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ABSTRACT

Losers and Losers: Some Demographics of Medical Malpractice Tort Reforms

Our research examines individual differences in the effects of medical malpractice tort reforms on pre-trial settlement speed and settlement amounts by age and most likely settlement size. Findings of note include that, unlike previously assumed, both absolute and percentage losses from tort reform are small for infants in an asset value sense and that the prime-aged working population is the group most negatively affected by tort reform. Maximum entropy quantile regressions highlight the robustness of our conclusions and reveal that the settlement losses most informative for policy evaluation differ greatly from mean regression estimates.

JEL Classification: C21, I18

Keywords: medical malpractice, tort reform, Texas closed claims, damage caps, quantile regression, maximum entropy

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The medical malpractice tort system in the United States has several purposes. Most noted is the goal of incenting doctors to practice so-called appropriate medicine through the negligence rule of liability. The negligence aspect of the malpractice system has been widely studied for its implications on physician behavior, particularly the practice of defensive medicine (Kessler and McClellan 1996, Kim 2007) or physician work choices (Kessler, Sage, and Becker 2005; Matsa 2007). Another purpose of the malpractice tort system is to compensate injured patients. The compensation is intended to offset economic damages from lost wages and the psychic costs of pain and suffering. The medical malpractice tort system therefore provides implicit insurance against adverse outcomes among patients when they consume medical services. Here we examine an under-appreciated dimension of the insurance aspect of the medical malpractice tort system, which is how tort reforms have affected interpersonal differences in patients' implicit insurance.[1]

In particular, we use closed claims from the state of Texas to examine econometrically how a reform package impacts people seeking recompense under their implicit insurance – people who have been negligently injured and are trying to get quick compensation. The particular reform package of interest was part of the Texas 2003 HB 4 law, which introduced two changes to the Texas malpractice liability system: (1) a cap on non-economic damages and (2) an early offer system.

The most widespread policy reform of medical malpractice has been a cap on non-economic damages. Caps have been implemented in about half the states and their effects widely studied in terms of their total cost implications for the medical care system

[1] A parallel line of research examines differences in damage cap effects across insurance providers (Viscusi and Born 2005).

(Danzon 1985, Donohue and Ho 2007, Lakdawalla and Seabury 2009, and Mello et al. 2010 to name a few). Damage caps put a maximum on how much can be paid out and, as such, lower the likelihood of a so-called blockbuster case.[2] Because caps reduce the variance between the plaintiff's and defendant's expected values of the case they have the dual consequences of a lower average payout per case plus a shorter length of time to settlement (Abraham 2001, Avraham 2007).

Early offer schemes create incentives for plaintiffs and defendants to settle early and punish them for passing up so-called good deals. In Texas, if it can be shown after the case that the party in question would have been better off accepting the offer the early offer scheme forces the side that turned down the early offer to pay the other side's legal fees. Not only do early offer reforms save considerable time in the litigation process (Hersch, O'Connell, and Viscusi 2007) but they also lower the payouts in malpractice litigation (Black, Hyman, and Silver 2009).

The components of the Texas reforms, damage caps and early offer schemes, have similar effects on the insurance that is implicit in the medical malpractice liability system. The implicit insurance claims have smaller, quicker payouts after the reforms. Whether or not the reforms improve the economic well-being of the holder of the policy depends on two factors. The first is the cost of the insurance paid implicitly through changes in

[2] Although not a perfect match, damage caps parallel bankruptcy law. One has an asset with uncertain value (the right to sue here/the right to declare bankruptcy). It could be worth zero (you lose the case/cannot declare for legal reasons or benefits could be totally offset by a lowered credit score). It could also be worth a lot (you win the case/you are able to declare bankruptcy and protect your assets). The outcome is ambiguous as risk abounds (juries/uncertainty as to the law or how severely your credit score will be affected). In both tort cases and bankruptcy there is an intermediate way out (settlement/ debt restructuring that is less protection of assets or less of a disruption to one's credit score).

patients' costs of medical services. Evidence is far from plentiful, but research suggests that physicians respond to changes in malpractice liability mainly via services quantities and not prices (Danzon 1990, Lakdawalla and Seabury 2009, Kessler 2011). Second, the ultimate welfare effect of the reforms depends on the change in the value of a settlement, which involves both the size of the settlement and the time it takes to reach the settlement, and is the focal point of our empirical research.

Specifically, we look at how the value of a settlement changes across different age demographics after the reform was enacted. The change in settlement value comes from three channels: a direct effect of the reform lowering the amount of the average settlement, an indirect effect of the reform lowering the average amount that a claimant asks for, and a timing effect of the reform speeding up the time until settlement. We find that claimants in their prime working years suffer the largest economic loss in settlement value. The age pattern is true for the mean, median and maximum entropy quantile of settlement amounts across age groups although the most informative location in the distribution is most often the median. Our results differ from the common belief that medical malpractice reforms have the largest negative impact on the settlements of the very young and the elderly.[3]

2. Theoretical Considerations

To understand the fundamental economics of the decision to settle and why there may be age and other interpersonal differences in malpractice insurance damage caps' effects consider two actors *A* and *B*. Here both have been negligently injured and now

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[3] Medical malpractice damage caps supposedly reduce settlements for the young and the elderly most because they do not have large earnings and, as such, do not have large economic damages to claim (Finley 2004; Rubin and Shepherd 2008).

have the right to sue. The right to sue is a risky asset S that takes on two values. An actor can go to court and will win with probability p, in which case S takes on the value $S^* > 0$, or may lose with probability $1 - p$, in which case S takes on the value zero. For simplicity, assume that $p = 1 - p = 0.5$, although the implications of the theoretical exercise that follows does not depend on the assumption of a 50-50 chance of winning the case.

A and B have different risk preferences: A is risk neutral and B is risk averse. More formally, the actors have respective utility functions $U_A(S)$ and $U_B(S)$ such that $U_A(S)', U_B(S)' > 0$ and $U_A(S)'' = 0, U_B(S)'' < 0$. We also assume that $U_A(0) = U_B(0) = 0$ and that the utility functions do not cross. This gives the two utility functions shown in Figure 1.

