THE EFFECT OF MALPRACTICE LIABILITY ON THE DELIVERY OF HEALTH CARE*

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INTRODUCTION

Recent increases in medical malpractice premiums and malpractice awards to plaintiffs have received much attention in publications as diverse as *The New England Journal of Medicine* and *TIME* magazine.(1-3) Physicians have responded to this cost escalation through a combination of persuasion and protest: by October 2003, the American Medical Association (AMA) declared 19 states to be in "full blown medical liability crisis" and advocated legislation to establish a $250,000 limit to non-economic damages – a position subsequently endorsed by President Bush.(4-7) More dramatically, surgeons in West Virginia walked off the job to protest the growth of malpractice insurance premiums.(8) These concerns are not limited to the physician community: a recent survey published in *New England Journal of Medicine* reported that both physicians and the broader public identified the spiraling costs of malpractice insurance, not medical errors or medical coverage, to be the largest and most important problem facing health care today.(3)

The growth of medical malpractice liability costs has the potential to affect the delivery of health care in the U.S. along two dimensions. First, if growth in malpractice payments results in higher malpractice insurance premiums for physicians, these premiums may affect the size and composition of the physician workforce. While the empirical strength of this relationship has not been conclusively established, a General Accounting Office (GAO) study of seven states concluded that the growth of insurer's losses from payments is the primary driver of the growth of premiums.(9) Indeed, the AMA blames the skyrocketing costs of malpractice insurance for the exodus of

physicians from already underserved rural areas.(10) Such declines might reduce access to high-quality care for residents in those areas.

Second, the growth of potential losses from malpractice liability might encourage physicians to practice "defensive medicine," ordering more tests and performing more procedures than is economically efficient in order to reduce their malpractice exposure. Previous research has suggested that the current malpractice system is responsible for 5-9% of medical expenditures by encouraging doctors to practice defensive medicine.(11) These findings, however, rely on indirect evidence from tort reforms, rather than direct evidence on malpractice costs themselves. Furthermore, it is not clear how these two effects interact, nor what the net effect of liability costs is on patient care.

In this paper we use rich new data to examine the relationship between the growth of malpractice costs and the delivery of health care along both of these dimensions. We pose three questions. First, are increases in payments responsible for increases in medical malpractice premiums? Second, do increases in malpractice liability really drive physicians to close their practices? Third, do increases in malpractice liability change the way medicine is practiced by increasing the use of certain procedures? Our analysis suggests that indirect and anecdotal evidence on size of these effects may be quite misleading.

EMPIRICAL STRATEGY

We use annual state-level data on premiums, payments, physicians, and treatments to explore the long-run effects of changes in physician malpractice liability on the physician workforce and on the practice of medicine. Since tort-law is left to the

purview of the states, all physicians within a state are subject to the same legal environment. Furthermore, insurance companies that underwrite malpractice policies operate at the state level.(12) For both reasons, states are a useful unit of aggregation for the study of medical malpractice.

We begin by estimating the effect of changes in malpractice payments (through judgments and settlements) on changes in malpractice premiums. We estimate this relationship for average physician premiums as well as for different physician specialties:

$$\Delta \log(premium)_i = \beta_0 + \beta_1 \Delta \log(payments)_i + \Delta X_i \Gamma + \varepsilon_i \quad (1)$$

Payments and premiums are measured per doctor and all variables are measures in logs, thereby allowing the estimated coefficients to be interpreted as elasticities. Equation (1) is estimated in differences over time (between 1993 and 2001) at the state level. Therefore, the results are robust to the presence of unobservable (state-level) factors that are fixed and correlated with payments. To control for time-varying factors, we include changes in the unemployment rate, per capita income, and the mortality rate from flu and malignant neoplasms.

We can also decompose the size of total payments per doctor into two subcomponents: the number of payments per doctor and the size of the average payment:

$$\begin{aligned} \Delta \log(premium)_i = \beta_0 + \beta_1 \Delta \log(\#\ payments / MD)_i + \\ \beta_2 \Delta \log(average\ payment\ size)_i + \Delta X_i \Gamma + \varepsilon_i \end{aligned} \quad (2)$$

This estimate tells us whether premiums are differentially responsive to the number of payments or the average size of judgments and settlements. For example, if the number

of payments captures other costs associated with malpractice cases (such as the fixed costs of preparing for time in court) then premiums may respond more to that factor.

