

## **Does Sorry Work?**

### **The Impact of Apology Laws on Medical Malpractice**

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#### **ABSTRACT**

Apologies made by physicians for adverse medical events have been identified as a mitigating factor in whether patients decide to litigate. However, doctors are socialized to avoid apologies because apologies admit guilt and invite lawsuits. An apology law, which specifies that a physician's apology is inadmissible in court, is written to encourage patient-physician communication. Building on a simple model, we examine whether apology laws at the State level have an impact on malpractice lawsuits and settlements. Using a difference-in-differences estimation, we find that State-level apology laws could expedite the settlement process. Using individual level data, we also find that apology laws have the greatest reduction in average payment size and settlement time in cases involving more severe patient outcomes.

*“It’s sad, so sad  
Why can’t we talk it over?  
Oh, it seems to me  
That sorry seems to be the hardest word”*

~ “Sorry Seems to Be the Hardest Word”: *Elton John*

## **1. Introduction**

Healthcare costs are a growing popular concern in the United States. Many reports identify the rising number of medical malpractice lawsuits, the corresponding increase in medical malpractice insurance premiums, and the widespread practice of defensive medicine as the main factors that contribute to the rising cost of health care.<sup>1</sup> In response, national and State legislatures have proposed and enacted legislation to put into place a number of reforms, including jury award caps, insurance premium price caps, State medical malpractice funds, greater information disclosure, and of particular relevance to the current paper, apology exemptions. In 1986, Massachusetts became the first State to adopt some form of an apology law, which was designed to protect doctors from statements they might make to their patients regarding complications the patient suffered under their care. More recently, these apology laws specifically declare that a statement of apology made by a medical practitioner to a patient is inadmissible as evidence of liability in court. In September 2005, then-Senators Clinton and Obama cosponsored the National MEDiC Act, which would have implemented such exemptions at a national level. As of January 2009, 36 States have implemented various forms of apology laws.

State apology laws are premised on two stylized facts. The first fact is that doctors would like to apologize to their patients for medical mistakes, but are stymied by their fear of inviting a lawsuit. Research shows that doctors are typically told to avoid admissions of fault and apologies because of the risk of lawsuits (Lamb et al., 2003; Novack et al., 1989; Pinkus, 2000). The second fact is that a main

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<sup>1</sup> For more discussion and overview on medical malpractice see Sloan and Chepke’s (2008) book *Medical Malpractice*.

motivation patients give when asked why they chose to sue their doctors is anger, and that this anger would have been assuaged by an apology (Hickson et al., 1992; May & Stengel, 1990; Vincent & Young, 1994). These two facts lead to a vicious cycle that breaks down patient-doctor communication and thereby increases litigation costs. By making apologies inadmissible as evidence in malpractice lawsuits, it is hoped that doctors would communicate with patients more effectively, thus reducing patient confusion and anger in the case of adverse complications and thereby reducing the cost of medical malpractice (Cohen, 2003).

To date, this paper is the first economic study to investigate the impact of the State-level apology legislation on claim frequency and claim severity.<sup>2</sup> In legal studies, apologies have been found to have an important impact on the outcome of many legal cases. Unsolicited apologies can have an impact on conviction rates as well as sentence and judgment sizes (Rehm & Beatty, 1996). Some studies which give subjects hypothetical situations report that apologies may reduce the subjects' likelihood to litigate (Mazor et al. 2004; Robbenholt, 2003; Wu, 1999; Wu et al., 2009). There are a few studies in the medical/legal literature that are similar to our current research. These studies examined the apology programs in individual hospitals in Pennsylvania (Liebman & Hyman, 2004, 2005) and Tennessee (Kraman & Hamm, 1999) and found that programs that encourage effective apologies and disclosure of mistakes can dramatically reduce malpractice payments. Most notably, a study performed at the University of Michigan Health Service reported that their per case payments decreased by 47% and the settlement time dropped from 20 months to 6 months since the introduction of their 2001 apology and disclosure program (Boothman, 2006). While the findings associated with hospital-level apology programs are promising, one is uncertain of the generalizability of these results. The reason why the

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<sup>2</sup> There is an extensive literature investigating the impact of tort reform on the speed of settlements and the amount of malpractice payments (Browne & Puelz 1999; Danzon 1984, 1986; Durrance, 2009; Yoon 2001), but to our knowledge, apology laws have always been ignored in past studies.

hospitals in these studies decided to pioneer such programs could be endogenous, or there could be other concurrent reforms at the hospital level, as such programs are often implemented by a charismatic and reforming administrator. Therefore, the true effect of apologies on medical malpractice litigation could be overestimated and the external validity of these studies is in question.

Our study examines the impact of State-level apology legislation. Conceptually, there are several possible effects due to the apology laws. If the laws work as intended, and patients' anger is reduced then we would expect to see less litigation and faster settlements. However, if the unintended consequences of the laws dominate then we would expect to see more litigations. To disentangle these effects we use data from the National Practitioner's Data Bank (NPDB) Public Access File (2009), which includes the universe of all medical malpractice payments made by or on behalf of a healthcare provider since 1991. Given that NPDB data set only consist claims with positive payout, it does not contain information on open claim nor closed claims without payments, therefore, the dependent variable in most analysis would be number of closed claims with positive payout in a State-year.

Our analysis is conducted at two levels. The first is a difference-in-differences analysis using the time variation from the staggered implementation of State-level apology laws to investigate the impact on the malpractice closed claims frequency and malpractice compensation payout within a State-year. We further explore the change of claim composition by the severity of injury. The second is a duration analysis on the impact of apology laws on time to resolution (i.e., how long it takes for a malpractice suit to be resolved), which is conducted at the individual level. We further investigate the impact of apology laws on claim payment and how the size of this impact depends on the severity of medical injury. Similar to the concern raised earlier about the hospital-level apology policy, one may be concerned that the passing of apology laws at the State level could also be endogenous, which would result in a biased estimate. To address these concerns we perform various robustness checks and the results remain

consistent. The analysis suggests that the apology laws could increase the number of closed claims, and most of the claims increased come from the cases with most severe medical injuries. One can attribute the increased number of closed claims to several reasons. Most notably, the increase can be due to faster resolution time or it could be due to an overall increase in the number of claims filed. Consistent with our theory, we find evidence that suggests that the overall increase in closed cases is due to faster settlement times, while in the long run, the total number of malpractice claims being brought forth is declining. For example, on the subset of cases involving insignificant injuries—those cases which are most likely to be resolved in the 3 to 5 years of available data—we see a 16–18% reduction in the number of closed claims. When we investigate the impact of apology laws on the duration of cases by the severity of medical outcomes, the hazard analysis results suggest that conditional on the cases resolving before 2009, the cases with most severe outcomes settle sooner in States that have the apology laws relative to States that do not. As for the claim compensation payouts, again conditional on the cases resolving before 2009, apology laws reduce the claim payouts of the most severe cases by \$58,000–73,000 per case and the claim payouts of the “somewhat” severe cases by \$7,000–14,000 per case. In sum, we find that apology laws induce faster resolution and lower payments for those malpractice cases brought by patients who sustained the most severe medical injuries.

The remainder of the paper proceeds as follows: in Section 2, we provide background on apology laws. In Section 3 we provide a model. Section 4 describes our dataset. In Section 5, we discuss our empirical specification and present our findings. Section 6 concludes.

## **2. Background of Apology Law**

As of January 2009, apology laws had been enacted in 36 States, all of which were enacted between 1999 and 2008 (except for Massachusetts, whose law dates to 1986). Table 1 lists all of the State

legal codes pertaining to medical apologies.<sup>3</sup> Table 2 shows that the timing of other medical malpractice tort reform is generally not correlated with the passage of apology legislation. Unlike other tort reforms, which have predominantly been a Republican issue (Durrance, 2009), apology laws are not disproportionately supported by any particular political party.<sup>4</sup> While there is no hard data to substantiate the following claim, it is anecdotally accepted that apology laws have been passed due to activist pressure rather than systemic changes in the litigation environment, which means that apology laws are unlikely to be correlated with other changes that affect litigation (e.g., tort reform).<sup>5</sup>

[Insert Table 1 About Here]

[Insert Table 2 About Here]

State apology laws are very similar to one another as they tend to be copied from similar templates. Connecticut's apology law is a typical example. The Connecticut law states that:

In any civil action brought by an alleged victim of an unanticipated outcome of medical care, or in any arbitration proceeding related to such civil action, any and all statements, affirmations, gestures or conduct expressing **apology, fault, sympathy, commiseration, condolence, compassion or a general sense of benevolence** that are made by a health care provider or an employee of a health care provider to the alleged victim, a relative of the alleged victim or a representative of the alleged victim and that relate to the discomfort, pain, suffering, injury or death of the alleged victim as a result of the unanticipated outcome of medical care shall be inadmissible as evidence of an admission of liability or as evidence of an admission against interest. (emphasis added)

Depending on the State, there is a slight variation in the types of statements that are protected by these statutes. Protected statements typically include a combination of apology, fault, sympathy,

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<sup>3</sup> California, Massachusetts, Florida, Tennessee, Texas, and Washington have general apology statutes that apply across all industries while the other 30 States have specific laws that only protect the statements of apology made by health care providers. The States can be first divided into two types depending on the applicability of these laws: general versus health practitioners only. We perform an *F*-test checking whether we can group the general versus health-care only laws together, the *F*-test fails to reject the null hypotheses that these two types of apology laws have the same impact on claim frequencies and claim severity. Therefore, for the remainder of the paper, we are not going to differentiate between general and health-care only apology laws.

<sup>4</sup> In regressions not reported in the current paper, we find that political composition in the State Senate and State House has no significant explanatory power on the passage of apology laws.

<sup>5</sup> See for example the efforts of the Sorry Works Coalition.

commiseration, condolence, compassion, and admissions of mistakes, errors, and liability. In the legal literature, some studies divide apology laws into one of two categories: 1) full apology laws that protect against all types of apologies including those that contain statements of fault, mistakes, errors, and liability versus 2) partial apology laws that only protect against statements of sympathy, commiseration, condolence, and compassion.<sup>6</sup> An *F*-test fails to reject the null hypotheses that full and partial apology laws have the same impact on frequency of claims and total compensation payout; therefore, in our analysis, we will not differentiate between full and partial apology laws.