Let $E[S^*] = S^{**}$. Each actor receives utility from the asset, person A receives $U_A(S^{**}) = E[U_A(S)]$, which can be seen in Figure 1 by tracing up from S^{**} to $U_A(S)$ and over to the vertical axis. B receives expected utility $E[U_B(S)]$, which can be seen in Figure 1 by tracing up from S^{**} to the ray connecting the origin to $U_B(S^*)$ and over to the vertical axis. Both actors are indifferent between going to court and a settlement that gives them their expected utility of the risky asset, and will settle for that amount or any greater amount. Person B is willing to accept a settlement of less than S^{**} due to risk aversion.[4] There will then be age differences in settlement willingness to the extent that risk aversion varies by age (Halek and Eisenhauer 2001, Anderson et al. 2008).

[4] The more risk averse actor accepting a smaller settlement appears in a more general case of two risk averse bargainers who will go to an uncertain arbitrator if they cannot reach a settlement by Crawford (1984). In Crawford's model, an increase of an actor's risk aversion leads to a decrease in their settlement all else equal.

Now consider a cap on the amount that can be recovered in damages in a court award. This will change the maximum amount of the risky asset. The new asset S' can now either take on the value zero or S^{**} with equal probability. Let $E[S'] = S^{***}$. We can find each actor's utility from the new asset in a similar fashion as before. Person A receives $U_A(S^{***}) = E[U_A(S')]$, which can be seen in Figure 1 by tracing up from S^{***} to $U_A(S)$ and over to the vertical axis; B receives expected utility $E[U_B(S')]$, which can be seen in Figure 1 by tracing up from S^{**} to the ray connecting the origin to $U_B(S^{**})$ and over to the vertical axis.

If we take the difference between the utility from the original asset S, and the capped asset S' we get L_A for actor A, and L_B for actor B. It is immediately noticeable that $L_A > L_B$, or that the less risk averse actor has a larger reduction in utility from the implementation of a cap on damages. The implication is that risk aversion differences by age or predicted settlement size can lead to age and other differences in the welfare loss from damage caps.

There are a few remarks that should be made about the above theoretical exercise. The first is that the behavioral implications do not depend on one of the actors being risk neutral. If actor A is also risk averse the result that the less risk averse party suffers a larger utility loss is maintained as long as the other assumptions are still met. It is also important to note that actors' changes in minimum acceptable settlements do not follow as clean a rule as their changes in utility. A careful inspection of Figure 1 may make it look as if there is a clear association between changes in minimum acceptable settlement and the relative risk aversion of the actors, but that is an artifice of A being risk neutral. Any systematic effects of possible interpersonal differences in relative risk aversion and their attendant implications for how damage caps affect the size (asset value) of the settlement needs to be discovered empirically.

3. Data

The data we use to estimate the distributional consequences of malpractice reforms come from the Texas Department of Insurance Closed Claims Database (CCD), which include every insurance claim over $10,000 closed in Texas during 1988-2007. The data include indications of the type of insurance and the party purchasing the insurance so that one can identify cases that deal specifically with medical malpractice. The subset of the data we use includes 21,733 claims on medical malpractice insurance policies of health care providers including physicians, dentists, hospitals, and nursing homes.

Each of our data points is a closed claim. Although there are data for 2007, there can be cases originating prior to 2007 that closed after 2007 and so are not represented. Each claim provides information on the time, location, and type of injury (the closed claims report uses broad definitions such as brain damage or back injury rather than diagnosis codes). For the injured party the data include age, employment status, and availability of compensation other than torts. The CCD also has comprehensive information concerning any and all legal action that took place including all settlement amounts and jury awards. Finally there is limited information on the defendants, including the type of entity plus information about the payout limits associated with its policies, and the estimates of litigation and indemnity costs by its insurance providers.

To ensure that we are not looking at people who are deliberately holding out for a try at a so-called blockbuster jury award we limit our sample to cases settled in three years or less (the average length of a case that reaches a verdict is 5.5 years).[5] The result is a sample of 6,130 observations. Figure 2 shows the density of claims by year for both settled claims and claims that go to verdict. By limiting our sample to three years we exclude most cases that would have been settled close to verdict.

The main outcomes we examine are (1) the total amount of a settlement conditional on settlement before a verdict, (2) the amount of compensation demanded by the claimant conditional on settlement before a verdict, and (3) the time until settlement. Because it is a claims database, the CCD contains plentiful information on the relevant insurer and its behavior during the claims process. Of much importance is the indemnity reserve, which is the amount of money that the insurance company has set aside to pay for damages. The indemnity reserve is the insurance company's best estimate of the risk associated with a possible jury award or settlement, and effectively controls for many characteristics of the injury. Last, the claims database that we use also contains information on the specific policies' per accident maximum payout limits.

Table 1 contains the summary statistics for the data we use in the econometric estimation to follow. The first row documents the substantial reduction (about 55 percent) in the settlement amount after the reform, the second row documents a similar (50 percent) reduction in cash demanded, and the third row documents the notable reduction (33-45 percent) in case duration. There is clear evidence that the Texas reforms affected the ceiling of damages and encouraged quicker settlements on average. Our subsequent econometric models clarify the distributional consequences and the channels at work in the tort reforms producing the outcomes summarized in Table 1.

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[5] Later we examine the robustness of our results to the length of the settlement window.

4. Empirical Methods and Results

Estimating the component effects of the tort reform can be done with a multi-step procedure. First we estimate the amount that average settlement compensation decreased directly. Next we estimate the indirect effect in settlement amount via changes in cash demanded. Finally, we estimate the reduction in time to settlement after the reform. In all cases we consider distributional issues such as heterogeneity by age, settlement amounts or time to settlement.

4.1 Settlement Amounts and Initial Cash Demanded

To begin to separate the direct and indirect effects of tort reform from other variables that are also related to the size and speed of compensation, we estimate two multivariate OLS regressions:

(1) $Y_{it} = \alpha_{01} + \beta_{11} X_{1it} + \gamma_1 C_{it} + \delta_1 R_t$ and

(2) $C_{it} = \alpha_{02} + \beta_{12} X_{2it} + \delta_2 R_t$.