We next turn to the effect of malpractice liability on the physician workforce. We explore whether states with larger increases in malpractice premiums saw greater declines in the per-capita number of physicians. We further focus on physicians in two age groups where these effects may be largest: physicians under age 35 (who are most likely to be choosing where to set up their practices) and those physicians over age 55 (who are most likely to be choosing whether or when to retire from practice). These groups may be more sensitive to changes in premiums than physicians in the middle of their careers with established practices. For physicians (per capita) of different specialties and age brackets, we estimate:

$$\Delta \log(MDs)_i = \beta_0 + \beta_1 \Delta \log(premiums)_i + \Delta X_i \Gamma + \varepsilon_i \qquad (3)$$

There is reason to believe, however, that physicians may respond to more than just the dollar amount of the premium that they face. Being sued imposes other costs on physicians, including lost time at work and psychic costs.(13) We decompose the physician premium into three subcomponents to see whether physicians respond differentially to different aspects of the liability system: the number of payments per physician (again, through judgments or settlements), the average payment, and the load factor (premiums divided by payments). We thus estimate:

$$\begin{aligned} \Delta \log(MDs)_i = \beta_0 + \beta_1 \Delta \log(\#\ payments / MD)_i + \beta_2 \Delta \log(average\ payment\ size)_i \\ + \beta_3 \Delta \log(load\ \ factor)_i + \Delta X_i \Gamma + \varepsilon_i \end{aligned} \qquad (4)$$

Estimation of equations (3) and (4) allows us to test whether or not physicians respond to medical malpractice liability costs, and whether they respond simply to the total premium or differentially to subcomponents of the premiums. Our "long difference" approach allows us to gauge equilibrium reactions, since we expect that it might take several years for the physician workforce to adjust to changes in malpractice costs.

Finally, we explore the effect of malpractice costs on the treatments patients receive. We analyze several different treatments, including percutaneous coronary interventions, angiography, coronary artery bypass grafts, mammograms, cesarean sections, transurethral prostatectomies for benign prostatic hyperplasia and radical prostatectomies, as well as overall Medicare expenditures. We re-estimate equations (3) and (4) with these dependent variables. Ex ante, the effect of premium increases on the use of these treatments is ambiguous because of potential forces in opposite directions. If increases in premiums reduce the number of physicians in an area (on a per capita basis), that could drive overall usage down. If, on the other hand, increases in premiums cause an increase in "defensive medicine," that would drive usage up.

DATA

We bring several different data sources to bear on these questions, including two new sources of detailed information about medical malpractice liability. Table 1 provides summary statistics.

Premiums

We use data on malpractice insurance premiums from an annual survey conducted by the Medical Liability Monitor (MLM). Every year since 1991 the MLM has conducted

a nationwide survey of physician malpractice insurance premiums for policies offering $1 million in coverage for a claim, $3 million in total coverage for a year. In a few cases $1M / $3M coverage is not available, in which cases the MLM reports premiums for the policies offered. The MLM provides premium data for internal medicine, general surgery and Obstetrics-Gynecology by state. Often the data are broken down within state for certain geographic regions, typically counties or large metropolitan areas. In these cases we compute a population-weighted average state premium, using population data from the US Census Bureau. Multiple companies reporting premiums for each state in a given year are averaged together, but any companies that did not provide enough information on the geographic breakdown of premiums to compute appropriate weights are dropped. Our final data are comprised of average premiums by specialty and state for the periods 1991-1993 and 2000-2003, deflated to real 2000 dollars using the CPI.

Figure 1 shows the changes in premiums by specialty for the 10 largest states. By and large premiums for different specialties moved together (and up) in each state – suggesting that they were driven by system-wide factors within each state (such as the legal environment or the underwriting cycle), rather than by specific technological changes in certain specialties.

Payments

All malpractice payments made in the United States by or on behalf of a licensed health care provider must be reported to the National Practitioner Data Bank (NPDB) within 30 days under the Health Care Quality Improvement Act of 1986.(14) Noncompliance is subject to civil penalties codified in 42 U.S.C. 11131-11152.

The NPDB has been the subject of much criticism, from the Physician Insurers

Association of America (PIAA) in particular (15) but also from the GAO (16). One of the major points of criticism is that the "corporate shield" limits data availability. This loophole exempts payments made on behalf of a hospital or other corporation from inclusion in the NPDB, as long as any individual practitioner is dropped as part of a settlement agreement.(16) Other concerns about the NPDB include potential underreporting of clinical-privilege restrictions and certain data fields that are not relevant for our study.(16) Even given its limitations, the NPDB is the most representative national database on medical malpractice payments, and therefore the best available data for this study.

