly) a census, it is likely that the Florida reporters oversampled cases decided in favor of the plaintiffs.

C. Amounts Paid

The mean amount paid on paid (Florida closed) claims increased markedly from closing at pre-suit to closing on appeal. Data from the jury verdict reporters suggest much higher payments at verdict than do the Florida closed claims. There are two likely reasons. First, large cases were probably oversampled. Second, some large verdicts are appreciably reduced later by court action or settlement (Broder, 1986; Shanley and Peterson, 1987). The Florida data, but generally not the jury verdict data, provide information on payments after appeals.

To compute the returns to pursuing litigation, we analyze expected values. One perspective is to view expected values at the time the claim is filed. Expected values also rose monotonically by stage of disposition. Cases decided at pre-suit and pre-verdict suit had expected payments of $30,000 and $67,000. Cases decided at verdict and appeal had expected payments of $95,000 and $282,000, respectively. As indicated above, random errors in estimating awards at verdict should be greater for cases involving higher loss. Thus, the selection process provides an explanation for the pattern observed in Table 2.

For a number of severity levels, however, the expected value of a suit, pre-verdict, exceeded or was close to the expected value for cases closed at verdict. Expected payments at the two stages were close for severity levels 2, 3, 5, 6, 8, and 9. Considering litigation cost, the net return to pursuing the case to verdict viewed *ex*

[17] These percentages are not shown in Table 2, which combines data from the two Florida and the one Kansas jury verdict reporter. The probability of winning computed from our sample of verdicts from five jurisdictions (California, Illinois, Florida, and two in Kansas City) was 0.38.

ante must have been negative for cases in these severity categories. A plausible explanation for this pattern is that claimants have nonpecuniary motives as well as pecuniary ones for pursuing their claims.

From another perspective, a certain return at one stage is compared to an expected value at the next stage in the litigation process. Assuming that the claimant could have settled for the mean amounts given in Table 2, it was typically worthwhile for claimants to settle. Considering plausible values for claimant litigation cost adds force to this conclusion.

Payments increased monotonically with injury severity level up through permanent grave injuries. Death cases paid less than the most serious injuries. Although mean amounts paid generally rose with severity level, there was nevertheless substantial variation in payment level within injury level and, because the frequency distributions of paid claims are positively skewed, the mean of paid claims tended to be much higher than the corresponding median value (Fig. 1).

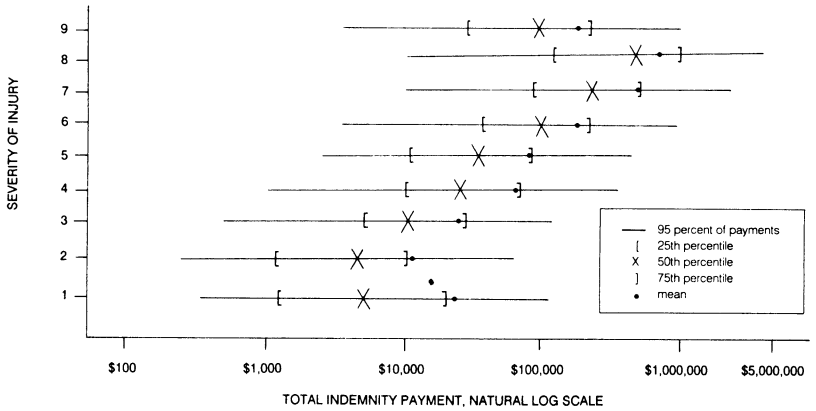

Figure 1

Sloan *et al.* (1989) found that claims with higher injury severity took longer to resolve. To the extent that the volume of new disputes has been rising, a closed claims file from a fixed period, such as 1985–88, probably contains disproportionately few severe cases with the longest resolution period. Total payments from cases arising from incidents that occurred during 1985–88 or from claims filed during that period may for this reason be appreciably higher than the aggregate value of claims closed during the period.

V. EQUATION SPECIFICATION

A. Overview

We estimated three equations predicting the probability that the claim closed with some payment to the claimant (versus no payment); the probability that the claim was resolved at verdict or

on appeal of the verdict (versus dropped or settled); and the average payment level for paid claims. The two probability equations allowed us to study the selection process of (1) paid claims versus claims that did not result in compensation to the claimant and (2) claims resolved at verdict-appeal versus dropped and settled cases. By estimating the payment equations, we could then determine whether payment levels varied systematically with losses or correlates of loss, stage at which the case was resolved, and contributory negligence on the part of the plaintiff. Brief definitions and means of the explanatory variables are presented in the Appendix.

B. Probability of Payment

We estimated probability of payment equations with both the Florida closed claims and the Florida–Kansas City jury verdict subsample. The probability of payment should depend on three general factors: (1) the degree of liability, (2) litigation cost, and (3) asymmetric payoffs. A higher degree of liability should result in a higher probability of payment. Higher litigation cost to the parties should decrease litigation effort and encourage earlier resolution of disputes. Asymmetric payoffs affect the benefit of pursuing and defending claims. The direction of effect on the probability of payment depends on the nature of the payoff. Any return accruing exclusively or disproportionately to the claimant (e.g., desire to know, vindication motives) will increase claimant litigation effort beyond that motivated by the financial return, thereby presumably increasing the probability of payment. On the other hand, the defendants probably are less likely to be liable, making payment less likely. Returns uniquely accruing to the defendant (effects on payments in subsequent cases, reputation motives) will increase defendant effort and lower the probability of payment.

1. Liability. To prove liability, a plaintiff must prove (1) that the plaintiff was injured (2) because of the acts or omissions of the defendant (causation) and (3) that the defendant's acts or omissions failed to meet a standard of care maintained by reasonably competent health care providers in the community (negligence). Degree of liability is not directly observable in claims or jury verdict data except in those cases in which a court has rendered a verdict, and, for purposes of this analysis, the outcome at verdict is an endogenous rather than an exogenous variable. Thus, we used proxy measures for degree of liability.

The most direct measure of degree of liability available for our analysis was an indicator of avoidability. The avoidability concept combines concepts causation and negligence (Havighurst, 1975; Havighurst and Tancredi, 1973). An injury was considered to be "avoidable" if it could have been prevented with good medical

care. Injuries that reflect the natural history of a disease or patient-induced injuries were not considered to be "avoidable."

To develop a list of avoidable outcomes for another project, physicians rated a subsample of the Florida closed claims according to whether the injury was, in descending order of degree of liability, "highly avoidable," "moderately avoidable," "injury might have been avoidable" or "unavoidable." The subsample was limited to cases involving obstetrician-gynecologist, general surgeon, and orthopedic surgeon defendants. Prior to this study, there was no evidence on validity and reliability of this scale. Since the physician raters were not told anything about the disposition of the cases, the empirical results presented below test both the scale's validity and its reliability and also test the hypothesis that the probability of payment rises with the degree of liability. For purposes of our analysis, we combined ratings of "highly avoidable" and "moderately avoidable" into a single variable "Avoidable." The middle group was "Maybe avoidable" (our contraction for "injury might have been avoidable"). The omitted reference group was "Unavoidable."

In the Florida closed claims analysis, we included nineteen principal allegation variables we coded from written descriptions on the closed claim forms using a scheme published in U.S. General Accounting Office (1987). The closed claim forms were completed by insurers, and, therefore, the allegations recorded on the forms represented the defendant's understanding of the claimant's accusation. For many of the binary variables, the relationship between the variable and liability is not clear, although a relationship may well exist. In some, however, the relationship is clear. In cases coded "res ipsa," if the allegation was related to treating the wrong person or operating on a wrong body part, defendant liability was relatively clear, assuming a jury would accept the plaintiff's version of the facts. Conversely, in cases coded "poor outcome of surgery," "claimant unhappy with personal treatment or outcome" (other than surgery cases), or case related to a "death—unspecified reason," liability is unclear. The latter were residual categories to be used only if these types of complaints were listed with no other mention of other allegations of defendant fault.