Here *Y* is a claim settlement amount, *X* is a vector of time varying control variables whose effect we wish to remove from our estimate of the effect of the reform, *C* is initial cash demanded, and *R* is an indicator variable equal to one in the time period after the reform has been enacted, and zero otherwise. Thus, δ_k ($k = 1, 2$) is the estimated effect of the reform on either the amount of the settlement or the amount initially demanded by the claimant.

The OLS results in Table 2 illustrate the post-reform settlement amount holding constant other factors, including cash demanded, which we view as an indicator of an initial signal of how likely the claimant is willing to settle. The results for the all ages regression reported in the last column indicate a $59,000 reduction in the settlement amount post-reform, which is about 13 percent of the pre-reform mean. The disaggregated results show that the groups most affected by the reform are people in the 20s and 30s, and that the reform is clearly non-neutral by age.

A final result of note in Table 2 is that for all the age groups there is a significant effect of initial cash demanded on settlements, with the largest impact on babies, where settlements rise by about \$0.74 for every \$1 of cash demanded initially. The consequence is that one also need examine the effect of damage caps on the initial demands which, as noted, may indicate bargaining rigidity of the claimant.

There is a substantial change in the post-reform period in initial cash demanded. For the pooled (N = 6,130) regression in Table 3 there is about a 40 percent reduction in initial cash demanded. So, when paired with the results of Table 2, the percentage total effect of the reform, $100(\delta_1 + \gamma_1\delta_2)/\mu_{Y(\text{pre-reform})}$, is to reduce settlements by an average of about 38 percent of the pre-reform average settlement, or by a total of \$177,000. Once again the results are heterogeneous by age, so that the largest dollar effects in Table 3 are in the prime working years. This may indicate that working age people care about getting back to work quickly compared to those close to retirement who may be more willing to endure a protracted settlement period.

4.2 Time to Settlement

To examine the issue of how the reform affected time to payment we also estimated Cox (1972) proportional hazard models

$$(3) \qquad h_i(t) = h_0(t)\exp(\beta_{13}X_{it} + \gamma_3 C_{it} + \delta_3 R_t),$$

with standard errors calculated using the robust method in Lin and Wei (1979). Here the antilog of the coefficient of the reform dummy implies the hazard ratios in Table 4, which are revealed in the survival functions illustrated in Figure 3. Note, for example, that pre-reform virtually no case had settled by the 500 day mark, while post-reform about one-third had settled. Similarly, it took about 50 percent longer for half the cases to have settled pre reform versus post reform.

From the estimated hazard ratios in Table 4 we see that, on average, people settle about 50 percent faster with the largest effect (–60 percent) on cases involving infants. Again there is substantial heterogeneity in the estimated effect of the reform on time until settlement, as cases involving the elderly are settled 40 percent more quickly. Finally, we note that, unlike the level of settlements, time to settlement is not affected by initial cash demanded so that there is no influence of the policy reform on time to settlement via a moderation of cash demanded channel.

4.3 Effect of the Reform on the Economic Value of Settlements

Using the procedure described in the Appendix we display in Table 5 the economic effects of the reform in terms of its impact on the asset value of a malpractice settlement. Table 5 breaks the effect of the policy out by channels, the direct effect on the settlement amount, the indirect effect via decreased cash demands, and then the change in timing from speedier settlements.

For all ages, while speeding up the time to payment by about 420 days, the effect of reform on settlements is to reduce the present value by 36 percent.[6] Once again there is substantial heterogeneity by age. Persons in their 30s demand about $175,000 less and then have an average settlement that is about $103,000 lower that is paid only about 421 days (50 percent) faster so that the implicit asset value of the settlement is about 60

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[6] Present value calculations use the average of the real interest rate on a 3-month T-bill over the time period of our sample.

percent ($276,000) lower. The tort reforms are not welfare improving in a basic economic sense. One possible explanation for the heterogeneity by age is that claimants in their prime working age have a different level of relative risk aversion than those with injured children or the elderly. It is also possible that working age claimants settle for less in an attempt to expedite the settlement process and return to work as quickly as possible.

4.4 Additional Dimensions of the Distributional Consequences of the Reform

There is much research demonstrating the usefulness of quantile regression in examining the distributional consequences of economic interventions in the labor market (Kniesner, Viscusi, and Ziliak 2010) and in the case of medical malpractice insurance (Viscusi and Born 2005). The standard quantile regression model has an expression for the fitted residual that in our case is

(4) $r_{it} = Y_{it} - \sum_j \beta_j x_{jit} + \gamma_4 C_{it} + \delta_4 R_t$ or

(5) $r_{it} = C_{it} - \sum_j \beta_j x_{jit} + \delta_5 R_t$.

Next there is a multiplier h_i where

(6) $$h_i = \begin{cases} 2q, & if\ \ r_i > 0 \\ 2(1-q), & otherwise \end{cases}$$

with q the quantile of interest. The quantile regression is then

(7) $min_{\beta_j} \sum_i |r_i| h_i$,

which is solved via linear programming (Armstrong, et al. 1975).

Recent research adds a parameter (τ) that, when minimized in conjunction with (4)-(7), reveals the most probable or maximum entropy quantile (Golan 2006, Bera et al. 2010).[7]

[7] One can also intuit τ as a penalty for deviating from the median as the most likely quantile.

In terms of policy interventions one should be particularly interested in the most likely effect size, which comes from the most likely quantile.

Table 6 presents the estimated maximum entropy quantile for the various age groups. The point of the exercise is to reveal more of the policy heterogeneity. Note that the estimated maximum entropy quantile is lower for older people. Although it is close to the median for ages 50-69, in no other age group is the median outcome the place in the fitted settlement distribution that is most likely.