### 3. Theory

One reason to formally model the role of apologies in medical malpractice is to clarify the implicit assumptions inherent to the implemented policy. We develop the model in two stages. We begin by providing a simple symmetric information model designed to illustrate the intentions of the apology law proponents. In the simplistic model, we assume that the apology laws do not devalue patients' perception of apologies and level of physicians' efforts remains constant regardless passing of the laws. In such a world, the apology laws increase the likelihood that a doctor apologizes, hasten settlement speeds, reduce total court costs and unambiguously improve welfare. In the appendix, we then demonstrate that introducing asymmetric information would give us ambiguous prediction of welfare improvement. For example, if physicians' efforts are unobserved, the laws could lead to increased moral hazard in quality of care. Similarly, the law could devalue apologies and reduce welfare.

The model is essentially a principal-agent game of asymmetric information followed by a bargaining game to determine the settlement payment in case of litigation. The principal (patient) engages

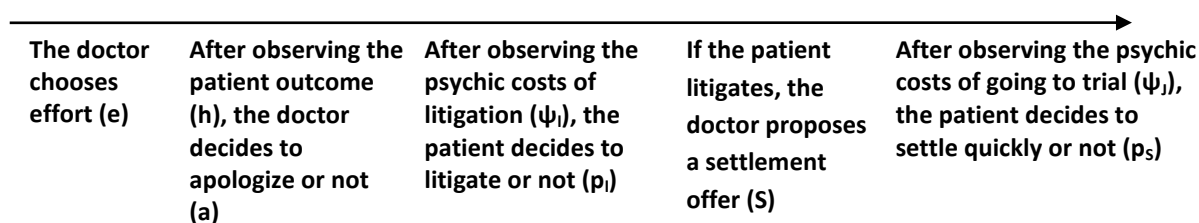
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<sup>6</sup> The divisions between full and partial apology laws are arguably poorly defined. A paper by McDonnell and Guenther (2008) reports eight States as having full apology laws, whereas an article by Morse (2009) reports only five States as having full apology laws.

the agent (doctor) for medical services. If the patient decided to litigate after observing his health outcome, then the doctor makes an offer which the patient can decide to accept (settle) or reject.

The key novelty in this model is that the patient care about the doctor's intention in addition to monetary payoffs. If as is standard, plaintiff and defendant care only about monetary payoffs, (Spier, 1992; Daughety & Reinganum, 1993, 2000; Farber & White, 1994; Spier, 2005), doctors would never apologize because patients would just use the apology as evidence to obtain a higher malpractice payment.

Let there be two players: a patient/plaintiff (P) and a doctor/defendant (D) who play a game of healthcare provision, apology, and litigation with the following timeline:



The game we analyze is a principal agent of medical service provision followed by a bargaining game where we explore the dynamics of pre-trial negotiations.

The patient's health outcome,  $h(e, \varepsilon)$ ,<sup>7</sup> depends on the doctor's effort,  $e$ , which can be thought of as whether the doctor adhered to the standard of care, ( $e = \bar{e}$ ), but also depends on the patient's circumstances, which are represented by a noise term,  $\varepsilon \sim F(\varepsilon)$ , and are unobserved by the doctor when deciding effort. We will assume for now that because the doctor's actions are perfectly observed, he always adheres to the standard of care ( $e = \bar{e}$ ), but later when we allow for private information, we will

<sup>7</sup> Higher  $h$  indicates better health. It is increasing with  $e$ , the doctor's effort. See for example, Gaynor and Gertler (1993).



consider what happens if the doctor's efforts depend on the incentives created by the threat of malpractice payments. After observing health outcomes, the doctor decides whether to apologize ( $a = 1$ ) or not apologize ( $a = 0$ ).<sup>8</sup>

The cost of an apology for the doctor is that the apology can be used as evidence against him/her in court. If litigation occurs, since the court cannot observe the doctor's effort, we assume that the expected judgment,  $J(h, a)$ ,<sup>9</sup> is exogenously decreasing with better health outcomes and exogenously increasing with the doctor's apology (Sloan & Hsieh, 1990) since the apology can be used as evidence (Rehm & Beatty, 1996). We also consider the implications of endogenizing the judgment size in the next section.

The benefit of an apology to the doctor is that it increases the psychic cost of litigation. Numerous case studies suggest that anger is a main motivator for litigation and can overcome the patient's aversion to litigate (Hickson et al., 1992; May & Stengal, 1990; Vincent et al., 1994). Studies also find that apologies reduce patient anger, increase communication, and reduce the patient's motivation to litigate (Liebman & Hyman, 2004, 2005; Ohbuchi, Kameda, & Agarie, 1989; Sloan & Hsieh, 1995). We capture these psychological factors by saying there is a psychic disutility of initiating litigation,  $\psi_L(a)$ , and a psychic disutility for going to trial,  $\psi_J(a)$ . Both disutilities would increase if the doctor apologizes. These psychic costs are modeled as random valued functions of whether a doctor apologizes where  $\psi_i(1)$  first order stochastically dominates  $\psi_i(0)$  for  $i \in \{L, J\}$ . Let  $\bar{\psi}_L$  and  $\bar{\psi}_J$  be constants for the additional psychic cost of litigating/seeking judgment against a doctor who apologized. Assume the psychic disutility follows a uniform distribution such that  $\psi_i(a) \sim U(0, 1) + \bar{\psi}_i a$  where  $a = 1$  if an apology was tendered,

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<sup>8</sup>In this model, even though doctors adhere to the standard care procedure, since the court cannot observe the level of care, they might still want to apologize if apology helps reduce the probability of litigation. Patients could still sue the doctors as long as the utility from litigation is higher than the disutility from litigation.

<sup>9</sup>This is the amount that the patient receives and the doctor is required to pay after accounting for the probability that the patient wins.

$a = 0$  otherwise for  $i \in \{L, J\}$ .<sup>10</sup> In the next section, we consider the effect of endogenizing the assumption that apologies increase the psychic disutility of litigation by assuming that apologies serve as signals.

Let  $p_a$  be the probability the doctor decides to apologize, which will depend on the health outcome. After the doctor apologizes (or not), the patient observes the realization of his psychic disutility of litigating ( $\psi_L$ ). It is now the patient's turn to decide whether to litigate or not. Let  $p_L$  be the probability the patient litigates. If the patient litigates, the doctor will offer a settlement  $S$  as a take-it or leave-it offer. Let  $p_s$  be the probability the patient accepts the settlement offer. If the patient does not accept the offer, the patient incurs legal costs  $c_P$  and the doctor incurs legal cost  $c_D$  and damages are awarded according to an exogenous function,  $J(h, a)$ .

To summarize, the patient's utility depends on the patient's health plus expected malpractice payments net of litigation and psychic costs, while the doctor's utility depends on the doctor's cost of effort minus expected malpractice payments and the economic costs of litigation:

$$\begin{aligned} U_P(p_L, p_S) &= h(e, \varepsilon) + \Pi_P(p_L, p_S) \\ U_D(e, a) &= -e - \Pi_D(a). \end{aligned} \quad (1)$$

Where the malpractice payments net of costs  $\Pi_P$  and  $\Pi_D$  are given by:

$$\begin{aligned} \Pi_P(p_L, p_S) &= p_L \left[ p_S S + (1-p_S) \left( J(h, a) - c_P - \psi_J(a) \right) - \psi_L(a) \right] \\ \Pi_D(h, a) &= p_L \left[ p_S S + (1-p_S) \left( J(h, a) + c_D \right) \right]. \end{aligned} \quad (2)$$

We consider pure strategy sub-game perfect Nash Equilibrium. Solving by backward induction yields the following results:

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<sup>10</sup> All we really need is that these are random valued functions of whether a doctor apologizes where  $\psi_i(1)$  first order stochastically dominates  $\psi_i(0)$  for  $i \in \{L, J\}$ . However a uniform distribution will make calculations more convenient.

**Proposition 1:** *In the symmetric information pure strategy Nash equilibrium with interior solution, when a doctor apologizes:*

- a. *Probability of settlement  $p_s$  increases*
- b. *Probability of initiating litigation  $p_L$  may increase or decrease*
  - i. *An increase is more likely when the value of apology as evidence is higher  $J(h, 1) - J(h, 0)$  or when the total cost of seeking court judgment  $c_P + c_D + \frac{\bar{\psi}_J}{2}$  is higher.*
  - ii. *A decrease is more likely when the psychic cost of litigating a doctor who apologizes  $\bar{\psi}_L$  is higher*

Proof in the Appendix.

A rational doctor would only apologize if it maximized her utility. Since we assume the doctor has only pecuniary motives, doctors who apologize have lower expected malpractice payments. Similarly, since apologizing makes it more costly for patients to litigate and to seek judgment apologies increase the likelihood of settlement and decrease the likelihood that a patient initiates litigation. What may be unexpected is that an apology is more likely to increase the likelihood of litigation when the costs of seeking a court judgment are higher. This result is due to the fact that one cost that deters patients from initiating litigation is the possibility of suffering costly court costs. Since an apology makes settlement outside of court more likely, it also makes it easier for the patient to litigate.

### ***Introducing Apology Laws***

Now suppose that the legislature passes a law excluding apologies as evidence in court. Assume that the law has no effect on how apologies affect psychic costs and that the only effect of an apology is to reduce judgments such that the new expected judgment function,  $\hat{J}$ , treats all cases as if no apology was ever tendered:  $\hat{J}(h, 1) = \hat{J}(h, 0) = J(h, 0)$ . This section considers the symmetric information case to

demonstrate how the law was intended to function, but we will demonstrate how asymmetric information assumptions that endogenize the effects of apologies and the size of judgments change these results in the next section.

**Proposition 2:** *In the symmetric information pure strategy Nash Equilibrium with interior solution, after the introduction of an apology law:*

- a. *Apologies  $p_a$  are more frequent*
- b. *The probability of litigation  $p_L$  decreases.*
- c. *The probability of settlement  $p_S$  increases.*
- d. *For any particular case, the settlement offers  $S^*$  decrease*
- e. *For any particular case, net expected malpractice payments  $\Pi_D$  and  $\Pi_P$  decrease*
- f. *Excluding psychic costs, social welfare increases*

Proof in the Appendix.

The law eliminates the primary cost the doctor faces from an apology.<sup>11</sup> Thus in a symmetric information world, the law has exactly its intended effects. Doctors apologize more often. Less litigation is pursued. The litigation that does occur is more likely to settle, and when it does settle, payments are smaller. Since the law reduces the number of cases that go to court, the dead weight loss of court costs are reduced, so excluding psychic costs, social welfare increases.