We could construct only a more limited set of allegation variables from information provided in the jury verdict reporters. However, the reporters provided information on the legal doctrine used in the case. Although potentially of value to plaintiffs in allowing them to name ("deep pockets") hospitals as defendants, given the novelty of the doctrine in medical malpractice litigation at the time, cases in which plaintiffs invoked *respondeat superior* may have in fact been more difficult for plaintiffs to win. The doctrine has been used in the context of medical malpractice to extend the liability of hospitals for the actions of persons who work at hospitals, especially physicians.

The place where the injury occurred (emergency room, physician's office, etc.) may be systematically related to defendant liability in ways that are not at all well understood. For example, in emergency room settings the standard of care may be lower than in a situation in which patient visits can be scheduled, but, at the same time, the probability of a medically induced injury may be appreciably higher than in other settings.[18]

To prove liability, a plaintiff must prove that an injury occurred. This is likely to be most difficult to do for the injuries of lowest severities—"emotional only" and "temporary insignificant" injuries.

2. Litigation Cost. The delay to filing is a measure of claimant litigation cost. A lengthy delay to filing may make the case more difficult for the plaintiff to prove because the information is "stale" and witnesses become difficult to locate. We therefore included a variable for months from incident of injury to filing.[19]

3. Asymmetric Pay-offs. If persons have nonpecuniary motives for filing a claim, they may push their claims further than would be justified on pecuniary grounds alone. Cases with allegations interpreted above as being associated with a low degree of liability, such as "claimant unhappy with personal treatment or outcome," suggest a nonpecuniary motive.

A source of differences in asymmetric payoffs on the defendant side is the type of insurer. Commercial insurers in recent years have often dropped the medical malpractice line when selling such insurance appeared to be unprofitable (Sloan *et al.,* 1991). A case in point is St. Paul, the largest commercial stock insurer of medical malpractice nationally and the largest stock insurer by far in the Florida closed claims data base. St. Paul left the Florida medical malpractice market (and other markets) in the 1980s after determining it could no longer write such coverage profitably. By contrast, the noncommercial medical malpractice insurers have tended to remain in the market.

To the extent that the noncommercial companies anticipate continued insurance activity, they are more likely to consider the effects on subsequent cases of winning a particular case and therefore to fight harder.[20] A higher investment by the insurer plausi-

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[18] Empirical evidence unfortunately is lacking. These points are suggested by articles in the emergency medical literature. See, e.g., Trautlein *et al.,* 1984; Soler *et al.,* 1985; and Rusnak *et al.,* 1989.

[19] A lengthy delay may also be an indicator that liability is ambiguous. Because of this, the claimant consults more and finds it more difficult to obtain legal representation.

[20] The most direct available measure of effort spent in defending cases is "loss adjusted expense" (LAE). The mean LAE for cases defended by commercial insurers in our Florida sample was $10,485 versus $13,615 for trusts, $19,483 for mutuals, and $20,367 for other noncommercial insurers. The differ-

bly reduces the probability of payment to the claimant. The fact that the majority of noncommercial medical malpractice insurers are sponsored by physician organizations is a second reason for an asymmetric payoff. These insurers may invest more in defending individual cases because they place a value on the reputation of physicians in the area. Commercial insurers, by contrast, would only invest an amount that maximizes the net financial return to shareholders and not consider reputational benefits.

C. Probability of Resolution at Verdict

We have identified three factors affecting stage of dispute resolution: random errors in predicting the outcome at verdict, asymmetric payoffs, and asymmetric information. Data from the Florida closed claims file allowed us to measure aspects of the first two.

The size of the error in predicting awards is plausibly positively correlated with the amount of damage incurred as measured by the severity of injury, claimant age, and the number of defendants. The error in predicting the probability of winning is greatest for cases with probabilities of winning around 0.5. Cases assessed by the physician panel as "might have been avoidable" are likely to fall within this range. By contrast, there should be less error in predicting the outcome of cases involving injuries rated "avoidable" or "unavoidable." The same variables associated with asymmetric payoffs above were included in the analysis of the probability of resolution of the dispute at verdict.

D. Payment

We estimated two payment equations with Florida closed claims data and three with jury verdict data using the natural log of the indemnity payment as the dependent variable. We converted all monetarily expressed variables to 1987 dollars. We made payment a function of variables for (1) the amount of damage, (2) comparative plaintiff negligence (jury verdict data only), and (3) case selection.

In the Florida closed claims analysis, to measure the amount of damage, we included injury severity, claimant age at the time of the injury, gender, and number of defendants. Damage measures available from the jury verdict data base were in some ways better and in other ways worse than those from the Florida closed claims file. The RAND Corporation did not record severity of injury according to the nine-point scale used in Florida but did develop an injury index based on a regression of the logarithm of payments related to the nature of the injury and consequent impairments (Peterson, 1984: 71–86). When analyzing jury verdict data with Cal-

ences for the commercial and the other company ownership types in mean LAE were all statistically significant at the 5 percent level or better.

ifornia and Chicago included, we had to substitute the injury index for the severity variables. When the data set was limited to Florida and Kansas City, we included the injury index and binary variables for severity. Other damage measures included marital status, race, employment status, the occupation of those working at the time of the injury, and the number of defendants and plaintiffs involved in the case. In medical malpractice, the vast majority of cases involves only one plaintiff. We defined a variable "Shortened life" to equal 1 if the injury shortened life expectancy.

A major advantage of jury verdict data is that they contain a measure of the plaintiff's economic loss, past and future medical expense, past and future income loss, property damage, funeral expense (if the victim died), and other expense. There was no indication from the jury verdict abstracts about how economic loss was computed. We do not know whether future losses were discounted, and, if so, which discount rate was used. We suppose that, in most cases, the estimate of loss was the plaintiff's.[21]

To measure the influence of comparative negligence on awards, only possible with the jury verdict data, we included a variable for percentage of plaintiff negligence. This percentage was determined at verdict.

We accounted for cases selected in the Florida closed claims analysis in three ways. First, we included variables for the stage at which the dispute was resolved and the number of months from filing to closing. Cases selected for later stages of dispute resolution are likely to yield higher amounts to claimants because as the claimant's (and attorney's) investment in the case rises, so do the prospective returns. Even with measures of amount of loss included, there are undoubtedly other important determinants of prospective returns that are observable by the disputants and juries but not captured by the closed claims data. We included the stage and time lag variables to account for these unobserved determinants. Second, we distinguished between cases in which the claimant was represented by an attorney from those without legal representation. Third, we included in the payment analysis only cases resulting in payment to the claimant. Unless one adjusts for selection to payment, the results generalize to cases with payment but not to the universe of cases. As discussed above, low probability-low award cases are probably eliminated early. We took account of selection to payment using a method developed by Heckman (1979).

The jury verdicts represent the tip of the iceberg; the vast majority of cases in these jurisdictions was undoubtedly eliminated

[21] Susan Smith of the Greater Kansas City Jury Verdict Service (telephone conversation, 21 Sept. 1990) indicated that losses obtained and reported are the values the jury heard. She asks a lawyer on each side to verify this. Agreement about what the jury was told does not mean that the lawyers agreed on the validity and accuracy of the loss calculation.

before trial.[22] Our results based on jury verdict data show sources of variation of payments decided at verdict and do not generalize to medical malpractice cases more generally. To account for differences in case selection procedures across reporters as well as underlying jurisdictional differences, we included binary variables for jurisdictions.

Several variables had many missing values. Rather than drop the variable or lose the entire observation, we included a variable to indicate that the variable was missing. For example, if we had no data on economic loss, we set the economic loss variable equal to 0 and set a variable "Econ. loss missing" equal to 1. The coefficient on the latter variable represents the product of (1) the mean economic loss for observations with missing data on this variable and (2) the effect of such loss on the amount awarded.