There is substantial heterogeneity in the impact of the reform across conditional quantiles of cash demanded and settlement amounts. The differing effects of the policy are presented in Figure 4 for conditional quantiles of settlement amount and in Figure 5 for conditional quantiles of cash demanded. For the pooled sample the negative effect of the policy on settlement amounts peaks at the 30^{th} conditional quantile and then drops off at the quantiles increase. For cash demanded the effect of the policy is monotonically increasing in magnitude with the conditional quantile. Because of the differing effects, if a part of the distribution other than the mean is most likely, then using the estimated policy effect at the maximum entropy quantile will make a sizable difference in the estimated value of the settlement.

The heterogeneity in policy effects and the difference it makes in focusing on the most likely place in the distribution of potential outcomes are highlighted in Table 7. There we compare estimated mean, median, and maximum entropy quantile malpractice reform effects on asset value lost. Note that for people in their 30s the most likely effect is less than half the mean effect. Alternatively, the most likely effect is much larger (−28 percent) than the mean effect (0) in the case of young people 3-19. It is also the case that

(1) there is little heterogeneity in effect by age group for the vast majority of the groups and (2) the most likely quantile estimates are often fairly similar to the estimates one would get from a median regression. When estimating medical malpractice reform effects, a simple least absolute deviation regression, which trims the outliers, is an important improvement over OLS.

The conclusion again emerging from maximum entropy quantile regressions is that on pure economic asset returns grounds the policy is welfare reducing. Claimants would have benefitted economically from a slower larger settlement typical of the pre-reform period. Unlike what has been inferred previously (Finley 2004; Rubin and Shepherd 2008), the results in Table 7 show that infants and the elderly are not the hardest hit. In addition to infants having the smallest expected effects from damage caps the largest percentage asset loss is among people in their 50s.

4.5 Robustness Check

The final econometric issue we confront is whether our results are sensitive to small changes in the assumed settlement period window of three years. Table 8 presents settlement results for a 3.5 year time frame compared to a 3 year window, which enlarges the sample size by 50 percent. Note the similarity of results of interest, the estimated values of γ and δ, with those in Table 2.[8] Table 9 repeats the robustness checking exercise for the dependent variable of cash demanded by the claimant. Again, the results are similar to those found in the three year window.

[8] Results not tabulated are similar for settlement windows of 3.25 or 3.75 years.

5. Conclusion

Because of its many perceived benefits state legislatures have found tort reform attractive. Reforms such as damage caps and early offer systems speed up cases and help reduce caseloads in the courts. They also lower the size of claims, which possibly decreases so-called wasteful defensive medicine and decreases the related stress costs on physicians. Another touted benefit of tort reforms are that they cut down on claims that lack merit and help prevent blockbuster jury awards that are perceived to increase the overall cost of health care. The benefits we have mentioned are not without a downside. Our evidence is that although injured parties who may desire quicker payment are compensated more quickly after the reforms, the cost of doing so is large. It may certainly be the case that given the choice specified in clear economic terms claimants, particularly those of prime working ages, would have preferred the pre-reform medical malpractice tort system.

Table 1: Summary Statistics

Variable Name	Settled Within 3 Years Before Reform	Settled Within 3 Years After Reform	Universe of Settled Claims Before Reform	Universe of Settled Claims After Reform
Settlement Amount (Thousands)	471.64	212.79	420.33	228.63
	(1,152.18)	*(577.29)*	*(958.01)*	*(530.99)*
Cash Demanded (Thousands)	530.05	249.74	516.69	259.07
	(1,310.77)	*(756.15)*	*(1,322.53)*	*(703.95)*
Duration of Case (Days)	837.81	632.96	1,597.17	896.61
	(188.78)	*(257.39)*	*(897.89)*	*(618.44)*
Initial Indemnity Reserve (Thousands)	91.37	74.89	79.19	81.69
	(151.64)	*(134.13)*	*(160.45)*	*(135.21)*
Per Accident Policy Limit (Thousands)	1,223.17	1,602.66	999.16	1,390.35
	(2,101.66)	*(2,087.11)*	*(2,241.30)*	*(1,989.05)*
Age of Injured Party (Years)	42.62	41.02	38.09	41.17
	(24.85)	*(26.61)*	*(25.27)*	*(26.12)*
Injured Party was a Baby (Binary)	0.11	0.17	0.17	0.16
	(0.32)	*(0.37)*	*(0.38)*	*(0.37)*
Other Physicians Defending (Binary)	0.63	0.27	0.76	0.33
	(1.07)	*(0.72)*	*(1.32)*	*(0.77)*
Other Health Care Providers Defending (Binary)	0.27	0.13	0.37	0.16
	(0.91)	*(0.51)*	*(1.56)*	*(0.58)*
Observations	4,358	1,772	17,660	2,702

Note: All dollar values are scaled to year 2000 dollars

Table 2: OLS Regression Results - Settlment Amount for Cases Settled Within 3 Years (Thousands)

Age Group	**0 to 2**	**3 to 19**	**20 to 29**	**30 to 39**	**40 to 49**	**50 to 59**	**60 to 69**	**All Ages**
After Policy Change (Binary)	-105.68	-4.95	-111.11 ***	-103.40 ***	-47.59	-25.00	-23.16	-59.10 ***
	(69.63)	*(63.84)*	*(40.19)*	*(35.54)*	*(39.92)*	*(18.20)*	*(31.77)*	*(16.15)*
Cash Demanded (Thousands)	0.74 ***	0.47 ***	0.38 ***	0.56 ***	0.61 ***	0.55 ***	0.64 ***	0.61 ***
	(0.09)	*(0.07)*	*(0.09)*	*(0.14)*	*(0.15)*	*(0.10)*	*(0.16)*	*(0.06)*
Initial Indemnity Reserve (Thousands)	0.46	0.29	0.60 ***	0.61 **	0.84 **	0.24	0.41 **	0.46 ***
	(0.32)	*(0.19)*	*(0.16)*	*(0.29)*	*(0.41)*	*(0.16)*	*(0.18)*	*(0.12)*
Per Accident Policy Limit (Thousands)	0.00	0.01	-0.01	0.02	0.04	0.00	-0.01	0.01
	(0.03)	*(0.02)*	*(0.01)*	*(0.02)*	*(0.03)*	*(0.00)*	*(0.01)*	*(0.01)*
Other Physicians Defending (Binary)	87.03 *	99.57 **	147.49 ***	*35.14*	108.11 ***	76.17 ***	18.63	72.85 ***
	(49.68)	*(43.46)*	*(53.48)*	*(31.59)*	*(33.25)*	*(19.04)*	*(21.55)*	*(13.87)*
Other Health Care Providers Defending (Binary)	150.56	57.72	-4.48	103.25 **	-42.00	125.59 **	35.08	39.21 **
	(110.26)	*(48.23)*	*(10.69)*	*(50.77)*	*(37.70)*	*(52.24)*	*(23.87)*	*(16.93)*
Constant	143.63 **	60.86	98.84 ***	34.58	-43.35	*43.99* **	31.92	175.75 ***
	(71.57)	*(98.45)*	*(29.17)*	*(30.85)*	*(71.07)*	*(17.93)*	*(54.54)*	*(42.88)*
Age								*(5.63)* ***
								(1.53)
Age Squared								*0.04* ***
								(0.01)
Observations	840	373	598	939	871	852	691	6,130
R-squared	0.470	0.647	0.377	0.640	0.660	0.823	0.696	0.575