A key variable we will consider in the empirical analysis is the time to settlement. We think of  $p_S$  as the probability of settling early, rather than prolonging pre-trial negotiations and incurring costs  $c_P$ ,  $c_D$ ,  $\psi_J$  from a long negotiation process. Thus we will interpret the model as predicting that apology laws should increase the speed of settlement.

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<sup>11</sup> The only cost that remains is that an apology makes settlements more likely making it easier for patients to initiate litigation since they know court costs are now less likely to be incurred.

Propositions 1 and 2 depend on the linearity assumptions and the uniform distributions of psychic costs, however, qualitatively similar results can be obtained using more general functional forms so long as we assume symmetric information.

### ***Introducing Private Information***

While the above results are consistent with the intentions of the law, the analysis presumes that there is no private information between players. Much of the past theoretical literature on malpractice litigation has focused on asymmetric information, and thus, introducing private information is important for increasing the validity of the model. Unfortunately, private information also makes the model's predictions indeterminate. The impacts of private information are considered in more detail in the Appendix.

**Moral hazard and the provision of care:** The current model has no moral hazard since doctor effort is symmetrically observed. However, if effort were unobserved, reducing the consequences of poor performance could reduce quality of care (Polinsky and Rubinfeld, 1988).

**Disclosure of health outcomes:** If patients are imperfectly informed about whether a mistake was made, laws that encourage doctors to disclose more information that could induce patient to litigate more.

**Signaling and the value of an apology:** The above model assumes an exogenous value of an apology. If instead, an apology provides information about a doctor's type, and the psychic cost of litigating is the probability of suing a good doctor, rather than a negligent one, then apology laws could reduce the signaling value of apologies, and thus increase litigation.

**Effects on bargaining and settlement:** A substantial literature considers the effect of asymmetric information on pre-trial bargaining (Bebchuk, 1984; Daughety & Reinganum, 1994; Spier, 1994; Shavell, 1989; Spier, 2004) and the effect of over-optimism (Priest and Klein, 1984; Waldfogel, 1995; Babcock et al. 1995, 1997; Watanabe, 2004). Both literatures predict that increased information disclosure should

lead to faster settlements. Unlike the other effects of private information, this literature tends to conform to the laws intentions.

**Private information and judicial decision making:** The law presumes that less evidence against doctors means more judgments in favor of doctors. However, if a rational risk neutral judge knows that the same level of malpractice is occurring, then the judges should on average award the same level of damages.

### ***Summary***

We are not aware of any comprehensive dataset of malpractices cases that includes information about apologies. Thus we will focus on the theory's predictions regarding the probability of litigation, the probability of settlement and the size of claim payout. We would like to conduct our analysis on the total number of malpractice claims ever filed (including both open and closed claims) in order to examine the probability of settlement and claim payout. Unfortunately, to our knowledge, comprehensive public data on all open claims that have yet to be resolved also does not exist. This presents some challenges which will be addressed in the next section.

## **4. Data**

To assess the impact of these various types of apology laws, we use data drawn from the National Practitioner Data Bank's (NPDB) Public Use Database (2009). Due to the Federal Health Care Quality Improvement Act (HCQIA), all malpractice payments—either as part of a settlement or as part of a court judgment—made by or on behalf of a licensed health care provider must be reported within 30 days. The NPDB contains the universe of all malpractice cases with non-zero payments and it provides additional information about each claim beyond payment size. For each claim, there is information regarding the

year the incident occurred<sup>12</sup>, the nature of the allegation (e.g., diagnosis related, anesthesia related, surgery related, etc.), the outcome of the incident (e.g., emotional injury, minor temporary injury, major permanent injury, death, etc.),<sup>13</sup> the practitioner's graduation year and age group, the practitioner's work and licensing state, and whether the payment was for a judgment or a settlement. This dataset has been widely used in many studies related to medical malpractice (see Baicker & Chandra, 2005; Chandra, Nundy & Seabury, 2005; Durrance, 2009; Matsa, 2007). We restrict our analysis to the reports in which adverse events occurred after 1991 due to the incomplete reporting in the earlier years. Table 3 provides summary statistics at the individual level. There are a total of 225,319 payment reports in our sample.<sup>14</sup>

[Insert Table 3 About Here]

In Figure 1 we present, by the year the event occurred, the number of resolved cases and the average number of years taken to resolve them.<sup>15</sup> Since the NPDB only receives information about an offense/omission when the payment is made, the dataset is truncated for offenses/omissions that occurred late in the dataset but have yet to be resolved. For example, as evident in Figure 1, fewer than 1,000 offenses that occurred in 2007 are included in our data since the rest of the cases have yet to be resolved.

[Insert Figure 1 About Here]

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<sup>12</sup> Since the finest date information we have about the case are years, we cannot use any finer definition of date (such as months, quarters) to look at the cases that took place right before the law passed and the cases that took place right after the law passed.

<sup>13</sup> The outcome variable only became mandatory for recording in 2004. The categories of injuries are reported by the entities that make payments to the patients.

<sup>14</sup> The NPDB dataset is not free of problems. It has been criticized because of a "corporate shield" loophole, through which settlement payments made on behalf of a practitioner end up excising the practitioner's name from the settlement data in the NPDB. Chandra, Nundy, and Seabury (2005) compare data from the NPDB with other sources of malpractice information and while they find approximately 20% underreporting, they find that underreporting is not systematically different across States. Therefore, for our analysis, which is extracting information at the State level, there is no obvious reason why the corporate shield loophole would bias the effects of the apology legislation. It is also important to note that the NPDB dataset has been used for most recent influential studies of medical malpractice reform (Currie & MacLeod, 2008)

<sup>15</sup> Figure 1 includes both those cases settled out of court and those cases resolved in court.

Using individual level data allows us to compare the characteristics of cases that take place right before the law and right after the laws. However, it does not provide insights on whether the laws reduce total claims or total malpractice compensation payouts. Therefore, the NPDB was used to generate an aggregate dataset where an observation is at the State-year level. At the aggregate level, several predictions that follow from the model relates to the rate of litigation and the rate of settlement;; however, this dataset does not contain information on open claims and closed claims without payouts and so these rates cannot be computed. Instead, we, consider two other measures at the State level. The first is the number of payouts made by practitioners working in a given State for offenses committed in a given a year.<sup>16</sup> The second is the value of malpractice payments made by medical practitioners in a given State for offenses committed in a given year.<sup>17</sup> Table 4 presents summary statistics for this dataset. With 51 States (including the District of Columbia) reporting over a 17 year period (1991-2007), there are 867 observations in the State-level dataset.<sup>18</sup> In 2000, the median number of incidents per State was 184 incidents and the median total value of payments was \$35.7 million. Note that the average time to resolution was 3.86 years with a standard deviation of 2.15. Longer resolution times are associated with cases that involve more severe injuries. In Figure 2 we present a histogram of time to resolution for cases that occurred in 1992 so that we can be reasonably certain that this represents a fairly complete distribution of cases.

[Insert Table 4 About Here]

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<sup>16</sup> Another way to construct the State-level dataset is by the total number of settlements made in a given year. Our goal is to analyze the impact of apology laws, which intend to encourage practitioners to apologize and communicate more openly with their patients. The impact on the settlement is hinged upon the apology. While the model in Section 2 cannot distinguish the timing of the apology, the apology is likely to be most effective soon after the incident occurs, not a few years later. Therefore, we aggregate it by the year of incident instead of the year of settlement.

<sup>17</sup> We adjust the settlement by CPI. Therefore, all payments are in Y2000 dollars.

<sup>18</sup> We have excluded all cases that occurred in 2008 since only less than 100 cases which occurred in 2008 had been settled by 2009.



[Insert Figure 2 About Here]

## 5. Empirical Specification and Results

The effect of apology laws on medical malpractice outcomes is estimated using a difference-in-difference method. The validity of this specification rests on the assumption that the states that have passed apology laws would have otherwise followed the same trend as those States that have not passed apology laws. Therefore, we perform various checks to examine the validity of this assumption. Another crucial assumption that merits attention is that the passage of apology laws is not correlated with any other event that would affect medical litigation—an obvious possibility being the passage of other tort reform or malpractice laws. To ensure that a correlation with other malpractice laws does not drive our results, we include controls for other tort reforms as studied by Currie and MacLeod (2009) in each of our specifications.<sup>19</sup> Furthermore, in each specification, we cluster standard errors by State to avoid problems of serial correlation (Bertrand, Duflo, & Mullainathan, 2004).

### *State-Level Analysis*

There are two main outcome variables. The first variable is the number of already-resolved malpractice cases for incidents that occurred in year  $t$  and State  $s$ , while the second variable is the value of the total payments made in State  $s$  for incidents that occurred in year  $t$ . We aggregate the data by the year the incident occurred, not the year the incident settled because our assumption is that apologies would be most effective when expressed soon after the incident. For example, if a malpractice case took place in 2000 and the law was passed in 2004, and the physician issues an apology only after the law passes, this

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<sup>19</sup> The other law measures for which we have controlled the timing in our study include the existence of noneconomic cap, punitive cap, laws on full information disclosure, joint and several liabilities, and collateral source rule. The information on the existence of the laws (excluding information disclosure laws) is from the annual produced by the American Tort Reform Association. The information on the disclosure laws is from Gibson and Del Vacchio (2006).

apology is not going to be as effective in reducing the patient's intention to litigate as apology that is issued in 2000. Essentially, we assume that the law has very limited impact on the malpractice cases that occurred before the law is passed. If cases that occurred before the law being passed are also affected by the apology law, our estimate would be an underestimate of the true impact.<sup>20</sup>

We first employ OLS to estimate the following:

$$\log Y_{st} = \lambda controls_{st} + \beta apology_{st} + \sum_t \delta_t Year_t + \sum_s \delta_s State_s + \varepsilon_{st},$$

where  $Y_{st}$  is the outcome variables and  $apology$  is a dummy variable which is one if an apology law was in effect in State  $s$  during year  $t$  and otherwise is zero. Our main coefficient of interest is  $\beta$ , which represents the percentage change in the number of closed claims with positive payout due to the adoption of the apology law.