VI. RESULTS

A. Probability of Payment

Overall, the results indicate that cases involving a higher appearance of fault were more likely to be paid (Table 3). Cases that seem to have stemmed from a motive of claimant vindication less often resulted in payment to claimants. The high standard errors associated with a few coefficients is attributed to a small sample size for the variable.

Regression 2 contains measures of the extent to which the injury could have been avoided by the health care provider. "Avoidable" injuries had a higher probability of being paid than those classified as "maybe avoidable." Both of these types of cases had a higher probability of being paid than those in the "Unavoidable" reference category. The coefficient on "avoidable" is statistically significant at the 1 percent level. This result suggests both that the avoidability scale is valid and reliable and that there is a relationship between the probability of payment and the degree of liability.

Results on some of the allegation variables reinforce the latter conclusion. Cases involving allegations of treating the wrong person or operating on the wrong body part ("*res ipsa*") were much more likely to be paid (regressions 1 and 2). Cases involving the use of the *res ipsa loquitur* doctrine were less likely to be paid in the jury verdicts analysis (regression 3), an unanticipated finding. Cases alleging gross negligence were more likely to be paid (regression 3). By contrast, cases in which the claimant was unhappy with personal treatment or outcome ("Unhappy"), and cases related to a death without a specific allegation of negligence on the closed claim form ("Death—unspec.") were less likely to be paid.

[22] In a later paper, we plan to model this selection process.

Table 3. Case Characteristics as Factors Explaining Probabilities of Payment and Resolution at Verdict, Multiple Regressions (Standard Shown Errors in Parentheses)

	Payment: Florida Claims				Payment: Jury Verdicts Florida–Kansas City		Resolution at Verdict: Florida Claims			
	Full Sample		Subsample				Full Sample		Subsample	
Explanatory Variables	Regression 1		Regression 2		Regression 3		Regression 4		Regression 5	
Intercept	0.098	(0.057)	0.023	(0.27)	−0.46**	(0.14)	−1.84**	(0.11)	−1.46**	(0.35)
MEASURES OF LIABILITY										
1. *Avoidability*										
Avoidable	—		0.69**	(0.25)	—		—		−0.58*	(0.29)
Maybe avoidable	—		0.11	(0.26)	—		—		−0.57	(0.30)
Rating missing	—		−0.032	(0.24)	—		—		−0.46	(0.28)
2. *Allegations*										
Res ipsa	0.53**	(0.11)	0.87**	(0.23)	—		−0.017	(0.15)	−0.35	(0.32)
Unhappy	−0.38**	(0.082)	−0.59**	(0.17)	—		0.24*	(0.099)	0.23	(0.19)
Death—unspec.	−0.69**	(0.091)	−0.77**	(0.22)	—		0.044	(0.12)	0.028	(0.29)
Anesthesia	0.19	(0.12)	−0.041	(0.36)	1.17	(0.63)	0.023	(0.17)	0.32	(0.42)
OB-delivery	0.20*	(0.10)	0.17	(0.16)	0.68	(0.38)	−0.054	(0.16)	−0.093	(0.24)
OB-fetal	−0.045	(0.10)	−0.23	(0.17)			0.11	(0.16)	0.027	(0.26)
IV error	0.37**	(0.14)	−0.052	(0.61)	—		0.097	(0.20)	−4.12	(404.0)
Consent	0.40*	(0.17)	0.26	(0.29)	0.36	(0.28)	0.21	(0.21)	0.15	(0.36)
Surgery	0.018	(0.056)	0.091	(0.10)	0.46*	(0.21)	0.14	(0.073)	0.049	(0.13)
Treatment	−0.040	(0.055)	0.090	(0.12)	0.34	(0.18)	0.15*	(0.070)	−0.10	(0.16)
Equipment	0.29*	(0.12)	0.30	(0.26)	3.48	(26.03)	0.052	(0.17)	−0.73	(0.48)
Drug	0.28**	(0.073)	0.20	(0.20)	0.49	(0.30)	−0.24*	(0.11)	−0.37	(0.30)
Blood product	−0.50	(0.36)	−4.99	(338.9)	—		0.37	(0.41)	−3.92	(904.1)
Failure	0.35	(0.30)	—		—		0.12	(0.39)	—	
Falls	0.34**	(0.068)	−0.16	(0.30)	—		0.17	(0.099)	0.35	(0.35)
Infection	−0.14	(0.087)	−0.15	(0.16)	0.44	(0.40)	0.11	(0.12)	0.16	(0.20)
Dispute—surg.	−0.21	(0.14)	−0.44	(0.23)	—		0.20	(0.17)	0.68**	(0.25)
Emergency	—		—		0.87*	(0.34)	—		—	
Other alleg.	−0.60**	(0.093)	−0.85**	(0.21)	0.41	(0.28)	0.052	(0.11)	−0.19	(0.26)

Table 3 (Continued)

Explanatory Variables	Payment: Florida Claims Full Sample Regression 1		Payment: Florida Claims Subsample Regression 2		Payment: Jury Verdicts Florida–Kansas City Regression 3		Resolution at Verdict: Florida Claims Full Sample Regression 4		Resolution at Verdict: Florida Claims Subsample Regression 5	
3. Legal Doctrine										
Res superior	—		—		−0.59*	(0.25)	—		—	
Gross negligence	—		—		1.13	(0.61)	—		—	
Res ipsa loq.	—		—		−0.43	(1.02)	—		—	
Other liability	—		—		−0.43	(0.63)	—		—	
4. Place of Injury										
Emergency room	−0.063	(0.061)	−0.00007	(0.19)	—		0.14	(0.080)	0.22	(0.23)
Other hosp.	−0.092	(0.047)	0.045	(0.11)	—		0.031	(0.063)	−0.048	(0.15)
Office	0.38**	(0.07)	0.19	(0.17)	—		0.012	(0.094)	0.090	(0.21)
Other location	0.075	(0.068)	0.12	(0.18)	—		0.14	(0.090)	−0.059	(0.25)
Location missing	−0.17**	(0.059)	−0.024	(0.16)	—		−0.055	(0.075)	−0.14	(0.20)
MEASURES OF LITIGATION COST										
Months to file	−0.011**	(0.001)	−0.008**	(0.003)	—		0.0052**	(0.0014)	0.004	(0.003)
Mos. to file missing	0.035	(0.133)	—		—		0.038	(0.18)	—	
MEASURES OF ASYMMETRIC PAYOFF										
1. Type of Insurers										
Trust	0.13**	(0.041)	0.14	(0.090)	—		0.25**	(0.057)	0.11	(0.12)
Mutual	0.54**	(0.075)	0.50**	(0.12)	—		0.43**	(0.090)	0.24	(0.15)
Self-insured	0.44**	(0.062)	0.56	(0.38)	—		0.30**	(0.084)	0.16	(0.45)
Other insurers	0.24**	(0.046)	0.25**	(0.090)	—		0.54**	(0.057)	0.65**	(0.11)
Insurer missing	0.18	(0.16)	−0.83**	(0.31)	—		−0.063	(0.25)	0.15	(0.41)
2. Type of Defendants										
Hospital def.	−0.25**	(0.042)	−0.42	(0.27)	0.95**	(0.25)	−0.068	(0.057)	0.55	(0.29)
Other def.	0.26**	(0.090)	−0.044	(0.68)	1.06**	(0.31)	0.069	(0.11)	−4.05	(447.9)
MEASURES OF DAMAGE										
1. Severity of Injury										
Level 1	−0.71**	(0.073)	−0.48**	(0.17)	−0.82	(0.81)	0.18	(0.095)	0.19	(0.23)
Level 2	−0.31**	(0.056)	−0.33*	(0.13)	−0.71	(0.40)	−0.17	(0.093)	0.030	(0.20)

Table 3 (Continued)