Note: * denotes P < 0.1, ** denotes P < 0.5, ** denotes P < 0.01, effect of binary variables and constant reported in thousands, robust standard errors in parenthesis

Table 3: OLS Regression Results - Cash Demanded for Cases Settled Within 3 Years (Thousands)

Age Group	0 to 2		3 to 19		20 to 29		30 to 39		40 to 49		50 to 59		60 to 69		All Ages	
After Policy Change (Binary)	-195.69	**	-138.65		35.44		-312.90	***	-341.75	***	-119.37	**	-205.40	***	-193.82	***
	(85.52)		*(168.80)*		*(114.81)*		*65.40*		*(152.61)*		*(45.94)*		*(36.41)*		*(27.29)*	
Initial Indemnity Reserve (Thousands)	2.70	***	1.59		1.27	***	2.19	***	2.58	**	0.78	*	1.70	*	1.97	***
	(0.73)		*(0.96)*		*(0.30)*		*0.75*		*(1.00)*		*(0.44)*		*(0.98)*		*(0.34)*	
Per Accident Policy Limit (Thousands)	0.20	***	0.04		-0.01		0.07	**	0.09		0.01		0.01		0.04	**
	(0.08)		*(0.04)*		*(0.02)*		*(0.03)*		*(0.07)*		*(0.01)*		*(0.02)*		*(0.01)*	
Other Physicians Defending (Binary)	87.42		223.61	**	187.75	***	159.07	**	227.33	***	188.13	***	93.46	***	162.49	***
	(53.55)		*(99.83)*		*(498.34)*		*(69.99)*		*(68.18)*		*(45.13)*		*(33.12)*		*(20.78)*	
Other Health Care Providers Defending (Binary)	293.74	***	-22.54		13.39		49.14		-22.17		505.83	***	-34.71		113.07	**
	(111.73)		*(91.88)*		*(21.29)*		*(67.38)*		*(68.51)*		*(156.80)*		*(43.21)*		*(43.85)*	
Constant	103.33		184.62		184.90	***	187.90		149.63		148.58	**	220.89	***	300.06	***
	(97.46)		*(112.33)*		*(37.72)*		*(58.36)*		*(152.61)*		*(60.27)*		*(66.99)*		*(47.63)*	
Age															*(3.78)*	**
															1.89	
Age Squared															*0.01*	
															(0.02)	
Observations	840		373		598		939		871		852		691		6,130	
R-squared	0.209		0.138		0.100		0.122		0.136		0.245		0.113		0.123	

Note: * denotes P < 0.1, ** denotes P < 0.5, ** denotes P < 0.01, effect of binary variables and constant reported in thousands, robust standard errors in parenthesis

Table 4: Duration Results - Cox Proportional Hazard, Cases Settled Within 3 Years

	Hazard Ratio
Age Group	**After Policy Change**
0 to 2	2.450***
	(0.213)
3 to 19	2.253***
	(0.284)
20 to 29	1.971***
	(0.244)
30 to 39	1.994***
	(0.192)
40 to 49	2.051***
	(0.199)
50 to 59	1.902***
	(0.169)
60 to 69	1.777***
	(0.196)
All Ages	2.006***
	(0.072)

*Note: * denotes P < 0.1, ** denotes P < 0.5, ** denotes P < 0.01, other regression coeffecients supressed (available upon request), Cash Demanded does not statistically influence duration*

Table 5: Effect of Reform on Quick Settlements, Cases Settled Within 3 Years (All Dollar Values in Thousands)

Age group	Average Settlement Pre-Reform	Estimated Effect of Reform on Settlement Amount	Estimated Effect of Reform via Cash Demanded	Pre-Reform Average Time to Payment (Days)	Estimated Change in Time to Payment (Days)	Difference in Settlement's Asset Value	Percent of Original Value Lost
0 to 2	784.29	0.00	-144.81	832.18	-492.51	-132.61	16.91
3 to 19	436.84	0.00	0.00	818.47	-455.19	7.69	-1.76
20 to 29	409.37	-111.11	0.00	840.21	-413.92	-106.34	25.98
30 to 39	469.34	-103.40	-175.22	844.61	-421.03	-275.52	58.70
40 to 49	532.87	0.00	-208.47	843.21	-432.09	-203.05	38.10
50 to 59	433.06	0.00	-65.65	854.88	-405.42	-59.89	13.83
60 to 69	381.37	0.00	-131.46	836.17	-365.62	-127.93	33.54
All Ages	471.64	-59.10	-118.23	837.81	-420.16	-172.54	36.58

Note: All dollar values are scaled to year 2000 dollars, calculations assume a real interest rate of 0.0141. Estimated effect amounts generated using Tables 2, 3, and 4, statistically insignificant results reported as zeroes. Estimated effect on settlement amount is the after policyeffect from Table 2. Estimated effect via Cash Demanded is the effect of Cash Demanded from Table 2 multiplied by the after policy effect from Table 3. Estimated change in time to payment is the inverse of the hazard from Table 4 multiplied by average pre-reform time to payment.