We examine payments that resulted from either a court judgment against the provider or a settlement made outside of the courts. The NPDB has information on 250,137 such payments made between September 1, 1990 and December 31, 2003. We restrict our sample to the 50 U.S. states and exclude payments made for Washington DC, areas with missing state information, and other U.S territories. We exclude payments that were linked to dentists, pharmacists, social workers or nurses. In a small fraction of payments, there are multiple physician defendants (and thus multiple reports) but only the total payment by all defendants is reported. In these cases we average the payment by the number of physicians involved. In the NPDB, 5 percent of payments are made by state funds in addition to other payments made by the primary insurer for the same incident. We match such payments based on an algorithm that uses unique physician identifiers, state of work, state of licensure, area of malpractice, type of payment (judgment or settlement) and year of occurrence. We group payments into those resulting from medical treatments (including diagnosis, medication, and other medical treatment),

surgical treatments (including surgery and anesthesia), obstetrical treatment, and other treatments (including monitoring, equipment, intravenous and blood, and all others). We emphasize that it would be misleading to infer anything about negligence from these data, as past work shows a weak correlation between a malpractice claim and negligence.(17-21)

We analyze payments at the state level (overall and by specialty) for 1992-1994 (averaged) and 2000-2002 (averaged). All payment amounts are converted into 2000 dollars.(22) It is worth noting that increases in payments by specialty within states were not as highly correlated as were increases in premiums.

Physician Workforce

Data on the number of physicians by specialty and age come from the 2003 Area Resource File (ARF) published by the National Center for Health Workforce Analysis.(23) The ARF gathers information from the AMA Physician Master File and the County Hospital File and is reported at the county level. Data from the county level is summed into state measures. For each state, per capita workforce measures are computed by dividing state physician workforce counts by population counts from the Bureau of the Census. Data on the physician workforce by specialty and age are only available for 1989, 1995, 2000, and 2001. Intervening years are linearly interpolated.

Figure 2 shows the increase in physicians per capita by specialty, for all ages and for physicians under age 35, for the 10 largest states. While the number of physicians per capita grew in almost all states and specialties, the number of young physicians almost uniformly fell, suggesting that physicians were entering the workforce later and/or

working longer. The number of physicians per capita over the age of 55 increased during this period overall.

Treatment Rates

Data on cesarean section rates by state come from the National Center for Health Care Statistics. We have averaged rates by state for 1992-1994 and 1999 and 2002. We gather information on the rates of usage for other procedures from the *Dartmouth Atlas of Health Care*, based on Medicare Claims data.(24) We have information on the use of six procedures at the state level for Medicare fee-for-service enrollees over age 65 for 1992-1993 and 1998-2001, including angiography, CABG, PCI, radical prostatectomy and transurethral prostatectomy for benign prostatic hyperplasia for men, and mammograms for women. We also use data on total Medicare expenditures by state. All Medicare measures are adjusted for the age, race, and sex (where appropriate) composition of the state population, and expenditures are measured in real 2000 dollars.(24)

Covariates

Covariates, including per capita income, the unemployment rate, and the mortality rate from flu and malignant neoplasms come from the ARF. Here, too, county-level measures are aggregated to the state level (weighted by county population). When data are only available for some years, values for intervening years are linearly interpolated.

RESULTS

We use these data to estimate (1) the relationship between malpractice premiums and payments, (2) the response of the physician workforce to increases in these malpractice costs, and (3) changes in the use of several treatments in response to increases in malpractice costs.

Relationship Between Premiums and Payments

Surprisingly, there seems to be very little relationship between malpractice payments (for judgments and settlements) and premiums – either overall or by specialty. Table 2 shows the results of estimating equation (1). Each column in the second, third, and fourth panels represents a regression of premiums for MDs in that specialty on payments made for treatments within that specialty. The coefficients are all small and insignificant. Figure 3 shows the regression results from column (1) graphically: a 10% increase in malpractice payments (per MD) yields a statistically insignificant 1.6% increase in premiums.

Table 2 also shows the results of estimating equation (2), which decomposes the changes in malpractice payments into two subcomponents: the change in the number of payments and the change in the size of the average payment. Premiums seem equally unresponsive to each of these components. While both payments and premiums may have increased over the decade, the states that saw the largest increases in the former were not the ones that saw the largest increases in the latter, suggesting that other factors may be responsible for any observed increases in premiums.

Relationship Between Malpractice Costs and the Physician Workforce

We next turn to the relationship between malpractice costs and the size and composition of the physician workforce. Table 3 shows the relationship between malpractice costs and the physician workforce (by specialty and age). We first examine whether physicians respond to overall premium increases, as in equation (3), and then decompose the response into three components of premium increases, as in equation (4). We look at the response of all physicians, young physicians, and older physicians practicing in all areas of medicine and with specialties in obstetrics-gynecology, surgery, and internal medicine.

On average, the size of the physician workforce in each state does not seem to respond to increases in premiums. For example, a 10% increase in surgery premiums yields an insignificant 0.1% decrease in the number of surgeons. Younger and older physicians seem slightly more responsive to increases in premiums, but these responses are small and not consistently statistically significant. These findings are consistent with those of a GAO study which was unable to substantiate claims by provider organizations that rising premiums were dramatically reducing the supply of physicians.(25)

When we decompose increases in premiums into their subcomponents, we see that younger and older physicians seem somewhat more responsive to some sub-components of increases in premiums, although in most cases we cannot reject the hypothesis that responses to these subcomponents are the same (or that they are zero). Younger and older doctors in general and in ob-gyn seem to respond to increases in the number of cases (as do younger ob-gyns and older internists in particular). Older internists also seem responsive to the size of the average award. The load factor seems to

play a smaller role in these decisions. Overall, these results provide weak evidence that some physicians on the margins of their careers make entry and exit decisions in part based on the size and number of malpractice payments.