Explanatory Variables	Payment: Florida Claims Full Sample Regression 1		Payment: Florida Claims Subsample Regression 2		Payment: Jury Verdicts Florida–Kansas City Regression 3		Resolution at Verdict: Florida Claims Full Sample Regression 4		Resolution at Verdict: Florida Claims Subsample Regression 5	
Level 3	—		—		—		−0.13	(0.073)	−0.079	(0.17)
Level 4	—		—		—		−0.27**	(0.096)	−0.036	(0.19)
Level 5	—		—		—		−0.076	(0.084)	0.16	(0.17)
Level 6	—		—		—		0.082	(0.081)	0.25	(0.17)
Level 7	—		—		—		0.43**	(0.10)	0.46	(0.25)
Level 8	—		—		—		0.059	(0.12)	0.048	(0.27)
Severity missing	—		—		—		0.26	(0.22)	0.79	(0.82)
2. *Plaintiff's Age*										
Newborn	—		—		—		0.24	(0.13)	0.39	(0.25)
Under 6	—		—		—		0.37**	(0.11)	0.28	(0.36)
6 to 24	—		—		—		0.21*	(0.085)	0.22	(0.18)
25 to 34	—		—		—		0.31**	(0.076)	0.38*	(0.17)
35 to 44	—		—		—		0.39**	(0.076)	0.42*	(0.17)
45 to 54	—		—		—		0.35**	(0.077)	0.39*	(0.17)
55 to 64	—		—		—		0.22**	(0.076)	0.34	(0.18)
Age missing	—		—		—		0.45**	(0.13)	0.60*	(0.30)
3. *Other*										
No. of defendants	—		—		—		0.017	(0.027)	0.093	(0.051)
OTHER CONTROL VARIABLES										
1. *Specialities*										
OB/GYN	—		−0.070	(0.090)	—		—		0.039	(0.12)
Orthopedic surg.	—		−0.22*	(0.086)	—		—		0.040	(0.11)
2. *Other disposition*	—		—		−0.069	(0.39)	—	—		
−2 × (log likelihood)	8,483.0		1,905.8		525.9		4,441.4		1,132.1	
Sample size	6,612		1,549		416		6,612		1,549	

*p = .05 (two-tailed t-test).
**p = .01 (two-tailed t-test).

We suggested above that these latter types of cases tend to have less associated liability.

Claimants with relatively minor injuries were less likely to receive any payment. The coefficients for severity levels 1 and 2 are statistically significant at conventional levels in the regressions based on Florida closed claims data. Although of similar magnitude, the coefficients on the same variables based on jury verdict data do not attain statistical significance.

We hypothesized that claims filed long after the injury occurred are more difficult and costly for the claimant side to win. Indeed, coefficients on "Months to file" are negative and statistically significant at the 1 percent level.

On average, claimants had a lower probability of receiving compensation when the defendant was insured by a commercial stock company (the omitted reference group in regressions 1 and 2). This result, taken alone, is inconsistent with our hypothesis that noncommercial insurers fight claims harder.

B. Probability of Resolution at Verdict

As noted above, random errors by the parties in predicting the outcome at verdict are more likely to be decided at verdict. Several findings in Table 3 lend support to this argument. Cases involving relatively large potential awards tended to go to verdict. Cases with higher injury severity were more likely to be decided at verdict. This pattern is more apparent in regression 4 than in regression 5, which is based on a subsample of cases. The omitted reference group is severity level 9 (deaths). Holding severity and other factors constant, claimants who were over age 65 (the omitted reference group) at the time of the injury received less compensation (see table 4 below). Cases involving elderly claimants were less likely to be resolved at verdict.

There is presumably less error in predicting the outcome of "avoidable" and "unavoidable" cases. The parameter estimates in regression 5 imply that "avoidable" cases and "maybe avoidable" cases were more likely to be settled. This pattern implies another explanation. Defendants and insurers may fight the "unavoidable" cases to preserve their reputations and prevent unfortunate judicial precedents.

Claimants with nonpecuniary motives should fight harder than is justified on the basis of financial returns alone. Claimants unhappy with the outcome were more likely to pursue their claims to verdict (result statistically significant in regression 4, based on the full Florida sample). Cases involving a commercial stock insurer were less likely to be resolved at verdict. Taken in combination with the results for the probability of payment, it appears that the noncommercial insurers fought claimants harder but compensated claimants more often. Because of their orientation to future

potential claims and their likely concern for physicians' reputations, we anticipated that the noncommercial companies would fight harder and pay less often. The results suggest that noncommercial insurers may be selective in the cases they pursue vigorously, settling cases that are likely to be embarrassing at trial and cases whose outcomes are unlikely to affect payments downstream.

C. *Payments*

We considered payments as a function of (1) severity of injury, (2) comparative claimant negligence, and (3) selection processes (Table 4). Most of the five payment regressions explain about half of the variation in payments. In general, the results are consistent with the notion that claimants who have incurred higher losses receive more compensation. In the Florida closed claims analysis, payments rise roughly monotonically with injury severity through level 8 (quadriplegic); deaths (level 9) paid about as much as level 6 ("permanent significant" injuries, such as deafness, loss of limb). The coefficients on the injury index are statistically significant at the 1 percent level in the two jury verdict regressions where the index appears. The severity of injury scale used in the Florida closed claims analysis was only available for the Florida–Kansas City sample. With the injury index included, death cases yielded the highest compensation on average (regression 5). When we held injury severity constant, we found that claimants who were 65 or older at the time of the injury tended to receive less compensation. Such persons would be most likely to be retired, and the vast majority had Medicare coverage for their hospital and physicians' services. There were no differences in payments on the basis of claimant gender.

Most of the jury verdict abstracts contained estimates of economic loss. The coefficients on economic loss are all statistically significant at the 1 percent level, but they are far less than 1, implying that a 1 percent increase in loss yields about a 0.1 to 0.2 percent increase in compensation on average. (The coefficients on economic loss are interpretable as constant elasticities.) There is no way to determine from the jury verdict reporters how economic loss was calculated in individual cases. The parameter estimates may be biased toward zero because of errors in variables. One source of error may be an overstated estimate of economic loss by the plaintiff that no one else regards as credible. An alternative view is that large economic losses are undercompensated and small losses are overcompensated.

With economic loss and injury severity included, other measures of loss do not have systematic and statistically significant effects on payments. The coefficients on the occupation variables suggest that, holding other factors constant, plaintiffs classified as

Table 4. Case Characteristics as Factors Explaining Payment Levels, Multiple Regressions (Standard Errors Shown in Parentheses)