Table 6: Maximum Entropy Quantiles

Age Group	MEQ
0 to 2	62
3 to 19	62
20 to 29	45
30 to 39	35
40 to 49	43
50 to 59	52
60 to 69	49
All Ages	43

Table 7: Effect of Reform on Asset Value, Cases Settled Within 3 Years

	Percent of Asset Value Lost		
Age group	**OLS**	**Median**	**MEQ**
0 to 2	16.91	5.76	5.34
3 to 19	-1.76	23.08	26.96
20 to 29	25.98	29.14	25.73
30 to 39	58.70	27.59	22.34
40 to 49	38.10	35.69	26.79
50 to 59	13.83	30.29	28.73
60 to 69	33.54	25.37	23.47
All Ages	36.58	29.76	22.94

Note: All dollar values are scaled to year 2000 dollars, calculations assume a real interest rate of 0.0141. OLS results taken from Table 5. Median and MEQ columns replicate Table 5 using median or MEQ settlement amounts and Median or MEQ regression.

Table 8: OLS Regression Results - Settlement Amount (Thousands) - Maximum Time to Settlement Sensitivity

Age Group	**3.5 Years**		**3 years**	
After Policy Change (Binary)	-68.11	***	-59.10	***
	(14.19)		*(16.15)*	
Cash Demanded (Thousands)	0.58	***	0.61	***
	(0.04)		*(0.06)*	
Initial Indemnity Reserve (Thousands)	0.35	**	0.46	***
	(0.14)		*(0.12)*	
Per Accident Policy Limit (Thousands)	0.02	*	0.01	
	(0.01)		*(0.01)*	
Other Physicians Defending (Binary)	57.85	***	72.85	***
	(10.40)		*(13.87)*	
Other Health Care Providers Defending (Binary)	39.34	***	39.21	**
	(12.22)		*(16.93)*	
Constant	164.07	***	175.75	***
	(31.68)		*(42.88)*	
Age	-4.30	***	-5.63	***
	(1.18)		*(1.53)*	
Age Squared	*0.03*	**	*0.04*	***
	(0.01)		*(0.01)*	
Observations	9120		6,130	
R-squared	0.549		0.575	

Note: * denotes P < 0.1, ** denotes P < 0.5, ** denotes P < 0.01, effect of binary variables and constant reported in thousands, robust standard errors in parenthesis

Table 9: OLS Regression Results - Cash Demanded (Thousands) - Maximum Time to Settlement Sensitivity

Age Group	**3.5 Years**		**3 years**	
After Policy Change (Binary)	-204.98	***	-193.82	***
	(43.81)		*(27.29)*	
Initial Indemnity Reserve (Thousands)	2.43	***	1.97	***
	(0.39)		*(0.34)*	
Per Accident Policy Limit (Thousands)	0.05	***	0.04	**
	(0.01)		*(0.01)*	
Other Physicians Defending (Binary)	137.72	***	162.49	***
	(18.00)		*(20.78)*	
Other Health Care Providers Defending (Binary)	67.93	**	113.07	**
	(29.01)		*(43.85)*	
Constant	285.95	***	300.06	***
	(43.81)		*(47.63)*	
Age	-4.32	***	-3.78	**
	(1.56)		*1.89*	
Age Squared	*0.02*		*0.01*	
	(0.02)		*(0.02)*	
Observations	9120		6,130	
R-squared	0.153		0.123	

Note: * denotes P < 0.1, ** denotes P < 0.5, ** denotes P < 0.01, effect of binary variables and constant reported in thousands, robust standard errors in parenthesis