Relationship Between Malpractice Costs and Treatment

Last, we examine the effect of malpractice costs on the use of cesarean sections and several different treatments for Medicare enrollees over age 65, including angiography, CABG, PCI, radical prostatectomy and transurethral prostatectomy for benign prostatic hyperplasia for men, and mammograms for women, as well as total Medicare expenditures by state. Table 4 summarizes the effects of increases in malpractice costs on the use of cesarean sections, PCI, mammograms, and Medicare expenditures. For the most part, there is little evidence of change in treatment patterns in response to increases in premiums or the subcomponents. (This is consistent with Dubey et. al, who estimate that a 58% reduction in annual premiums would reduce the number of cesareans performed in the United States by half a percentage point — a miniscule effect.)(26) The results for the other coronary treatments (CABG and angiography) and prostatectomies show similarly small and insignificant effects.

The use of mammography seems somewhat more sensitive to malpractice costs than the other procedures tested. In particular, mammography rates increase significantly with the average size of payments: when the average malpractice award goes up by 10 percent, the rate at which mammography is used goes up increases by 4 percent. (Note that very similar results are obtained when premiums and payments for internal medicine are used, rather than the average across specialties. This is not surprising given the correlation of increases in premiums across specialties. When both average and

medicine-specific premium subcomponents are included simultaneously as regressors, the medicine-specific variables have a larger and more significant effect on the use of mammography, but standard errors are large enough that we cannot reject that they are the same.) This sensitivity of screening procedures seems consistent with anecdotal evidence of changes in physician behavior. Unfortunately we do not have data on other screening procedures with which to generalize this finding.

There is also little increase in overall expenditures for the Medicare population – consistent with the fact that the only observed increase in usage appeared in a low-cost screening procedure. Of course, it could be that decreases in treatment resulting from decreases in the physician workforce in response to increases in liability are being cancelled out by increases in treatment resulting from the practice of more defensive medicine in response to increased liability – but we see little evidence of decreases in the physician workforce.

DISCUSSION AND POLICY IMPLICATIONS

This analysis yields three specific findings. First, increases in malpractice payments do not seem to be the driving force behind increases in premiums. Premium growth may be affected by many factors beyond increases in payments, such as industry competition and the insurance underwriting cycle. Second, increases in malpractice costs (both premiums overall and the subcomponent factors) do not seem to affect the overall size of the physician workforce, although they may deter marginal entry and increase marginal exit. Third, there is little evidence of net increases in the use of many

treatments, although there may be some increase in screening procedures such as mammography.

Our analysis is, however, subject to several limitations. First, while the period we are analyzing saw a substantial increase in malpractice costs, the effect of the recent premium increases on the delivery of healthcare may be different. In the 19 AMA-designated "crisis states" where premiums have grown dramatically, premiums for a standard professional liability policy ($1 million per incident, $3 million per year) for an obstetrician-gynecologist grew by 20% between 2001 and 2002 in some states (like Connecticut, Illinois, and Kentucky), and by over 50% in other states (such as Pennsylvania, Arkansas, and Oregon).(2) In our analysis, premiums grew by an average of 7% between 1992 and 2002, but there were states that saw much larger increases. For example, over the period of our study average premiums grew by over 30% in Utah, Nevada, Indiana, Texas and Arkansas. In Texas, premiums for internal medicine physicians grew by 140%. Therefore, our data demonstrates a range of premium growth that is comparable to (or perhaps even greater than) the increase in premiums seen in the "crisis" between 2001 and 2002. While this does not in itself imply that the response to the current crisis will be the same as the responses we saw to changes between 1992 and 2002, we have no a priori reason to believe that the response would be different.

Second, our state-level analysis generates some mismeasurement in the use of different procedures, since patients may travel across state lines for treatment. This potential mismeasurement would tend to bias our results towards zero. However, our analysis was weighted by state population, and cross-state migration is less of a concern for the large states such as California, New York and Illinois. This state-level analysis

will also fail to capture treatment changes and physician movements within states in response to local variation in premiums, although, as discussed above, many state-wide factors affect premium rates.

Third, we have by no means captured the universe of treatments that patients receive that may respond to changes in malpractice costs. For example, while we do not find evidence of large defensive medicine effects for procedures involving infants or the elderly, it is possible the greatest manifestations of this effect occur for other patients or for other specific procedures. The addition of data on the use of other treatments on other groups of patients would increase the generality of our results.