	Florida Closed Claims				Jury Verdict					
	Full Sample Regression 1		Subsample Regression 2		Full Sample[a] Regression 3		Full Sample Regression 4		Florida-Kansas City Regression 5	
Explanatory Variables										
Intercept	9.54**	(0.17)	9.30**	(0.32)	6.24*	(2.59)	5.74*	(2.57)	11.31**	(1.30)
MEASURES OF DAMAGE										
1. *Severity of Injury*										
Level 1	−2.05**	(0.15)	−1.50**	(0.31)	—		—		−2.52*	(1.22)
Level 2	−2.34**	(0.11)	−2.14**	(0.23)	—		—		−2.34**	(0.79)
Level 3	−1.55**	(0.078)	−1.72**	(0.17)	—		—		−2.51**	(0.37)
Level 4	−0.94**	(0.092)	−0.77**	(0.19)	—		—		−1.45**	(0.36)
Level 5	−0.69**	(0.092)	−0.65**	(0.17)	—		—		−1.83	(0.30)
Level 6	0.024	(0.093)	0.045	(0.18)	—		—		−0.98**	(0.35)
Level 7	0.80**	(0.14)	0.63*	(0.28)	—		—		−0.87	(0.48)
Level 8	1.33**	(0.13)	1.00**	(0.27)	—		—		−0.08	(0.59)
Severity miss.	−1.01*	(0.48)	−0.55	(0.93)	—		—		—	
Injury index	—		—		—		0.46**	(0.079)	0.56**	(0.15)
2. *Plaintiff's Age*										
Newborn	0.45**	(0.12)	0.76**	(0.24)	—		1.60**	(0.41)	1.85**	(0.60)
Under 6	0.49**	(0.13)	0.80*	(0.33)	—		1.09*	(0.45)	1.32*	(0.65)
6 to 24	0.17	(0.092)	0.31	(0.19)	—		1.05**	(0.31)	0.86	(0.45)
25 to 34	0.44**	(0.085)	0.55**	(0.18)	—		0.72*	(0.28)	0.47	(0.40)
35 to 44	0.36**	(0.086)	0.54**	(0.17)	—		0.69*	(0.28)	0.67	(0.37)
45 to 54	0.19*	(0.087)	0.32*	(0.18)	—		0.69*	(0.30)	0.12	(0.44)
55 to 64	0.11	(0.083)	0.38*	(0.19)	—		0.90**	(0.30)	0.62	(0.39)
Age missing	0.11	(0.16)	0.17	(0.32)	—		0.16	(0.29)	0.33	(0.36)
3. *Economic Loss*										
Economic loss	—		—		0.21**	(0.031)	0.16**	(0.03)	0.093*	(0.040)
Econ. loss missing	—		—		2.01**	(0.31)	1.58**	(0.30)	0.54	(0.32)
4. *Plaintiff's Sex*										
Sex	0.009	(0.049)	−0.087	(0.10)	—		−0.002	(0.15)	0.52*	(0.20)
Sex missing	—		—		—		0.03	(0.34)	−0.004	(0.33)

Table 4 (Continued)

Explanatory Variables	Florida Closed Claims				Jury Verdict					
	Full Sample Regression 1		Subsample Regression 2		Full Sample[a] Regression 3		Full Sample Regression 4		Florida-Kansas City Regression 5	
5. *Marital Status*										
Not married	—		—		—		−0.32	(0.26)	−0.36	(0.44)
Marital status miss.	—		—		—		−0.42*	(0.17)	−0.076	(0.22)
6. *Race*										
Nonwhite	—		—		—		—		−0.085	(0.26)
7. *Employment Status*										
Not working	—		—		—		0.08	(0.29)	−0.63	(0.45)
Emp. status missing	—		—		—		0.01	(0.26)	−0.45	(0.37)
8. *Occupation*										
Sales	—		—		—		−0.21	(0.33)	−1.32**	(0.48)
Craft	—		—		—		−0.79*	(0.33)	−0.37	(0.47)
Laborers	—		—		—		−0.29	(0.32)	−1.04*	(0.46)
Other job	—		—		—		−0.27	(0.41)	−0.029	(0.59)
Job missing	—		—		—		−0.37	(0.33)	−0.22	(0.47)
9. *Other*										
No. of defendants	0.22**	(0.030)	0.21**	(0.057)	0.14**	(0.04)	0.081	(0.041)	−0.055	(0.054)
No. of plaintiffs	—		—		0.21	(0.11)	0.12	(0.11)	−0.23	(0.15)
Shorten life	—		—		—		—		−0.43	(0.76)
Hospital defendant	−0.21**	(0.56)	−0.22	(0.35)	−0.07	(0.20)	−0.068	(0.20)	−0.42	(0.24)
Other defendant	−0.14	(0.12)	0.41	(0.94)	−0.37	(0.32)	−0.40	(0.30)	−0.35	(0.35)
Comparative Negligence										
Plaintiff % neg.	—		—		−0.031**	(0.008)	−0.034**	(0.008)	−0.049**	(0.012)
Plaintiff's % neg. missing	—		—		−0.27	(0.37)	−0.49	(0.35)	−0.84	(0.47)

Table 4 (Continued)

Explanatory Variables	Florida Closed Claims				Jury Verdict					
	Full Sample Regression 1		Subsample Regression 2		Full Sample[a] Regression 3		Full Sample Regression 4		Florida-Kansas City Regression 5	
MEASURES OF SELECTION										
1. *Stage of Resolution*										
Suit	0.58**	(0.066)	0.59**	(0.12)	—		—		—	
Verdict	1.32**	(0.13)	1.36**	(0.22)	—		—		—	
Appeal	1.79**	(0.27)	2.27**	(0.45)	—		—		—	
2. *Time to Resolution*										
Months to close	0.002	(0.002)	−0.0003	(0.0007)	—		—		—	
Mos. to close missing	0.13	(0.20)	—		—		—		—	
3. *Representation*										
Attorney	1.01**	(0.087)	0.95**	(0.19)	—		—		—	
4. *Jurisdiction*										
Kansas City, KS	—		—		−0.95**	(0.30)	−0.48	(0.33)	−0.42	(0.32)
Kansas City, MO	—		—		−0.80*	(0.40)	−0.39	(0.41)	−0.48	(0.38)
California	—		—		−1.01**	(0.19)	−0.92**	(0.18)	—	
Chicago	—		—		−0.54*	(0.27)	−0.41	(0.26)	—	
5. *Lambda*	−0.39**	(0.12)	−0.15	(0.17)	—		—		−0.70	(0.47)
OTHER CONTROL VARIABLES										
1. *Legal Doctrine*										
Res. superior	—		—		0.10	(0.21)	0.018	(0.21)	—	
Gross negligence	—		—		−0.11	(0.42)	0.03	(0.39)	—	
Res ipsa loq.	—		—		−0.75	(0.79)	−0.16	(0.75)	—	
Other liability	—		—		−0.09	(0.66)	0.077	(0.62)	—	
2. *Time Trend*										
1986	−0.056	(0.10)	0.15	(0.18)	—		—		—	
1987	−0.081	(0.098)	0.12	(0.18)	—		—		—	
1988	−0.071	(0.11)	0.26	(0.21)	—		—		—	
Year of trial	—		—		0.054	(0.030)	0.028	(0.028)	—	

Table 4 (Continued)

Explanatory Variables	Florida Closed Claims				Jury Verdict					
	Full Sample Regression 1		Subsample Regression 2		Full Sample[a] Regression 3		Full Sample Regression 4		Florida-Kansas City Regression 5	
1973-78	—		—		—		—		0.38	(0.33)
1979-83	—		—		—		—		−0.50*	(0.20)
3. *Specialties*										
OB/GYN	—		−0.11	(0.14)	—		—		—	
Orthopedic surg.	—		0.052	(0.12)	—		—		—	
4. *Other disp.*	—		—		0.025	(0.33)	0.05	(0.31)	—	
5. *Settled*	—		—		0.81**	(0.23)	0.61**	(0.22)	0.45	(0.34)
R^2	0.51		0.50		0.25		0.38		0.58	
$\bar{R}^2$	0.51		0.48		0.22		0.33		0.47	
F-statistic	$F(31, 3085) = 104.39$		$F(32, 733) = 22.65$		$F(19, 508) = 8.81$		$F(39, 487) = 7.55$		$F(44, 174) = 5.47$	

*Full sample of jury verdict data includes five jurisdictions: California; Chicago (Cook County); Kansas City, KS; Kansas City, MO; and Florida.
*p = .01 (two-tailed t-test).
**p = .05 (two-tailed t-test).

professional and managerial (the omitted reference group) tended to receive higher awards. However, the pattern of the coefficients are not consistent across the two regressions (4 and 5) in which these variables enter, and statistical significance is often lacking. Race has essentially no impact on compensation. The variable identifying cases in which the injury was alleged to have shortened the plaintiff's life has an unanticipated negative effect on payments. It is likely that this aspect of the injury has been captured by other explanatory variables.

Cases involving more defendants may offer a higher potential award at verdict. In fact, in four out of the five regressions in Table 4, the number of defendants has a positive and statistically significant impact on payments. The number of plaintiffs does not affect payments, but, as previously noted, having multiple plaintiffs is unusual in medical malpractice litigation. Contrary to the notion that payment is higher when the defendant has deep pockets, however, cases involving hospitals as named defendants resulted in lower rather than higher payments.