Before examining the regression results, we first illustrate how the fact that our dataset only consists of closed claims with positive payouts affects our findings. If the laws work as intended, such that they increase doctors apologies and decrease patient anger then we would expect:

- 1a. Cases are now settled faster ( $p_S$  increases)
- 1b. Some cases that would have been litigated before the law are dropped ( $p_L$  decreases).

If on the other hand, the unintended consequences of the laws dominate (due to devalued apologies, increased patient information, increased moral hazard, changes in judicial standards, etc.), then we would expect:

2. More cases are now litigated ( $p_L$  increases)

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<sup>20</sup> Legally, it is unclear whether apology laws would apply to cases that have occurred before the law passed.

If we had an ideal dataset, with the assumption that total number of medical procedure ( $N$ ) performed are unchanged, we would be able to investigate the probability of litigation,  $p_L$ , by examining total number of cases filed and the settlement rate,  $p_S$ , separately. Instead, in the short run, the number of closed cases is equal to  $N * p_L * p_S$ —for example, as of 2009, for States that passed a law in 2006, we only see the effects on cases that settled in under three years. However, given sufficient time, once all open claims have been closed, the number of closed claims from a given year would be equal to the number of claims filed, so closed claims would equal  $N * p_L$ . We will take advantage of the fact that these predictions should have different effects in the short run and the long run, and on minor injury cases and major injury cases to disentangle the results.

With the dataset we currently have, Scenario 2 would lead to an increase in the frequency of closed claims with positive payout. For cases that take place in a given year, Scenario 1a would lead to an increase in the frequency of closed claims in the short run, but the total number of closed claims would be unchanged in the long run. Scenario 1b would indicate an overall change of composition of cases and a decrease in the frequency of closed claims with positive payout. If both Scenarios 1a and 1b take places, the short-run prediction is ambiguous since the two have opposite effects. But in the long run, after the cases have taken place and have had the chance to settle, we would find a drop in the frequency of cases with payout.

The results are presented in Table 5. Columns 1 and 4 are presented without controls, columns 2 and 5 add a full set of social policy changes (the existence of a noneconomic cap, a punitive cap, joint and several liabilities and collateral source rule, and a law on full information disclosure), while columns 3 and 6 include a set of time-varying State demographics including the number of physicians in the State, racial compositions, population, and percentage of population that are 65 or above. The results show a

consistent 14–15% increase in closed claim frequency with positive payouts.<sup>21</sup> The results for the total compensation payout also show an increase of 20–27%. The fact that the percent increase shown in columns 4-6 is larger than those in columns 1-3, suggests that the payment per case increases after the law is enacted. The same analysis has also been performed on settlements excluding all cases that went to trial and the results are similar.

Recall that this increase could be explained by either Scenarios 1a or 2. Therefore, in Tables 6 and 7 we will present more evidence that the results are driven by Scenario 1a—cases are settling faster after the laws are passed. .

[Insert Table 5 About Here]

If these results are due to the fact that cases are settling faster, as in Scenario 1a, we should expect the upward bias on the effect of the laws to be more pronounced in States where the law was only recently passed (e.g. after 2007). For States where the law was passed less recently—since more years have elapsed and more cases have been resolved—the estimated coefficients should be a better reflection of the long run impact of the apology laws. Therefore, in Table 6 we restrict our sample to the four States that passed an apology law before 2002 and those States that have never passed an apology law. For each column, the dependent variable is the natural log of the number of closed cases that occurred before that year. Column 1 considers only the number of cases that occurred before 2002 and thus gives us an estimate of the apology laws’ net effect after 7 years have elapsed. Column 2 considers the effect on all cases that occurred before 2003, thereby giving an estimate of the apology laws’ net effect after 6 years have elapsed. Similarly, column 8 considers the effect on cases before 2008 and thus gives us a sense of the apology laws’ net effect on current cases. One notable trend from this table is that these coefficients

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<sup>21</sup> The coefficient in Column 3 is at the borderline of 10% level of significance. The magnitude of coefficient does not change from Column 1 or Column 2, but rather the standard errors have gone up.

increase from left to right and become more statistically significant. It indicates that the positive coefficients in Table 5 Columns 1 to 3 are driven by the cases that occur in more recent years. If it were due to Scenario 2 (more people are litigating), it would be difficult to explain this increasing trend. Table 6 suggests that the apology laws' net effect is zero (or possibly negative) in the long run.<sup>22</sup>

[Insert Table 6 About Here]

Table 7 considers the composition of cases in terms of the type of injury. The dependent variable is the log frequency of closed claims in each medical injury category (e.g., insignificant injury, “somewhat” significant injury, and major permanent injury/death).<sup>23</sup> Restricted by the sample of cases that occurred after 2002,<sup>24</sup> Table 7 shows that the overall increase in closed claims observed is due entirely to the closed claims for major/permanent injury and death. For insignificant injuries, which normally settle quickly enough to see the apology laws' full effect, we see a net reduction of 16.7–18.5% in the number of cases. Consider again the possible scenarios that could explain this result. Suppose that doctors are exerting less effort after the laws are implemented (Scenario 2), it is difficult to explain the pattern in Table 7. The results in Table 7 suggest that after passing the law, there is a short-term increase in the number of cases that normally take many years to resolve,<sup>25</sup> but an overall decrease in the number of cases involving the least significant injuries.

[Insert Table 7 About Here]

### ***Individual-Level Analysis***

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<sup>22</sup> One might think using the aforementioned logic, the dependent variable should be the cases that occurred in exactly 2002 in column 1, those that occurred in 2003 in column 3, etc. However, we would only have 21 observations in each regression and would not be able to capture any general State or year trends.

<sup>23</sup> There are nine categories of injuries in the NPDB, which we group into three categories for the ease of analysis and presentation (see Table 3 for subcategories).

<sup>24</sup> The severity of injuries is only available for cases reported after 2002. For a similar analysis grouped by the size of payment, see Table A2 in the Appendix.

<sup>25</sup> From this dataset we can observe that it is true that cases involving more severely injured patients usually take longer to resolve than insignificant injury cases.

Since we have data on the year in which the incident occurred and the year it was settled, hazard models provide a natural framework for modeling settlement probabilities (e.g., Hannan & McDowell, 1984). Let  $t$  be the time elapsed from the time of incident to the time of settlement,  $X_i(t)$  be a vector of relevant explanatory variables, and  $\beta$  be a vector of coefficients. Denoting the cumulative density function as  $F_i(t|X, \beta) = Prob(T \leq t|X, \beta)$  and the density function as  $f_i(t|X, \beta)$ , the hazard function which indicates the probability of settlement at period  $t$ , conditional upon no settlement by time  $\{t - 1\}$ , is defined as  $h_i(t|X, \beta) = f_i(t)/[1 - F_i(t)]$ .

The general form of the proportional hazard function is  $h(t|X(t), \beta) = h_0(t) \exp\{X'(t)\beta\}$  where  $h_0(t)$  is the baseline hazard. Since our regression result has indicated the hazard is time dependent, we use a Weibull baseline hazard specification:

$$h(t|X(t), \beta) = \delta_i t^{\delta_i - 1} \exp\{X'(t)\beta\}.$$

The hazard ratios from the aforementioned regressions are reported in Table 8. To interpret the coefficient, one needs to be cautious that the reported hazard ratios are conditional on resolution. Depending on which unintended consequence dominates, the theory is unclear as to how Scenario 2 would affect the hazard ratio as it would depend on the composition of the cases that are affected. Since our State level finds support the law decreases the amount of litigation (scenario 1b) for insignificant injuries (columns 1 to 3 of Table 7), we expect little or no change in the hazard rate for cases observed after passage of the law, since the hazard rate should not be affected by the dropped cases. This is confirmed in columns 1 to 3 of Table 8. For “somewhat significant injuries” the coefficients for the apology law in Table 7 columns 4 to 6 are all insignificant, suggesting that the two opposing forces in scenario 1a ( $p_S$  increasing) and Scenario 1b ( $p_L$  decreasing) cancel out, whereas, for major/permanent injuries columns 7 to 9, scenario 1a ( $p_S$  increasing) dominates Scenario 1b ( $p_L$  decreasing). Taken together this implies that when we examine the hazard ratio, we should expect the most significant injury

cases to show a higher effect of apology laws relative to those of the somewhat significant cases, which is what we find in Table 8. For a case involving a major/permanent injury, conditional on resolution, the probability it resolves in any given year is increased by 24–25% when the apology law is in effect.<sup>26</sup>

In Table 9 Panel A, we consider the impact the law has on the dollar value of malpractice payments using a difference-in-difference model. We find that after the law is adopted, payment amounts would be reduced by approximately \$17,000–27,000 for somewhat severe cases and \$55,000–73,000 for the most severe cases.<sup>27</sup> While, one might worry that the result could be driven by some outlier, therefore in Panel B, we present the result of regressions where the dependent variable is in log. We find positive effect for insignificant injury. Relating this to our earlier findings in Table 7 / Table 8, with the fact that scenario 1b ( $p_L$  decreases) dominates for insignificant cases, dropped cases would mean that the composition of cases that are filed could have changed due to the truncation. In other words, if all the case with potential judgment/settlement below certain cutoff would be dropped (due to the physician’s apology), then what we can observe are the cases with higher payouts. In “somewhat significant injuries”, again with the Scenario 1a and Scenario 1b cancels out the effect, we find statistically insignificant result. In “major injury”, where Scenario 1b is less dominant, we find that after the law is adopted, malpractice payouts decrease by about 14-17%.

[Insert Table 8 About Here]

[Insert Table 9 About Here]

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<sup>26</sup> We have also attempted a maximum likelihood estimate of the unconditional hazard ratio using a proportional hazards model that accounts for right truncation from Finkelstein, Moore, and Schoenfeld (1993). However, due in part to their model being weakly identified, the procedure largely does not converge.

<sup>27</sup> Regressing the same specification on different payment size quantiles finds that the law has the largest effects on the 3<sup>rd</sup> quantile and no effect on the 1<sup>st</sup> and 4<sup>th</sup> quantile. The lack of effect on 4<sup>th</sup> quantile payments could be due to the fact that apologies are likely to be less important in cases worth millions of dollars, or that the largest cases take many years to resolve and thus cases of this size have yet to be resolved in most States where apology laws have been passed.