While our study does not speak directly to the effect of malpractice reforms, it does provide insight into the mechanisms through which those reforms are likely (and unlikely) to operate. Previous research by Kessler and McClellan found that states that implemented tort reform saw declines in the use of defensive medicine for the treatment of heart attacks (although a Harvard malpractice study did not see any effect of threats of litigation on defensive medicine, and a more recent CBO study was unable to confirm the general nature of the Kessler-McClellan result).(11, 27, 28) Our analysis suggests that change in the physician workforce in response to reduced malpractice liability is not a mechanism through which tort reform is likely to affect the practice of medicine. In our data, we do see lower premium and payment growth in states that had adopted tort reforms or damage caps before the mid-1990s, but we do not find that such states have higher physician growth. Unfortunately, the design of our analysis (which uses data after the passage of most state tort reform measures) precludes a direct evaluation of the effect of tort reform on the delivery of health care.

The fact that we see very little evidence of widespread physician exodus or dramatic increases in the use of defensive medicine in response to increases in malpractice premiums places the more dire predictions of malpractice alarmists in doubt. In the absence of better evidence, it seems hard to use physician shortages or treatment inefficiencies as validation for radical reform of the malpractice system.

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FIGURE 1: GROWTH IN PREMIUMS (10 LARGEST STATES)

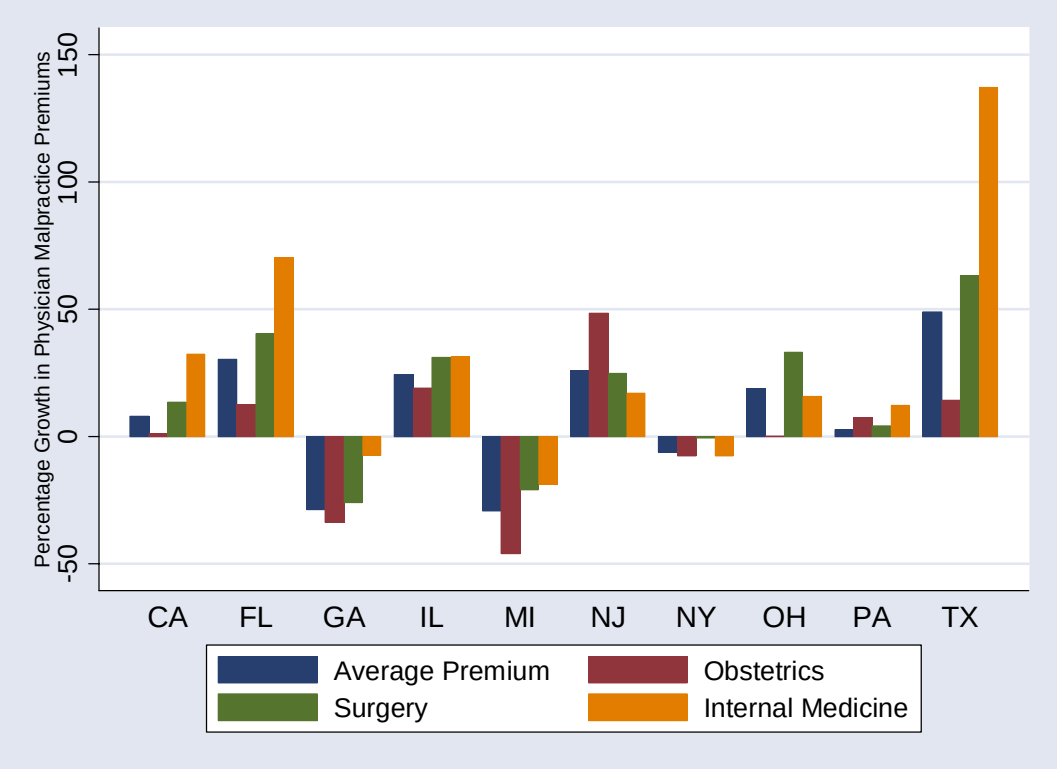
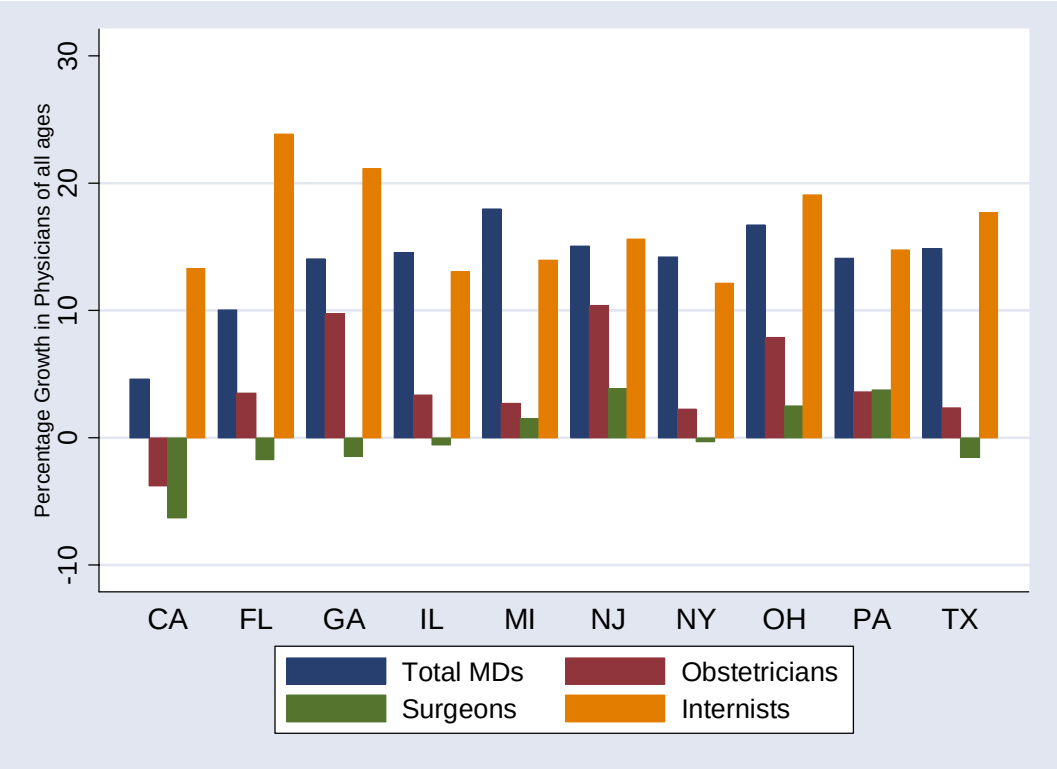