Awards at verdict were reduced substantially on a finding of comparative plaintiff negligence. The coefficients on "Plaintiff % neg." imply that for each percentage point increase in plaintiff percentage of negligence, awards were reduced by about 3 to 5 percent on average.[23] Although in a formal sense, the reduction should be one for one, a belief by juries that the plaintiff had a role in the injury probably has an impact on determination of damages before the percentage reduction is applied.

As anticipated, cases resolved at later stages result in much higher payments, even with observable severity of injury held constant. The appealed cases paid the most. In some cases, the amount paid would have been still higher if the defendant had not appealed the case. Pursuing a case requires considerable resources. The process weeds out cases for which the expected additional return does not cover the additional litigation cost to the claimant side. With stage of resolution variables included, "Months to close" has no impact on payments to claimants. Holding other factors constant, claimants with attorneys received twice as much as those without such representation.

The variable "Settled" in the jury verdict analysis has a different meaning. Here, settled cases means that there were settlements involving some of the defendants. According to the parameter estimates for "Settle," those cases resulted in substantially higher amounts than those finally resolved by a court.

In the payment analysis, we only included cases in which the claimant received some compensation. "Lambda" shows the effect of the Heckman selectivity adjustment. In all regressions in which

[23] We expressed the dependant variable in natural log form; "Plaintiff % neg." was in linear form.

we made the adjustment, the coefficient on "Lambda" is negative, and in one regression (1), the coefficient is statistically significant at conventional levels. A negative coefficient on "Lambda" implies that cases with characteristics associated with a high probability of claimant winning pay less on average, when other factors are held constant. This negative relationship is consistent with the view that cases with low probability of claimant winning and low anticipated award are dropped with no compensation before the parties make substantial investments in the case, which introduces a negative relationship between payments and the probability of winning.

VII. DISCUSSION

Overall, the results indicate that compensation of personal injuries is not haphazard as is often alleged. When the randomness of the current system of injury compensation is discussed in the public arena, medical malpractice is often cited as a primary example of now prevalent abuses.[24]

Once we accounted for general inflation and the other factors in the regressions, the coefficients of the time variables generally were not statistically significant at conventional levels. This result at least partly contradicts assertions about the "explosive growth in damage awards."[25] Awards have increased, but a large part of the increase reflects changes in the mix of cases brought to verdict. The fact that payments differ geographically and by stage of disposition points to the danger of generalizing from data collected from one or two jurisdictions and from one stage of dispute resolution.

The payment regressions explain as much as half of the observed variation in payments. This is true even of awards that are determined at verdict. Juries may often be swayed by emotional arguments made at trial, but systematic patterns underlie differences in awards nevertheless. Severity level alone explains up to two-fifths of the variation in payments (regression from Florida closed claims analysis not shown here). Although the objective of empirical analysis is rarely to develop models with high explanatory power but rather to test hypotheses, it is still noteworthy that

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[24] Sloan and Bovbjerg (1989) discussed various views of the medical malpractice situation.

[25] See, e.g., Tort Policy Working Group (1987: 35). Peterson (1987: 22) computed rates of increase in real malpractice awards between 1970–74 and 1980–84 separately for San Francisco and Chicago. Between these two periods, the real median awards rose 26 percent in San Francisco but decreased by 5 percent in Chicago. Mean awards in San Francisco rose by 159 percent and by 95 percent in Chicago. Our estimates are more directly comparable to Peterson's estimates of means, but Peterson's estimates did not control for such other factors as severity of injury. The notion of an explosion in claims frequency in other lines appears to be an oversimplification. See, e.g., Dungworth, 1988.

the explained variation in payments in this study is high for cross-sectional analysis.

Much of our empirical evidence applies to determination of payments, but our work also permits more tentative conclusions about determination of liability. In particular, using descriptions of injuries presented on the Florida closed claims forms, physicians rated cases according to avoidability of injury. They were not told which cases resulted in payment. Our analysis of the probability of payment reveals that payment was more likely in cases judged to have involved injuries that were avoidable by health care providers. Our results apply to settled and tried cases; settlements should reflect judgments at verdict. A disproportionate share of the avoidable cases was settled.

The injury descriptions on the closed claims forms were brief. Comparisons of liability assessments based on a reading of patients' charts with actual payments would permit much more definitive conclusions. However, even with limited information, we have been able to show that highly avoidable injuries are more likely to be compensated.

Judgments about the degree to which medical malpractice payments are equitable horizontally, that is, injured parties with similar losses receive similar compensation, are difficult to make. Although various illness-injury classification systems, such as those used here, aggregate conditions into reasonably meaningful but broad injury severity categories, in the real world, there are literally thousands of conditions, and for each of these the losses incurred vary.

In several respects, payment patterns appear to be inequitable horizontally, but each finding has a possible contrary explanation. We found considerable dispersion in payments within each of the nine severity of injury categories, even though the patterns in the means by severity were plausible. Less dispersion might have appeared if a more detailed injury severity coding system had been employed. When other factors were held constant, we found geographic variation in payment at verdict among the areas for which we had data from jury verdict reporters. Such variation, however, could reflect differences in the case types selected by the various reporters.

On another dimension of horizontal equity, we found no significant difference in payments associated with race. However, race was generally not mentioned in the jury verdict reports; we assumed that when race was not mentioned, the plaintiff was white.

The fact that claimants received higher payments at later stages of dispute resolution suggests that claimant risk taking, delay in receiving payment, and higher litigation cost are rewarded to some extent. Defendants were paid extra for holding out when they lost. However, considering the probability of receiving com-

pensation, for the "average" case in a severity category, claimants were mostly better off settling, not even taking risk aversion into account. In fact, the vast majority of malpractice cases did settle. By selection, those claims that make it to trial are often the ones with higher potential verdicts. If they had settled, they would have settled for more on average than they received in the cases that actually settled.

We found some evidence that cases with higher potential awards are selected for trial. Many other factors, not captured by our empirical analysis, however, may be at work. Plaintiffs and defendants not guided by the financial returns of the case may eschew out-of-court settlement. Disputants may disagree over the odds of winning and/or the potential award at verdict.

If stage of resolution and the resulting payment reflect differences in risk preferences, unrelated to claimant wealth, or random forecasting errors, there is little reason for concern about horizontal equity. The situation may be different, however, if the disparities reflect variation in quality of legal counsel and/or principal-agent problems between clients and lawyers.

There is some empirical evidence from other studies that claimants in medical malpractice and product liability cases receive higher compensation than similarly situated claimants with other types of defendants (Peterson, 1984: 34–37). The reason malpractice and product liability claimants do better is thought to reflect a combination of defendant ability to pay (deep pockets) and/or juries being more sympathetic to some types of defendants than others. While there may be rationale for payment differentials on grounds of deterrence, from the vantage point of injury compensation, these are inequities. We thought that payments in malpractice cases may be higher when the hospital is the defendant because hospitals may have deeper pockets. In fact, results based on both data sources indicated the contrary. When the hospital was a defendant, the claimant got less.