Figure 1

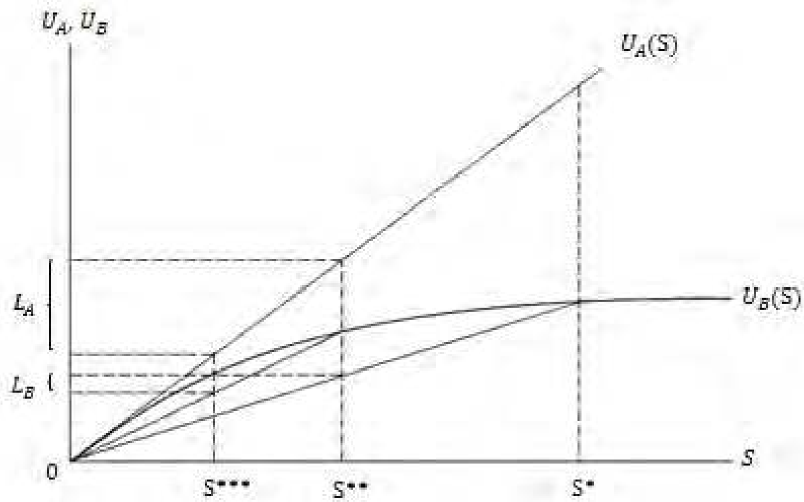


Figure 2

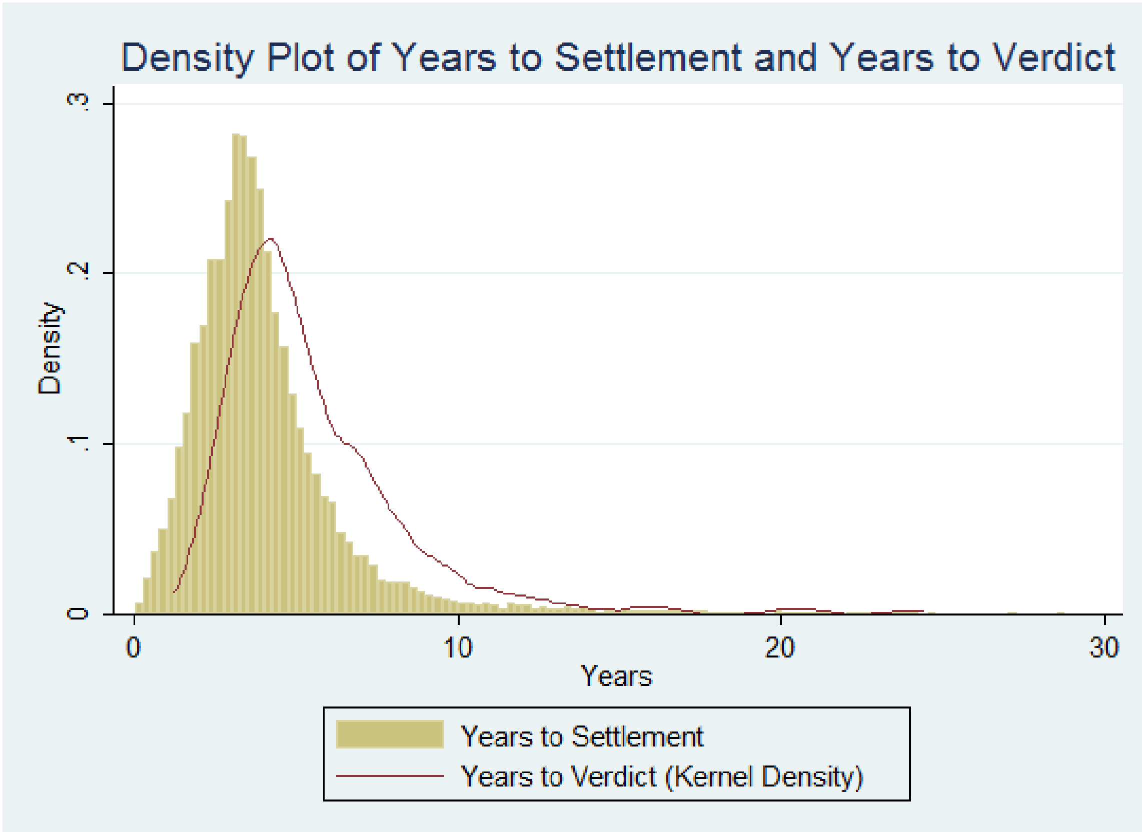

Density Plot of Years to Settlement and Years to Verdict
Density
0
.1
.2
.3
0
10
20
30
Years
Years to Settlement
Years to Verdict (Kernel Density)

Figure 3

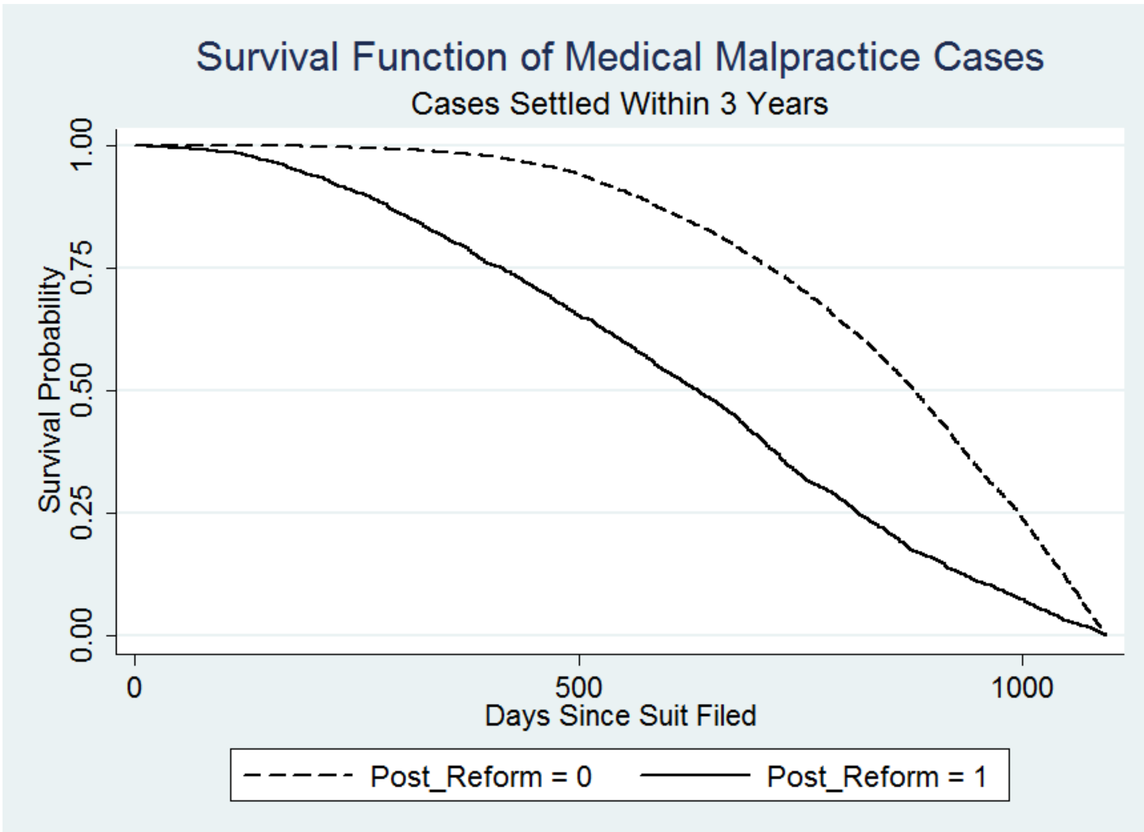

Survival Function of Medical Malpractice Cases
Cases Settled Within 3 Years
Survival Probability
0.00
0.25
0.50
0.75
1.00
0
500
1000
Days Since Suit Filed
Post_Reform = 0
Post_Reform = 1