FIGURE 2: CHANGE IN PHYSICIAN WORKFORCE (10 LARGEST STATES)



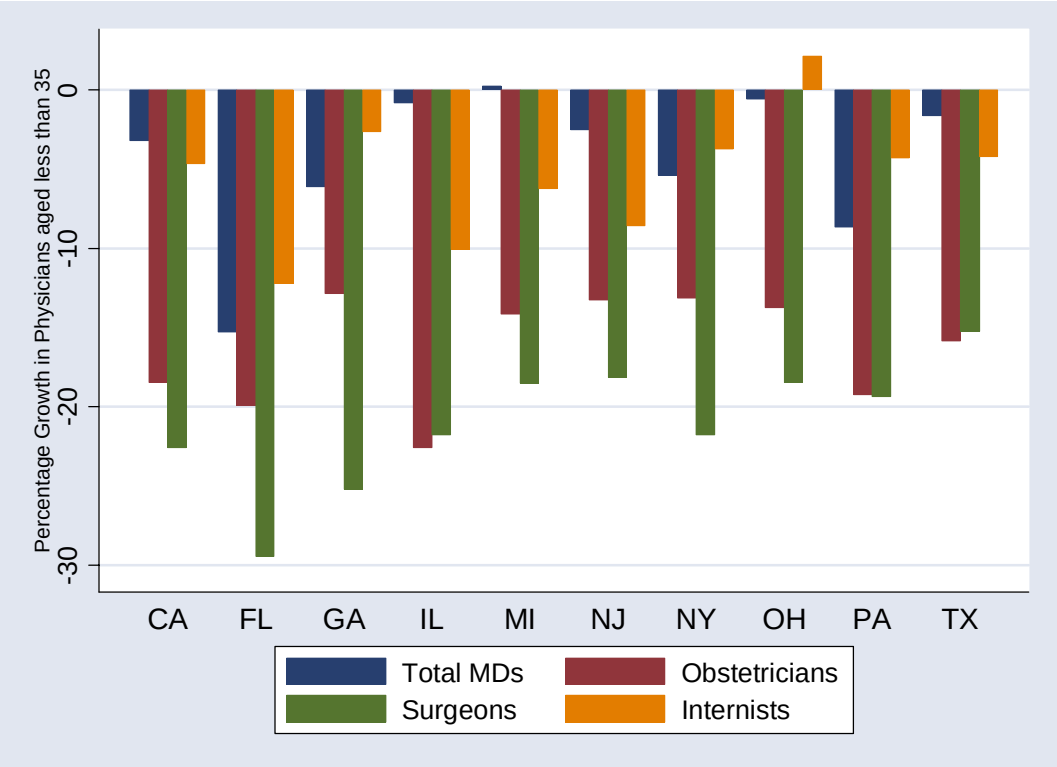


FIGURE 3: RELATIONSHIP BETWEEN PAYMENTS AND PREMIUMS

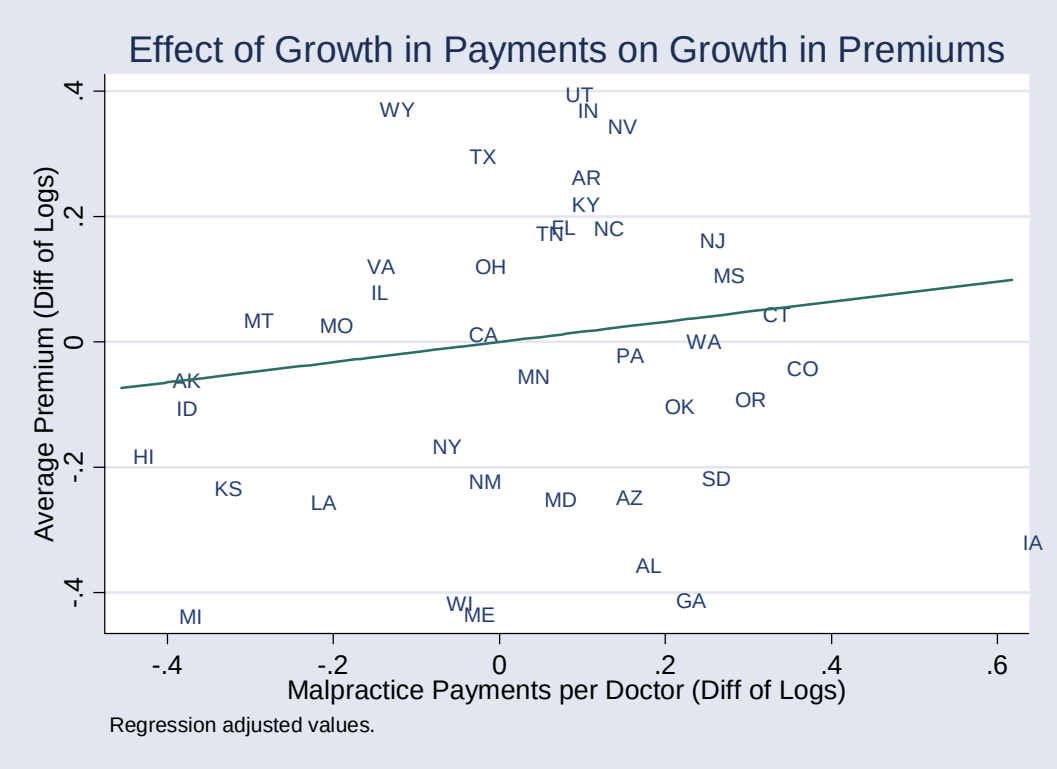


Table 1: Summary Statistics

	Level in 2001		Percent Growth 1993-2001	
	Mean	Std. Dev.	Mean	Std. Dev.
Medical Malpractice				
Premiums				
Average	28374	12627	10.7	24.1
Surgery	34360	15272	17.3	27.2
Ob-Gyn	52374	22504	2.3	22.4
Internal Medicine	10422	5270	30.2	42.2
Payments				
All	13.2	7.7	4.3	31.5
Surgery	3.4	2.0	11.4	91.3
Ob-Gyn	1.9	1.3	9.9	58.4
Medicine	7.7	4.7	8.2	32.7
Procedure Rates				
Angiography	21.9	3.8	37.4	14.1
CABG	6.2	0.9	19.3	9.8
PCI	9.4	1.7	95.6	35.7
TURP	6.8	0.8	-0.5	0.0
Radical Prostatectomy	1.6	0.4	-40.8	9.7
Mammography	35.3	3.2	77.4	23.7
Cesareans	24.0	2.4	11.1	6.5
Medicare Expenditures	6188.8	882.2	28.2	8.0
MDs				
Total	25.3	6.1	14.2	6.0
Surgery	5.4	1.0	1.8	6.4
Ob-Gyn	1.3	0.3	5.8	7.6
Internal Medicine	3.5	1.4	17.6	7.0

Notes: Summary statistics are weighted by population in 2001.
Observations are at the state-year level, with percent growth calculated for 1993 to 2001. Payment data are 3-year averages for 1992-1994 and 2000-2002. Premium data are 2-year averages for 1992-1993 and 2001-2002. Physician data for 1993 are interpolated using 1989 and 1995 observations. Treatments are calculated from 1992-1993 data and 1998-2001 data.

Physician data come from the Area Resource File based on the AMA Master file. Premiums come from Medical Liability Monitor. Payments Come from the National Practitioner Data Bank. Covariates come from the Area Resource File. Treatment rates and Medicare expenditures come from the Dartmouth Atlas of Health Care.