Some of our results shed light on vertical equity of the current system. In terms of ordinal ranking, the observed differences by claimant severity level and age make sense. An injury causing quadriplegia or severe permanent brain damage (severity level 8) could plausibly cost $40,000 a year. Discounting a stream of thirty equal payments of $40,000 at 5 percent yields a present value of $615,000, which, although less than the mean payment in Florida for suits settled pre-verdict of $824,000, exceeds the expected award at verdict of $581,000.[26] By contrast, suppose the cost associated with a severity level 7 injury—paraplegia, blindness, loss of two limbs, brain damage—is $20,000 annually; then the present

[26] Considering litigation cost to the claimant, a $824,000 payment may not yield as much as $615,000 net. Our choice of a discount rate is only made for illustrative purposes. Underlying analytic issues are discussed in Posner, 1986: 177–81.

value of the loss would be $308,000. This compares to pre-verdict settlements of $366,000 and expected awards at verdict of $387,000. Since our cost estimates are crude, the discrepancies between cost and payments are clearly within the range of plausible error.[27]

Payments for the temporary injuries tended to be much smaller but were less clearly associated with economic loss. For example, the mean pre-verdict settlement in Florida for "emotional only" injuries was $41,000. Payments at verdict were similar. Payments for such injuries were mostly for "pain and suffering." Viewed simply as insurance for injuries, the argument for paying for noneconomic loss is weak. Such payments, however, may deter injuries (Calfee and Winston, 1987; Rea, 1982; Shavell, 1987: 133–34), and results from value of life studies suggest values of life far in excess of economic loss (Bovbjerg *et al.*, 1989). One major deficiency with payment for both noneconomic loss and punitive damages is that courts have no objective criteria for setting appropriate values for such payments. To the extent that they are determined randomly, such payments are questionable on equity grounds and on their ability to deter. Based on economic loss alone, less serious injuries may be overcompensated and severe injuries may be undercompensated.[28]

A system of scheduled damages (Bovbjerg *et al.*, 1989) might offer an alternative to current methods for determining compensation. Limits on total payment and on payment for pain and suffering are crude forms of schedules. Scheduling damages may introduce greater equity to the extent that (1) compensation conditional

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[27] Actual estimates of cost by injury type are scarce. For some estimates of the costs associated with severe chronic illnesses in children, see Hobbs and Perrin, 1985.

[28] Danzon and Lillard (1983: 358) reported a similar result in a study of resolution of medical malpractice disputes, but their coefficient on economic loss was twice ours. Viscusi (1989: 96), summarizing a number of studies relating loss replacement rates for product liability, reported that payments exceeded bodily injury loss by a factor of 2.5 or more for bodily injury losses of under $100,000. Payments were only 0.25 of such economic loss when the loss exceeded $1,000,000.

Using data from Florida, Danzon estimated that 5.6 percent of all paid medical malpractice claims receive noneconomic damages in excess of $100,000. However, for cases going to verdict where noneconomic damages above $100,000 were awarded, the payment for noneconomic loss was between $428,000 and $738,000 on average (see Manne, 1985: 132–48). Given available data, such estimates must be extremely crude. For one thing, the vast majority of malpractice cases settle and the amount paid is typically given as a single total in such cases. Several accounts of the crisis in third-party insurance make much of the presumably high payments for noneconomic loss, but the loss figures underlying these statements must be considered crude at best. See, e.g., Tort Policy Working Group, 1987: 67; Priest, 1987: 1553–60; and Trebilcock, 1987: 964-65.

In Florida, to judge from the closed claims data, punitive damages were almost never paid. Using jury verdict reporter data from California and Chicago for several types of personal injuries, Peterson (1987) concluded that while punitive damages were rarely assessed, large amounts were assessed in a few cases.

on a finding of defendant liability is random and/or (2) the transactions cost of determining damages is high. Randomness in predicting awards at verdict makes out-of-court settlement less likely. This is a source of increased litigation cost. We are able to explain historical patterns of payment quite well, so that schedules reflective of past payment patterns could be developed. At the same time, however, our ability to predict undercuts the first reason for scheduling damages.

Any evaluation of horizontal and vertical equity should consider that the tort system requires injured parties to satisfy formal legal rules before they receive any compensation. Unless the plaintiff can show liability, payment for economic and noneconomic loss is zero, regardless of the loss incurred. Thus, even if liability determination is not random, the tort system provides compensation for only a subset of all injuries. In a narrow sense, our results imply that outcomes of the tort system are reasonably fair vertically and perhaps even horizontally, at least to a greater extent than critics of the system have alleged. However, in a broader sense, a complete evaluation of equity in medical malpractice would require us to apply the economic analysis employed here to the larger population of injured persons who for whatever reason do not choose to or are unable to file a tort claim at all.

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Florida Stat. Ann. § 627.912 (West 1984).

Appendix. Definitions and Proportion of Cases for Explanatory Variables

Variable	Proportion of Cases: Florida Closed Claims (N=6,612)	Proportion of Cases: Florida-Kansas City Jury Verdict (N=416)	Equations: Probabilities of Payment	Equations: Probabilities of Verdict	Equations: Payment	Variable Description
MEASURES OF LIABILITY						
1. *Avoidability*[a]						
Unavoidable[b]	0.020	n.a[c]				Injury was judged to be "unavoidable"
Avoidable	0.174	n.a.	X	X		Injury was judged to be "highly avoidable" or "moderately avoidable"
Maybe avoidable	0.096	n.a.	X	X		Injury "might have been avoidable"
Rating missing	0.710	n.a.	X	X		Liability rating was not performed
2. *Allegations*						
Diagnosis[b]	0.274	0.221				Allegation was diagnosis-related error
Res ipsa	0.026	n.a.	X	X		Allegation was related to treating wrong patient or operating on wrong body part
Unhappy	0.048	n.a.	X	X		Claimant unhappy with personal treatment or outcome
Death—unspec.	0.041	n.a.	X	X		Case related to death for unspecified reason
Anesthesia	0.019	0.014	X	X		Anesthesia-related
OB-delivery	0.027	0.034	X	X		Obstetrical delivery-related
OB-fetal	0.026	n.a.	X	X		Obstetrical fetal if problem related to baby before delivery
IV error	0.014	n.a.	X	X		Improper adminstration of fluids intravenously
Consent	0.009	0.058	X	X		Failure to obtain consent
Surgery	0.127	0.163	X	X		Error in surgery
Treatment	0.123	0.281	X	X		Treatment-related
Equipment	0.018	0.003	X	X		Equipment-related
Drug	0.059	0.058	X	X		Drug-related
Blood product	0.002	n.a.	X	X		Blood product-related
Failure	0.003	n.a.	X	X		Failure to follow policy/procedure or to review another provider's performance

Appendix (Continued)

Variable	Proportion of Cases: Florida Closed Claims (N=6,612)	Proportion of Cases: Florida-Kansas City Jury Verdict (N=416)	Equations: Probabilities of Payment	Equations: Probabilities of Verdict	Payment	Variable Description
Falls	0.092	n.a.	X	X		Patient falls
Infection	0.038	0.029	X	X		Patient infection
Dispute—surg.	0.014	n.a.	X	X		Poor outcome of surgery
Other allegations	0.040	0.091	X	X		Other unclassified allegations
Emergency	n.a.	0.048	X	n.a.		Emergency room-related
3. *Legal Doctrine*						
Direct negligence[b]	n.a.	0.719				Theory of liability was direct negligence
Res superior	n.a.	0.245	X	n.a.	*[d]	Cases involved superior or imputed negligence
Gross negligence	n.a.	0.017	X	n.a.	*	Gross negligence, intentional act of negligence, or fraud
Res. ipsa loq.	n.a.	0.005	X	n.a.	*	Basis for liability was *res ipsa loquitur*
Other liability	n.a.	0.014	X	n.a.	*	Other basis for liability
4. *Place of Injury*						
Hosp. patient's room[b]	0.008	n.a.				Injury occurred in hospital's patient room
Emergency room	0.112	n.a.	X	X		Injury occurred in emergency room
Other hosp.	0.422	n.a.	X	X		Injury occurred in hospital other than patient room and emergency room
Office	0.152	n.a.	X	X		Injury occurred in physician's office
Other location	0.081	n.a.	X	X		Injury occurred in other place, such as nursing home
Location missing	0.225	n.a.	X	X		Location missing
MEASURES OF LITIGATION COST						
Months to file	14.681[e]	n.a.	X	X		Months from incident of injury to filing
Mos. to file missing	0.015[e]	n.a.	X	X		Months from incident of injury to filing missing

Appendix (Continued)