Figure 4

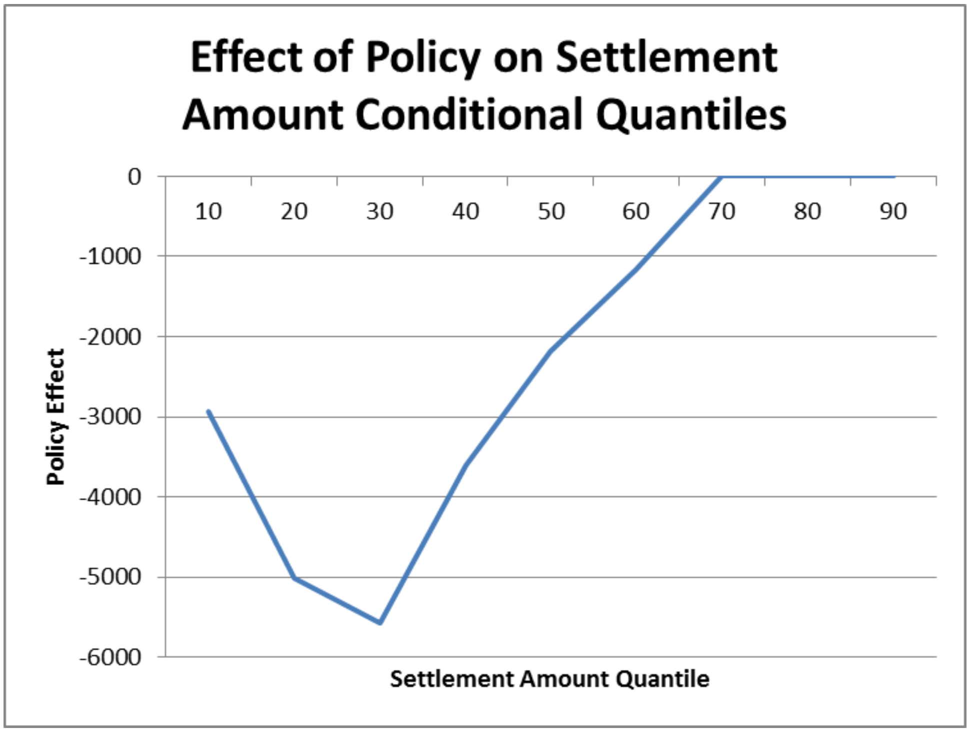
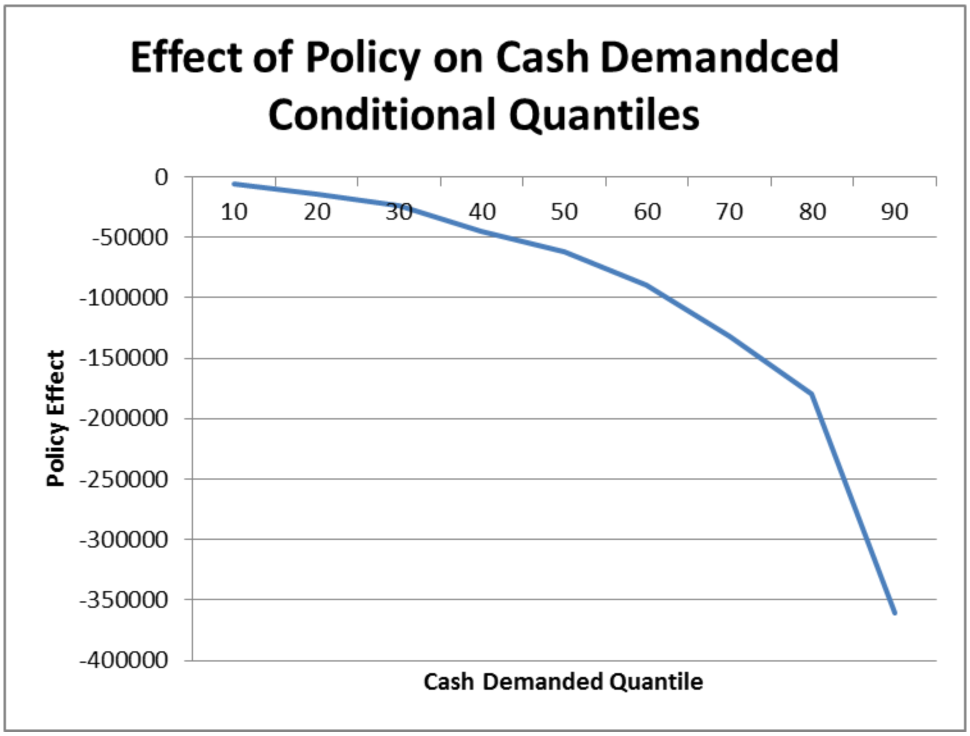

Effect of Policy on Settlement Amount Conditional Quantiles
0
-1000
-2000
-3000
-4000
-5000
-6000
10
20
30
40
50
60
70
80
90
Policy Effect
Settlement Amount Quantile

Figure 5


Effect of Policy on Cash Demandced Conditional Quantiles
0
-50000
-100000
-150000
-200000
-250000
-300000
-350000
-400000
10
20
30
40
50
60
70
80
90
Policy Effect
Cash Demanded Quantile

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Appendix: Asset Value Calculations

Asset Value (Table 5) generation

Table 5, Column 2 – Average of Settlements within 3 years for given age group

Table 5, Column 3 – Estimated policy effect from Table 2, set equal to zero if not significant

Table 5, Column 4 – Estimated policy effect from Table 3, set equal to zero if insignificant, multiplied by estimated effect of cash demanded in Table 3

Table 5, Column 8 – divide column 7 by column 1. Multiply by negative 1

Table 5, Column 6 – Column 4 multiplied by estimate from Table 4

Table 5, Column 7 – Sum of columns 2, 3 and 4, adjusted for change in timing of payment in Table 6

$$\frac{(col2 + col3 + col4)}{1.0141^{(\frac{Col6}{365})}}$$

Alternate Asset Value (Table 7) generation

Table 7, Column 1 – Same as Table 5, Column 8

Table 7, Column 2 – Uses median techniques, generated using same logic as Table 5, the differences are:

- Column 2 of Table 5 uses the median settlement amount
- Columns 3 and 4 of Table 5 come from median

Table 7, Column 2 – Uses MEQ techniques, generated using same logic as Table 5, the differences are:

- Column 2 of Table 5 uses the MEQ settlement amount
- Columns 3 and 4 of Table 5 come from MEQ regressions (MEQ's vary based on age group)