Taken together, Tables 7, 8, and 9 suggest that apology laws are consistent with the symmetric information model presented above as well as the legislators' intent; the apology laws' combined effect is to increase apologies and decrease expected settlement time, and should in the long term speed up settlements and reduce the total number and value of malpractice payments. We see that the apology laws reduce the total number cases which tend to settled quickly and reduce the payment size while increasing the settlement speed of cases involving major injuries/death.

***Threat to Validity: Robustness Check***

It could be worrisome if the effect of the States is spurious to the structure of the data or the time period upon which we estimate the data. Therefore, we perform various robustness checks. First, we randomly assign half of the States as having adopted the law between 2000 and 2005 and estimate the same difference-in-difference regression. The results are presented in columns 1-3 of Table A1 in the Appendix. Moreover, for all the States that have adopted apology laws, we subtract three years from the year of adoption and perform the same analysis to capture any possible spurious effect attributable to properties of the States in question rather than to the laws themselves. The coefficients remain insignificant in columns 4 and 5. Lastly, as we intend to interpret the result as a causal interpretation, we need to check to see if the increase in settlements came after the adoption of the apology laws. Therefore, we include in our differences-in-differences specification a series of lead dummy variables, which specifies whether apology laws will be adopted in that State 1 year, 2 years, 3 years, 4 years, or 5 years into the future. We find that all coefficients on the lead dummies are not statistically different from zero, suggesting that the effects that we find do not predate the passing of the apology laws. Now, knowing that the results are robust and not due to spurious effect, we need to find the hypotheses that could explain the seemingly surprising results.



Given that both main outcomes of interest are non-negative, we can also reanalyze the main outcomes using a Poisson model which makes assumptions about the distribution. The results are presented in Table A3 of the Appendix. We still find that most of the increases in the number of cases are from the medical cases involving the most severely-injured patients and that there is little change in the frequency of the cases involving minor injuries.

We examine the sensitivity of our results with a number of alternative specifications. First, we omit in turn each of the 36 States and each of the available years, and the regressions yield similar results, suggesting that the results are not driven by a single outlier or a particular year. Furthermore, median regression and population weighted least squares yield similar positive significant results.

Our regressions above are analyzed based on the year the offense occurred because the apology laws largely apply only to apologies that were made for adverse events that occurred after the law was passed. Also, arguably apologies are most effective shortly after the adverse event occurred, so medical errors that occurred years before the law was passed should be unaffected. As a robustness check, we provide a difference-in-difference analysis in which the dependent variable is the natural log of settlements grouped by the year of settlement, and we find that laws have no impact on the on the incidents that occurred before the passing of the apology laws. The results are presented in Table A4 of the Appendix.

One of our theory's predictions is that the probability a settlement is reached should increase. It may seem natural to look at the ratio between settlements over judgments across States over time. However, given that only 3% of the cases in this dataset are judgments, and that cases that have gone to court usually take much longer to resolve and thus would not enter our dataset, this ratio cannot be meaningfully estimated.

## **6. Conclusion**

We have demonstrated both theoretically and empirically the effects of apology laws on medical malpractice lawsuits. We find that in the short run the law increases the number of resolved cases, while decreasing the average settlement payment for cases with more significant and permanent injuries. While having an insignificant impact on the settlement payments for cases involving minor injuries, the apology laws do reduce the total number of such cases. While the short term increase in malpractice settlements could be a surprise to policymakers and advocates of apology laws, we believe this is an artifact of data limitations. Our findings suggest that apology laws reduce the amount of time it takes to reach a settlement in what would normally be protracted lawsuits, leading to more resolved cases in the short run. In the long run, the evidence suggests there could be fewer cases overall.

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## Appendix

### *Proof of Proposition 1*

#### Part (a) and Part (b)

The patient decides to settle if the benefit of settling,  $S$ , is greater than the benefit of going to trial,  $J(h, a) - c_p - \psi_J(a)$ . The probability of settling is given by:

$$p_s = \Pr \left[ S > [J(h, a) - c_p - \psi_J(a)] \right] \quad (3)$$

The doctor proposes a settlement  $S$  to minimize her expected payment:

$$\text{Expected Payment} = E[p_s S + (1 - p_s)(J(h, a) + c_D)] \quad (4)$$

Minimizing the doctor's malpractice costs from Equation (2) using the probability of settlement given by Equation (3) yields the optimal settlement offer:

$$S^* = J(h, a) - \frac{c_p + \bar{\psi}_J a - c_D}{2} \quad (5)$$

Doctors offer a higher settlement when their costs of going to court are higher and a lower settlement when the costs the patient faces are higher. The optimal settlement probability by the patient shows that the patient is more likely to settle as the costs of going to court go up:

$$p_s^* = \frac{c_p + \bar{\psi}_J a + c_D}{2} \quad (6)$$

The patient's probability of litigating,  $p_L$ , is then given by the probability that the expected malpractice payment is greater than the psychic cost of litigating:

$$p_L^* = \Pr \left[ E \left[ p_s^* S^* + (1 - p_s^*) (J(h, a) - c_p - \psi_J(a)) \right] > \psi_L(a) \right] \quad (7)$$

Using the assumption that psychic costs follow a uniform distribution and that we have an interior solution, we can reduce this probability to

$$p_L^* = [J(h, a) - c_p + p_s^{*2}] - \bar{\psi}_L a \quad (8)$$

Again,  $\bar{\psi}_L a$  is the additional psychic cost for the patient to sue if the physician apologizes. Consistent with the empirical evidence (Sloan and Hsieh, 1995), the probability of litigation given in Equation (8) is increasing with more serious health outcomes, decreasing in the costs of going to trial, but increasing in the probability an early settlement is reached.

Combining these results allows us to write the closed form solution for the expected malpractice payments net of costs for patient and doctor:

$$\begin{aligned} \text{Net Gain for Patient: } \Pi_P(h, a) &= p_L^* [J(h, a) - c_p + p_s^{*2}] \\ \text{Net Cost for Doctor: } \Pi_D(h, a) &= p_L^* [J(h, a) + c_D - p_s^{*2}] \end{aligned} \quad (9)$$

Finally, consider the doctor's incentives to apologize. The doctor will apologize for all health outcomes where  $\Pi_D(h, 1) < \Pi_D(h, 0)$ :<sup>28</sup>

$$p_a = \Pr[h \in \{h: \Pi_D(h, 1) < \Pi_D(h, 0)\}] \quad (10)$$

From Equation (6) we can calculate the difference in settlement probabilities after an apology to see that settlements increase in the event of an apology:

$$p_s^*|_{a=1} - p_s^*|_{a=0} = \frac{\bar{\psi}_J}{2} \quad (11)$$

However, the effect of an apology on the likelihood of initiating litigation depends on the relative effect of the apology on the psychic costs which makes litigation less attractive, with the effect of the apology on settlement probabilities and judgment payments which makes litigation more attractive. From Equation (8) the effect of an apology on probability to litigate is given by

$$p_L^*|_{a=1} - p_L^*|_{a=0} = J(h, 1) - J(h, 0) + \left(\frac{\bar{\psi}_J}{2}\right) \left(c_P + c_D + \frac{\bar{\psi}_J}{2}\right) - \bar{\psi}_L \quad (12)$$

The effect of an apology on the probability to litigate is increasing in the effect on judgment sizes— $J(h, 1) - J(h, 0)$ —and decreasing in the psychic costs an apology imposes,  $\bar{\psi}_L$ . Perhaps more interestingly, apologies make patients more likely to litigate when the costs of going to court (both actual and psychic) are higher due to the fact that one deterrent to litigation is the threat of having to pay high court costs, and apologies reduce the likelihood of going to court in the event of litigation.

## ***Proof of Proposition 2***

### **Part (a)**

We can see from Equation (6) that the apology law reduces the expected payment in case of an apology,  $\Pi_D(h, 1)$ , but has no effect on expected payments when no apology is made,  $\Pi_D(h, 0)$ , so the set of health outcomes where the doctor would apologize,  $\{h: \Pi_D(h, 1) < \Pi_D(h, 0)\}$ , must be larger than before the laws are passed.

### **Part (b)**

From equation (8), a patient decides to initiate litigation if the expected benefit from litigation outweighs the costs of litigation. Apology laws reduce judgment sizes which decreases the benefits of litigation; and thus, the probability that the patient litigates decreases.

### **Part (c)**

From the probability of settlement given in Equation (6), the likelihood of settlement is always higher in the event of an apology. Since apologies are more frequent, we expect more settlements.

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<sup>28</sup> Note that once the health outcome is realized, doctors will apologize deterministically.  $p_a$  therefore represents the ex ante probability that the doctor will apologize. We include this expression for ex ante probability of apology since it will be useful for discussing moral hazard and welfare in the next section



**Part (d)**

It can be seen from Equation (5) that settlements are smaller in the event of an apology (which are now more common) and smaller still after a law reduces  $J(h, 1)$ .

**Part (e)**

Since the laws increase settlement, reduce probability of litigation, reduce judgment sizes and reduce settlement sizes, then we see from Equation (2) that malpractice payments net of costs made by the doctor must also go down.

**Part (f)**

Given symmetric information and risk neutral parties, the welfare implication of the law is unambiguous: since we assume that doctor effort is unaffected, the only effect of litigation is a transfer from the defendant to the plaintiff that imposes a deadweight loss from the cost of litigation ( $c_P + c_D$ ). Thus the reduced likelihood of litigation and judgment means that the law increases welfare.

## ***Appendix 2: Private Information***

### **Moral Hazard in Provision of Care**

One typical place to introduce private information is to introduce moral hazard into the doctor's effort. The doctor knows whether she adhered to the standard of care (i.e., the doctor's effort), but the patient and the court cannot directly observe the doctor's standard of care. The primary consequence is that the welfare effects become ambiguous, because as noted by Polinsky and Rubinfeld (1988), malpractice litigation is an important deterrent to moral hazard. In the model, if we allow the doctor to choose her effort level, she would choose  $e$  such that the marginal cost of effort equals the marginal reduction in malpractice costs from greater effort:

$$1 = \frac{\partial [p_a \Pi_D(h, 1) + (1 - p_a) \Pi_D(h, 0)]}{\partial e} \quad (13)$$

The exact effect will depend on the shape of  $J(h, e)$  and  $h(e, \epsilon)$ , but it is easy to find examples where apology laws reduce doctor effort. This increase in moral hazard is echoed by Cohen (2002) who worries that the predicted decrease in lawsuits filed will have a detrimental impact on the natural process of remediation. Already, very few cases of medical malpractice come to trial (Huycke & Huycke, 1994). One could argue that since these lawsuits are essential for restorative justice and efficient monitoring, patient welfare would be enhanced if there were more lawsuits, not fewer.