Table 2: Effect of Malpractice Payments on Premiums

All measures represent differences of logs, 1993 to 2001

	Premiums							
	Average		**Ob-Gyn**		**Surgery**		**Internal Medicine**	
Difference of Logs Specialty-Specific Malpractice Payments								
Payments per MD	0.163		0.043		0.189		-0.050	
	(.262)		(.104)		(.187)		(.176)	
Number of Payments		0.160		0.054		0.234		-0.061
		(.293)		(.122)		(.268)		(.235)
Average Size Payment		0.213		0.040		0.162		-0.014
		(.335)		(.146)		(.227)		(.295)
R-squared	0.06	0.06	0.02	0.02	0.10	0.10	0.07	0.07
Obs	41	41	41	41	41	41	41	41

Notes:

Dependent and independent variables are all measured as differences in logs between 1993 and 2001 at the state level. Regressions are weighted by population in 2001. Robust standard errors in parentheses. Premiums and payments both measured per MD.

Covariates include growth in unemployment rate, per capita income, and deaths from malignant neoplasms and flu. Premiums come from Medical Liability Monitor. Payments Come from the National Practitioner Data Bank. Covariates come from the Area Resource File.

Table 3: Effect of Malpractice on Physician Workforce

All measures represent differences of logs, 1993 to 2001

	All MDs			Ob-Gyn			Surgery			Internal Medicine		
	All Ages	**Under 35**	**Over 55**	**All Ages**	**Under 35**	**Over 55**	**All Ages**	**Under 35**	**Over 55**	**All Ages**	**Under 35**	**Over 55**
Difference of Logs Specialty-Specific Premiums and Payments												
Premium Per Doctor	0.000	0.038	-0.050	0.016	0.040	0.022	-0.013	0.050	-0.031	0.046	-0.012	-0.056
	(.034)	(.054)	(.032)	(.037)	(.077)	(.046)	(.027)	(.055)	(.041)	(.026)	(.041)	(.041)
Number of Payments Per Doctor	-0.053	-0.188	-0.119	-0.001	-0.123	-0.070	-0.003	-0.003	0.038	-0.004	-0.066	-0.210
	(.065)	(.075)	(.055)	(.030)	(.074)	(.062)	(.065)	(.098)	(.081)	(.044)	(.101)	(.084)
Average Award Per Payment	0.002	-0.002	-0.036	0.067	-0.066	0.074	0.001	-0.090	-0.010	-0.054	-0.053	-0.124
	(.063)	(.074)	(.053)	(.032)	(.064)	(.066)	(.034)	(.068)	(.051)	(.046)	(.089)	(.094)
Load (Premiums /Amount of Payments)	0.011	0.011	-0.016	0.006	-0.009	-0.023	0.012	0.005	0.014	0.040	0.022	-0.037
	(.036)	(.041)	(.039)	(.022)	(.046)	(.046)	(.025)	(.038)	(.034)	(.024)	(.041)	(.040)
F-test Coefficients Jointly 0	*0.231*	*0.011*	*0.040*	*0.050*	*0.416*	*0.134*	*0.871*	*0.380*	*0.909*	*0.096*	*0.429*	*0.075*
F-test Coefficients Equal	*0.265*	*0.004*	*0.017*	*0.023*	*0.355*	*0.064*	*0.838*	*0.239*	*0.807*	*0.093*	*0.274*	*0.034*

Notes:

Dependent and independent variables are all measured as differences of logs between 1993 and 2001 at the state level. Regressions are weighted by population in 2001. Robust standard errors in parentheses.
Covariates include growth in unemployment rate, per capita income, and deaths from malignant neoplasms and flu.
Physician data come from the Area Resource File based on the AMA Master file. Premiums come from Medical Liability Monitor. Payments Come from the National Practitioner Data Bank. Covariates come from the Area Resource File.

Table 4: Effect of Malpractice on Patient Care

All measures represent differences of logs, 1993 to 2001

	Cesarean Sections		PCI		Mammography		Medicare Expenditures	
Difference of Logs for Average Premiums and Payments								
Premium Per Doctor	-0.057		0.060		0.190		0.035	
	(.040)		(.118)		(.112)		(.048)	
Number of Payments Per Doctor		0.043		0.137		0.136		0.067
		(.061)		(.220)		(.151)		(.097)
Average Award Per Payment		0.080		0.005		0.398		0.068
		(.060)		(.209)		(.147)		(.095)
Load (Premiums /Amount of Payments)		-0.049		0.113		0.171		0.050
		(.029)		(.109)		(.094)		(.058)
F-test Coefficients Jointly 0		*0.001*		*0.508*		*0.036*		*0.842*
F-test Coefficients Equal		*0.003*		*0.768*		*0.048*		*0.956*

Notes:

Dependent and independent variables are all measured as difference in logs between 1993 and 2001 at the state level. Regressions are weighted by population in 2001. Robust standard errors in parentheses. Covariates include growth in unemployment rate, per capita income, and deaths from malignant neoplasms and flu.

Treatment rates and Medicare expenditures come from the Dartmouth Atlas of Health Care. Premiums come from Medical Liability Monitor. Payments Come from the National Practitioner Data Bank. Covariates come from the Area Resource File.