Variable	Proportion of Cases: Florida Closed Claims (N=6,612)	Proportion of Cases: Florida-Kansas City Jury Verdict (N=416)	Equations: Probabilities of Payment	Equations: Probabilities of Verdict	Equations: Payment	Variable Description
MEASURES OF ASYMMETRIC PAYOFFS						
1. Type of Insurers						
Stock[b]	0.433	n.a.				Commercial stock insurance company
Trust	0.233	n.a.	X	X		Trust insurance company
Mutual	0.053	n.a.	X	X		Physician-sponsored mutual fund
Self-insured	0.090	n.a.	X	X		Self-insured plan
Other insurers	0.183	n.a.	X	X		Other sponsorship, such as Florida Patient Compensation Fund
Insurer missing	0.009	n.a.	X	X		Type of insurer missing
2. Type of Defendants						
Physician[b]	0.608	0.640				Physician defendant
Hospital def.	0.356	0.281	X	X	X	Hospital defendant
Other def.	0.036	0.079	X	X	X	Other defendant, such as podiatrists and clinics
MEASURES OF DAMAGE						
1. Severity of Injury						
Level 9[b]	0.202	0.189				Death
Level 1	0.067	0.010	X	X	X	Emotional injury
Level 2	0.097	0.029	X	X	X	Temporary insignificant
Level 3	0.244	0.132		X	X	Temporary minor
Level 4	0.098	0.089		X	X	Temporary major
Level 5	0.109	0.325		X	X	Permanent minor
Level 6	0.101	0.113		X	X	Permanent significant
Level 7	0.040	0.077		X	X	Permanent major
Level 8	0.034	0.036		X	X	Permanent grave
Severity missing	0.008	n.a.		X	X	Injury severity level missing
Injury index	n.a.	7.09		n.a.	X	Composite injury index (see text)

Appendix (Continued)

Variable	Proportion of Cases: Florida Closed Claims (N=6,612)	Proportion of Cases: Florida-Kansas City Jury Verdict (N=416)	Equations: Probabilities of Payment	Equations: Probabilities of Verdict	Equations: Payment	Variable Description
2. *Plaintiff's Age*						
60 and over[b]	0.226	0.102				Injured person's age was 65 or over
Newborn	0.059	0.050		X	X	Injured person was newborn
Under 6	0.043	0.034		X	X	Injured person's age was under 6
6 to 24	0.106	0.070		X	X	Injured person's age was 6 to 24
25 to 34	0.147	0.101		X	X	Injured person's age was 25 to 34
35 to 44	0.130	0.102		X	X	Injured person's age was 35 to 44
45 to 54	0.124	0.060		X	X	Injured person's age was 45 to 54
55 to 64	0.140	0.075		X	X	Injured person's age was 55 to 64
Age missing	0.025	0.406		X	X	Injured person's age missing
3. *Economic Loss*						
Economic loss	n.a.	4.27			X	Injured person's total economic loss (log)[f]
Econ. loss missing	n.a.	0.43			X	Injured person's economic loss missing
4. *Plaintiff's Sex*						
Male[b]	0.450	0.334				Injured person was male
Sex	0.550	0.440			X	Injured person was female
Sex missing	n.a.	0.226			X	Injured person's sex missing
5. *Marital Status*						
Married[b]	n.a.	0.334				Injured person was married
Not married	n.a.	0.149			X	Injured person was single, divorced, separated, or widowed
Marital status miss.	n.a.	0.517			X	Injured persons' marital status missing
6. *Race*						
White[b]	n.a.	0.887				Injured person's race was white
Nonwhite	n.a.	0.113			X	Injured person's race was nonwhite

Appendix (Continued)

Variable	Proportion of Cases: Florida Closed Claims (N=6,612)	Proportion of Cases: Florida-Kansas City Jury Verdict (N=416)	Equations: Probabilities of Payment	Equations: Probabilities of Verdict	Equations: Payment	Variable Description
7. Employment Status						
Working[b]	n.a.	0.320				Injured person was working full or part time
Not working	n.a.	0.230			X	Injured person was not working
Emp. status miss.	n.a.	0.450			X	Injured person's employment status missing
8. Occupation						
Professional[b]	n.a.	0.060				Injured person was professional or managerial worker
Sales	n.a.	0.040			X	Injured person was sales or clerical worker
Craft	n.a.	0.036			X	Injured person was craftsman or operative
Laborers	n.a.	0.061			X	Injured person was laborer, service worker, or farmer
Other job	n.a.	0.166			X	Injured person was military personnel or other
Job missing	n.a.	0.637			X	Occupation missing
9. Other						
Shorten life	n.a.	0.012			X	Injury shortened life expectancy
No. of defendants	1.250	1.93[e]		X	X	Original number of defendants involved in the case
No. of plaintiffs	n.a.	1.24[e]		n.a.	X	Original number of plaintiffs involved in the case
Comparative Negligence						
Plaintiff % neg.	n.a.	4.03[e]			X	Plaintiff's percentage of negligence
Plaintiff's % neg. missing	n.a.	0.45			X	Plaintiff's percentage of negligence not reported
MEASURES OF SELECTION						
1. Stage of resolution						
Pre-suit[b]	0.165	n.a.				Claim closed pre-suit
Suit	0.720	n.a.			X	Claim closed at suit
Verdict	0.105	n.a.			X	Claim closed at verdict
Appeal	0.010	n.a.			X	Claim closed at appeal

Appendix (Continued)

Variable	Proportion of Cases: Florida Closed Claims (N=6,612)	Proportion of Cases: Florida-Kansas City Jury Verdict (N=416)	Equations: Probabilities of Payment	Equations: Probabilities of Verdict	Equations: Payment	Variable Description
2. Time to Resolution						
Months to close	21.690	n.a.			X	Months from date claim filed to close
Mos. to close missing	0.101	n.a.			X	Months to close missing
3. Representation						
No attorney[b]	0.170	n.a.				Claimant not represented by attorney
Attorney	0.830	n.a.			X	Claimant represented by attorney
4. Jurisdiction						
Florida[b]	n.a.	0.592				Florida
Kansas City, KS	n.a.	0.257			X	Kansas City, Kansas
Kansas City, MO	n.a.	0.151			X	Kansas City, Missouri
OTHER CONTROL VARIABLES						
1. Time Trend						
1985[b]	0.073	n.a.				Claim closed in 1985
1986	0.276	n.a.			X	Claim closed in 1986
1987	0.493	n.a.			X	Claim closed in 1987
1988	0.158	n.a.			X	Claim closed in 1988
1984-87[b]	n.a.	0.546				Case tried between 1984 and 1987
1973-78	n.a.	0.144			X	Case tried between 1973 and 1978
1979-83	n.a.	0.310			X	Case tried between 1979 and 1983
2. Specialities[a]						
General surgeons[b]	0.408	n.a.				General surgeon
OB/GYN	0.309	n.a.	X	X	X	Obstetrician/gynecologist
Orthopedic surg.	0.283	n.a.	X	X	X	Orthopedic surgeon

Appendix (Continued)

Variable	Proportion of Cases: Florida Closed Claims (N=6,612)	Proportion of Cases: Florida-Kansas City Jury Verdict (N=416)	Equations: Probabilities of Payment	Equations: Probabilities of Verdict	Equations: Payment	Variable Description
3. Other dispositions	n.a.	0.031	X			Case not decided by jury
4. Settled	n.a.	0.055			X	Claimant received settlement from other defendants

[a] This set of variables was only included for a subsample of Florida closed claims (N=1,549). The mean values shown in this table are for the entire sample.

[b] The variable is omitted reference group for the corresponding set of binary variables.

[c] n.a.: variable was not available in that data set.

[d] In regressions 3 and 4 of Table 4, we present some results for the full sample of jury verdict data using OLS regression for comparison purposes. Since these two regressions did not incorporate a selection adjustment, we included legal doctrine in the payment equations.

[e] This value represents a mean.

[f] This was the only explanatory variable transformed into logarithms.