### **Private Information and Disclosure of Health Outcomes**

Private information could also play a role, in a world in which patients are imperfectly informed about their own health and doctors have private information about the health outcomes. An apology could lead to the disclosure of health information that informs the patient about his chance of winning a lawsuit. Consider a model where patients do not observe  $h$  unless they litigate. If a doctor apologizes, the patient becomes fully informed (a model where patients and courts care about doctor effort rather than health outcomes would generate the same results). In such an environment, apology laws could increase the information disclosure to the patient and lead to more lawsuits. Consider a world where the effect of apologies on judgment payments  $J(h, 1) - J(h, 0)$  is very high. In such a world, there still may be no litigation if the court costs the patient faces are very high. Using the probability of litigation from

Equation (8) where uninformed patients decide to litigate based on the expectation of their own health, then the following probability of litigation could be zero.

$$p_L^*|_{a=0} = E[J(h, 0)|a = 0]J(h, 0) - c_p + p_s^{*2} + p_s^{*2} \quad (14)$$

In such a world, an apology law that allows doctors to apologize for some health outcomes, changes the set of health outcomes where doctors do not apologize. Therefore, the judgments associated with this new set of health outcomes  $E[J(h, 0)|a = 0]$  could make litigation more attractive to uninformed patients, inducing lawsuits that would not have occurred before the law was passed.

### Private information and the value of an apology

A third way private information could play a role is in the meaning of an apology. If the law leads to a potential devaluation of the apology, then it could have ambiguous effects on malpractice payments. Ho (2009) analyzes a more general model of apologies and shows that the impact of an apology is increasing in the cost of tendering it.<sup>29</sup> By reducing an apology's potential consequences, the apology laws make apologies less meaningful, thereby potentially increasing lawsuits and decreasing patient welfare. In our simple symmetric information model, apologies have a constant effect  $\psi_f^a$  and  $\psi_L^a$  on the patient's psychic costs. However, if we instead allow the psychic cost to vary based upon the patient's beliefs about the doctor's type, then the meaning of an apology can change. For example, let there be two types of doctors, a good type,  $\bar{\theta}$ , and a bad type,  $\underline{\theta}$ . Patients only want to litigate bad types, so that the expected psychic cost of litigation occurs when the patient litigates the good doctor and is thus equal to the probability the doctor was a good type, defined using Bayes' rule:

$$\begin{aligned} E[\psi_f^a] &= \Pr[\theta = \bar{\theta}|a = 1] = \frac{\Pr[a = 1|\theta = \bar{\theta}] \Pr[\bar{\theta}]}{\Pr[a = 1|\theta = \bar{\theta}] \Pr[\bar{\theta}] + \Pr[a = 1|\theta = \underline{\theta}] \Pr[\underline{\theta}]} \psi_f^a \\ &= \Pr[\theta = \bar{\theta}|a = 1] = \frac{\Pr[a = 1|\theta = \bar{\theta}] \Pr[\bar{\theta}]}{\Pr[a = 1|\theta = \bar{\theta}] \Pr[\bar{\theta}] + \Pr[a = 1|\theta = \underline{\theta}] \Pr[\underline{\theta}]} \end{aligned} \quad (15)$$

It is easy to find parameter values such that passage of the apology law makes doctors of both types always apologize. If that were the case, apologies would have no effect on patient beliefs ( $\Pr[\theta = \bar{\theta}|a = 1] = \Pr[\theta = \bar{\theta}]$ ) and thus apologies would become ineffective at discouraging litigation.

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<sup>29</sup> Ho (2009) also predicts when apologies would be most prevalent, and therefore, when one might expect the apology laws to have the greatest impact. For example, the theory predicts that apologies are more prevalent when the patient has greater uncertainty about the doctor's abilities. Thus one might look at specialties in which the doctor's effect on the outcome is more difficult to observe. The theory also suggests that apologies are more important when reputations are less well established, and thus, one would expect younger doctors to apologize more frequently. Also, the differential importance of reputation means that apologies potentially play a bigger role in specialties such as obstetrics/gynecology (OB/GYN), for which patients shop around more for their doctors, as opposed to specialties such as emergency medicine, for which circumstances typically dictate which doctor the patient sees. Apologies are more important in longer term relationships with repeated doctor-patient interaction. Thus, one would expect larger effects in oncology, which has a long course of treatment, than in anesthesiology, which has little doctor-patient interaction. The theory predicts that conditional on there being a mistake; competent doctors apologize more than incompetent doctors. One would expect that doctors with fewer prior offenses or State licensing actions are more likely to apologize than doctors with more prior offenses. Finally, the theory predicts that apologies are more effective when outcomes are less severe, thus apologies are more effective for emotional injuries or minor temporary injuries rather than cases of major permanent injury or death.

Such concerns are echoed on legal and ethical grounds by Taft (2002) who argues that apology laws reduce the moral weight of apologies. Consider the following scenario that illustrates this counterintuitive result. In the event of a medical error in a State in which there is no apology law, an apology could possibly satisfy the patient and removed his desire to litigate. But if an apology law were in effect, a lawyer might tell the patient that the doctor only apologized because she was protected by the apology law, thus prompting the patient to litigate anyway. Furthermore, in States where apology laws have made apologies easier to tender, the lack of an apology could become even more offensive to a patient since the doctor no longer has a potential lawsuit as an excuse for not apologizing.

### **Private information and settlement rates**

The impact on the likelihood of settlement and the time to settlement are also affected by private information. The impact on the likelihood of settlement is beyond the scope of the model presented as outcomes depend critically on the assumptions about the bargaining process (Bebchuk, 1984; Spier 1992). Settlement offers could both serve to screen or to signal (Daughety & Reinganum, 1994; Spier, 1994). These models tend to predict that more asymmetric information reduces the likelihood of settlement and increases bargaining time (Shavell, 1989; Spier, 2004) Similarly, models with over-optimism also predict that more information should lead to more agreement and therefore faster settlements (Priest and Klein, 1984; Waldfogel 1995; Babcock et al, 1995, 1997; Watanabe, 2004). If the law does increase information disclosure to the patient, then States which implement apology laws could be expected to experience more settlements and faster resolution of malpractice cases.<sup>30</sup>

Daughety & Reinganum (1995) consider the related question of whether settlement offers should be admissible in court. Similar to our findings here,

### **Private Information and Judicial Decision Makings**

In our model, we assume that an apology serves as evidence and more evidence leads to higher judgments awarded to the patient. However, models of litigation often assume the judge is an imperfectly informed player who wants to award a judgment according to the true state of the world. For example, perhaps the law states that the judgment awarded should be proportional to the amount of effort  $e$  the doctor putspout in below some prescribed standard of care,  $\bar{e}$ :

$$J = \arg \min_j E[J - (\bar{e} - e)]^2 \quad (16)$$

The judge then would use observables like health outcomes,  $h$ , and apologies,  $a$ , to update his beliefs about the doctor's effort, and choose to award a judgment based on his updated beliefs. In such a world, a law that prohibited the use of apologies as evidence would make the judge's beliefs less accurate. However, if the equilibrium distribution of effort levels is unchanged, average judgment sizes would be unaffected. Without access to apology information as evidence, the judge is less able to tell which cases involved high effort and which cases involved low effort, but he does know that on average, effort should be unchanged and thus would choose judgment awards accordingly. In such a world, the law would be largely ineffective in changing the judgment size.

### **Summary of Private Information Effects**

While the theory presented here offers some guidance on the effects to expect, the net effect of apology laws on whether they increase or decrease medical malpractice litigation and whether the laws increase or decreases malpractice settlements becomes an empirical question that this paper intends to resolve.

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<sup>30</sup> A decrease in bargaining time and an increase in settlements would reduce the uncertainties involved in litigation, which would cause risk-averse patients to litigate more frequently.

Table 1. State with Statutes Pertaining to Apology Law

<u>State</u>	<u>Year Law Passed</u>	<u>Full Versus Partial</u>	<u>Statutes</u>
Massachusetts	1986	Partial	ALM GL ch. 233, § 23D (1986)
Texas	1999	Partial	Tex Civ Prac & Rem Code Ann 18.061 (1999).
California	2000	Partial	Cal Evid Code 1160 (2000).
Florida	2001	Partial	Fla Stat Ann Ch 90.4026 (2004).
Washington	2002	Partial	Rev. Code Wash. §5.66.010(2002)
Tennessee	2003	Partial	Tenn. Evid. Rule §409.1
Colorado	2003	Full	Colo Rev Stat Sec 13-25-135 (2003)
Oregon	2003	Partial	Oreg Rev Stat Sec 677.082 (2003).
Maryland	2004	Partial	Md. COURTS AND JUDICIAL PROCEEDINGS Code Ann. § 10-920
North Carolina	2004	Partial	N.C. Gen. Stat. § 8C-1, Rule 413 (2004)
Ohio	2004	Partial	ORC Ann. 2317.43 (2006)
Oklahoma	2004	Partial	(63 Okl. St. § 1-1708.1H
Wyoming	2004	Partial	Wyo Stat. § 1-1-130
Connecticut	2005	Full	Conn. Gen. Stat. § 52-184d (2005)
Louisiana	2005	Partial	La. R.S. 13:3715.5 (2005)
Maine	2005	Partial	24 M.R.S. § 2907 (2005)
Missouri	2005	Partial	Mo.Rev.Stat §538.229 (2005)
New Hampshire	2005	Partial	N.H.Rev. Stat. Ann. § 507-E:4 (2005)
South Dakota	2005	Partial	S.D. Codified Laws § 19-12-14 (2005)
Virginia	2005	Partial	Va. Code Ann. §8.01-581.20:1 (2005)
Arizona	2005	Full	A.R.S. § 12-2605
Georgia	2005	Full	O.C.G.A. § 24-3-37.1
Illinois	2005	Partial	735 ILCS 5/8-1901 (2005)
Montana	2005	Partial	Mont. Code Anno., § 26-1-814 (2005)
West Virginia	2005	Partial	W. Va. Code § 55-7-11a (2005)
Delaware	2006	Partial	Delaware Del. Code Ann. Tit. 10, 4318 (2006)
Idaho	2006	Partial	Ida. ALS 204; 2006 Idaho Sess. Laws 204;
Indiana	2006	Partial	Ind. HEA 1112
Iowa	2006	Partial	Iowa HF 2716 (2006)
South Carolina	2006	Full	South Carolina Ch.1, Title19 Code of Laws 1976, 19-1-190 (2006)
Utah	2006	Partial	2006 Ut. SB 41
Vermont	2006	Partial	Vermont S 198 Sec. 1. 12 V.S.A. 1912 (2006)
Hawaii	2006	Partial	HRS section 626-1, Hawaii Rules of Evidence Rule 409.5
Nebraska	2007	Partial	Nebraska Neb. Laws L.B. 373 (2007)
North Dakota	2007	Partial	North Dakota ND H.B. 1333 (2007)
District of Columbia	2007	Partial	D.C. Code 16-2841 (2007)

Table 2. Examples of Tort Reform Timing

	<u>NE cap</u>	<u>PD cap</u>	<u>CSR</u>	<u>JSL</u>	<u>Disclosure</u>	<u>Apology</u>
Texas	2003	1987	-	1987	-	2000
Maryland	1986	-	-	-	-	2004
Idaho	1987	2003	1990	1987	-	2007
North Carolina	-	1996	-	-	-	2004
Nevada	2002	1989	-	2004	2003	-

Source: American Tort Reform Association (2009), Currie & MacLeod (2009)

Table 3. Summary Statistics--Individual Level

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*Individual Level*

Number of Observation		224,904	
Average Amount of Settlement		\$200,120	
(standard deviation)		(378,986)	
Average Years to Settlement		3.86	
(standard deviation)		(2.15)	
Practitioners' License Field (%)			
Physicians and Physician Intern		72.9	
Osteopathic and Osteopathic Intern		4.81	
Dentist and Dentist Intern		13.13	
Others (RN, Pharmacist, Chiropractor)		9.16	
Outcomes (Available If Reported After 2004) (%)			
Emotional Injury Only	}	<u>Insignificant</u>	2.09
Insignificant Injury			3.04
Minor Temporary Injury	}	<u>"Somewhat"</u>	14.89
Major Temporary Injury			9.36
Minor Permanent Injury	}	<u>Sign. injury</u>	13.77
Significant Permanent Injury			13.94
Major Permanent Injury	}	<u>Significant</u>	9.17
Quadriplegic			4.32
Death		<u>Injury</u>	27.68
Cannot be Determined			1.76
Payment Type (%)			
Settlement			90.28
Judgment			2.54
Unknown			7.18

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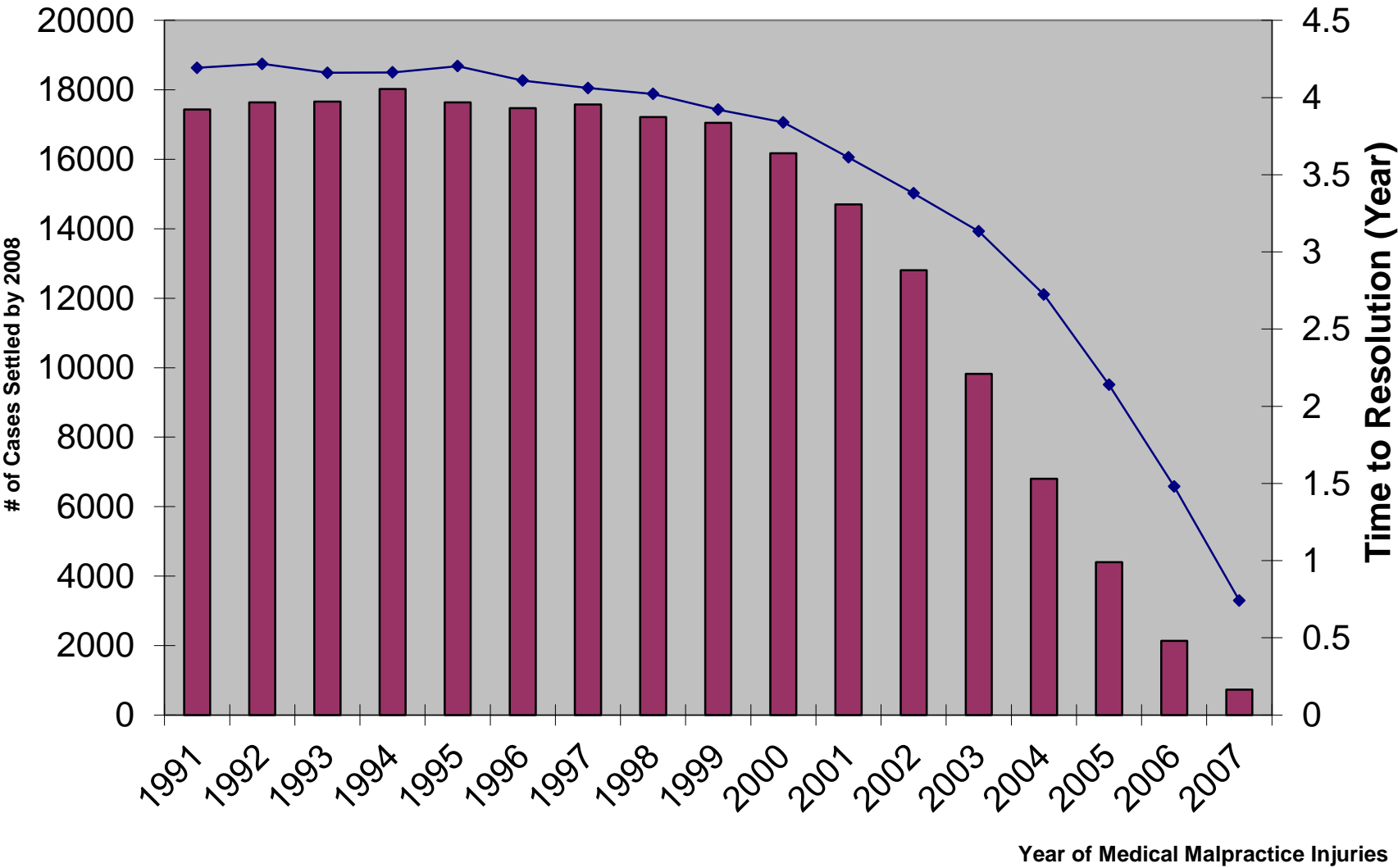
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Table 4. Summary Statistics--State Level

<i>State Level</i>	<u>Mean</u>	<u>SD</u>	<u>Median</u>
Incidents occurred in 2000	316.9	444.6	155.0
Payments in 2000	\$71,332,844	\$105,560,095	\$28,030,700
Physicians in 2000	13,892	16,724	8,581
Population in 2000	5,532,783	6,184,308	5,532,783
Noneconomic Damage Cap	51%	-	
Punitive Damage Cap	33%	-	
Collateral Source Rule	53%	-	
Joint & Several Liability	61%	-	
Law on Information Disclosure	12%	-	
Apology Law	63%	-	

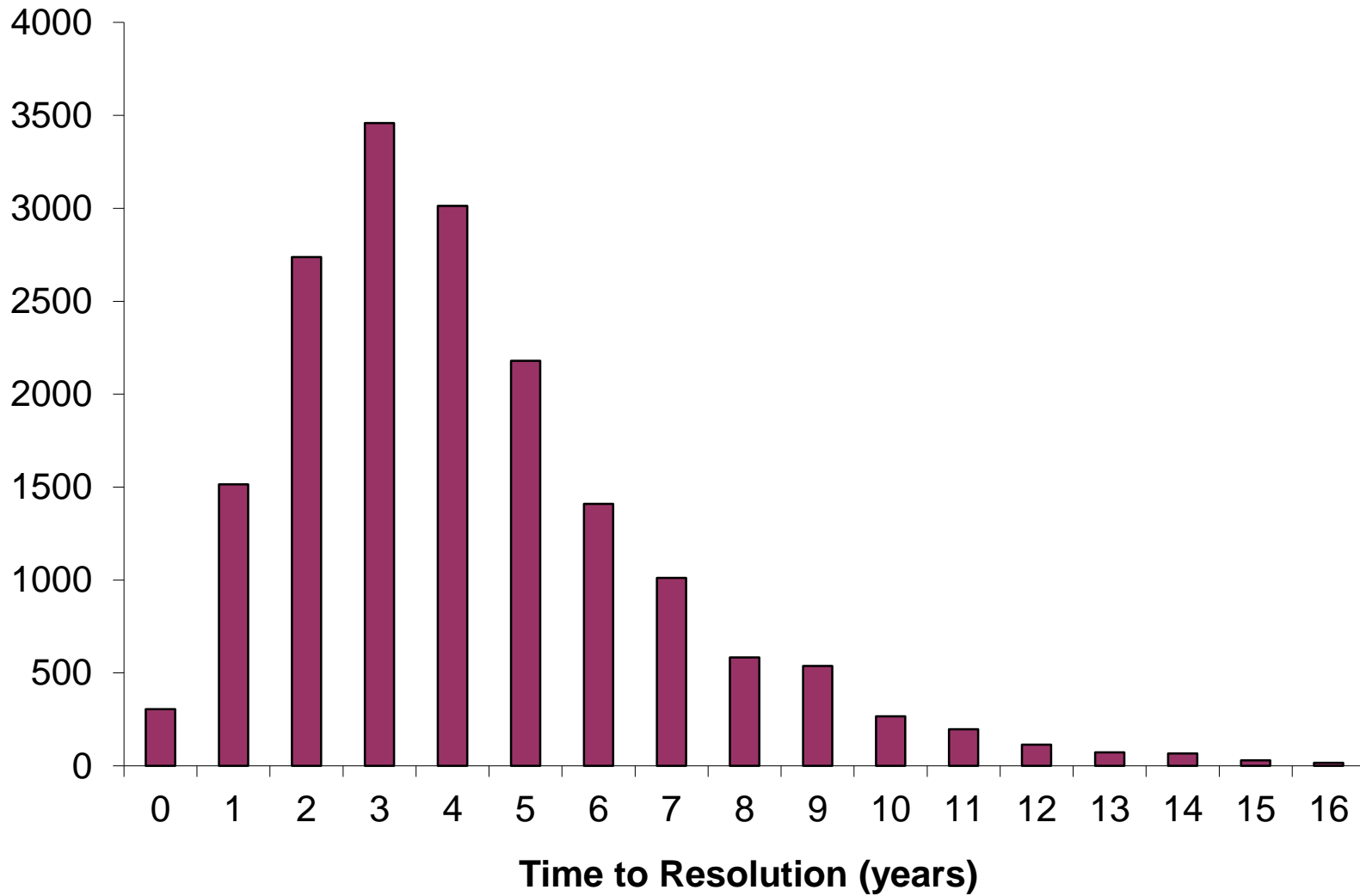
Note: All laws are tabulated in 2007.

Figure 1: Cases Settled By Year of Incidents





**Figure 2: Histogram of Claims By Time to Resolution**



**Figure 3: Histogram of Claims made in 1992 (Green) and Estimated Claims Had a Law Been Passed (Purple) By Time to Resolution**

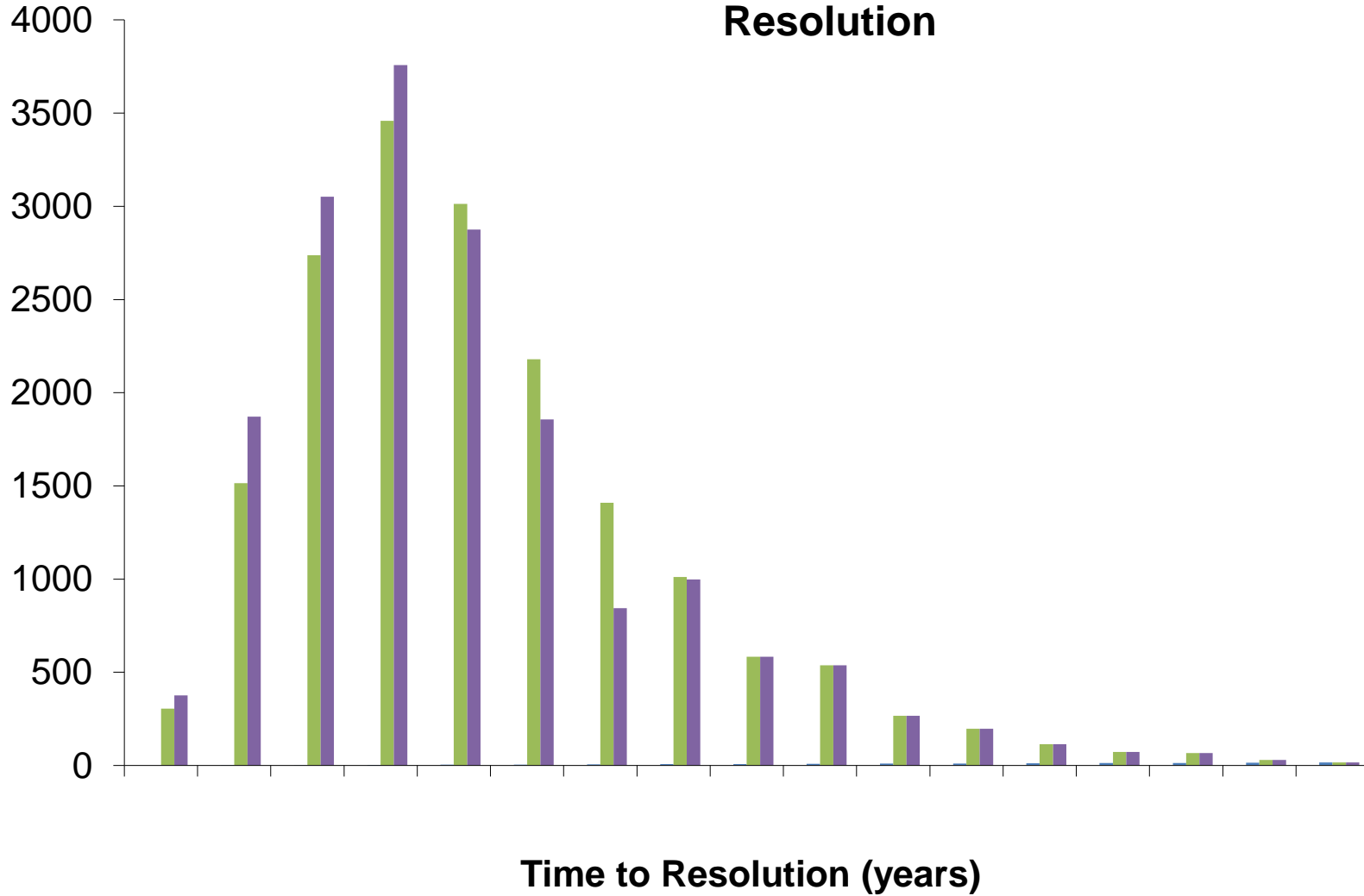


Table 5. The Impact of Apology Law on Medical Malpractice Settlements (% Change)

Dependant Variable	<i># of Cases</i>			<i>Value of Payments</i>		
	(1)	(2)	(3)	(1)	(2)	(3)
Apology Law Change	0.142 (0.086)	0.153 (0.083)*	0.147 (0.095)	0.279 (0.163)*	0.276 (0.163)*	0.202 (0.181)
Other Law Change <sup>a</sup>		X	X		X	X
Other Covariates <sup>b</sup>			X			X
State Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
N	867	867	867	867	867	867
R-squared	0.97	0.97	0.97	0.97	0.97	0.97

Note: Each column shows the results from a separate Diff-in-Diff regressions. Standard errors are clusteded at the state level. The dependent variables are either Log (Number of Cases) in a state-year or Log (Total amount of Settlement) in a state-year.

a. Other law change includes non-economic damage cap, punitive damage cap, law on medical malpractice disclosure, *csr\_tort* and *jsl\_tort*.

b. Covariates include population, % Black, % White, % of population that are 65 or above, and # of Physicians.

Table 6. Impact of Early Apology Law on Medical Malpractice

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>
Treat	0.001 (0.038)	0.044 (0.045)	0.082 (0.041)*	0.082 (0.045)*	0.130 (0.050)**	0.163 (0.061)**	0.236 (0.077)***	0.234 (0.086)**
Observations	210	231	252	273	294	315	336	357
R-squared	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.98

Note: Includes only states that passed apology laws prior to 2002 and states that have never passed an apology laws.

All regressions include state and year dummies and controlling for other tort reforms

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Robust standard errors in parentheses.

Table 7. The Impact of Apology Law on Medical Malpractice Cases by Severity of Outcomes (% Change)

	<i>Insignificant Injury</i>			<i>"Somewhat" Significant Injury</i>			<i>Major Permanent Injury/Death</i>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Apology Law Change	-0.167 (0.099)*	-0.182 (0.104)*	-0.194 (0.101)*	0.118 (0.124)	0.091 (0.124)	0.047 (0.121)	0.27 (0.129)**	0.265 (0.133)*	0.217 (0.141)
Other Law Change <sup>a</sup>		X	X		X	X		X	X
Other Covariates <sup>b</sup>			X			X			X
State Fixed Effects	X	X	X	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X	X
N	255	255	255	255	255	255	255	255	255
R-squared	0.91	0.91	0.92	0.93	0.93	0.93	0.93	0.93	0.94

Note: Each column shows the results from a separate Diff-in-Diff regressions. Standard errors are clustered at the state level. The dependent variables are Log (Number of Cases by severity of outcome) in a state-year

a. Other law change includes non-economic damage cap, punitive damage cap, law on medical malpractice disclosure, csr and jsl tort

b. Covariates include Population, % Black, % White, % of population that are 65 or above, and # of Physicians,

Table 8. The Impact of Apology Law on Prob of Resolution By Severity of the Outcome

	<i>Insignificant Injury</i>			<i>"Somewhat" Significant Injury</i>			<i>Major Permanent Injury/Death</i>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Apology Law Change	1.094 (0.103)	1.099 (0.102)	1.089 (0.097)	1.202 (0.126)*	1.209 (0.124)*	1.209 (0.129)*	1.255 (0.125)**	1.243 (0.130)**	1.252 (0.130)**
Other Law Change <sup>a</sup>		X	X		X	X		X	X
Other Covariates <sup>b</sup>			X			X			X
State Fixed Effects	X	X	X	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X	X
N	12864	12864	11242	23945	23945	22586	26437	26437	25153

Note: Numbers reported above are hazard ratios. Each column shows the results from a separate duration analysis with Weibull Specification. The dependent variable is time to settlement (year of settlement minus the year of incident). Errors are clustered at the state level

a. Other law change includes non-economic damage cap, punitive damage cap, csr\_tort, jsl\_tort & law on information disclosure

b. Other covariates include allegation nature, patient gender, settlement type, experience of physician

Table 9 Panel A The Impact of Apology Law on Payments By Severity of Outcome in Y2000 dollar

	<i>Insignificant Injury</i> Baseline Mean \$45,019			<i>"Somewhat" Significant Injury</i> Baseline Mean \$155,070			<i>Major Permanent Injury/Death</i> Baseline Mean \$342,869		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Apology Law Change	-431 (4,236)	632 (4,132)	3,132 (3,894)	-24,017 (13,432)*	-27,264 (13,564)**	-16,990 (9,538)*	-73,097 (17,334)***	-67,645 (21,188)***	-55,248 (18,022)***
Other Law Change <sup>a</sup>		X	X		X	X		X	X
Other Covariates <sup>b</sup>			X			X			X
State Fixed Effects	X	X	X	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X	X
N	13317	13317	11618	24156	24156	22780	26561	26561	25273

Panel B: The Impact of Apology Law on Payments By Severity of Outcome (Log Payment)

	<i>Insignificant Injury</i>			<i>"Somewhat" Significant Injury</i>			<i>Major Permanent Injury/Death</i>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Apology Law Change	0.096 (0.051)*	0.097 (0.053)*	0.140 (0.058)**	-0.083 (0.090)	-0.097 (0.085)	-0.080 (0.071)	-0.171 (0.075)**	-0.177 (0.074)**	-0.140 (0.067)**
Other Law Change <sup>a</sup>		X	X		X	X		X	X
Other Covariates <sup>b</sup>			X			X			X
State Fixed Effects	X	X	X	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X	X
N	13317	13317	11618	24156	24156	22780	26561	26561	25273

Note: Numbers reported above are payments in Y2000 dollar. Each column shows the results from a separate OLS regression. The dependent variable is the amount of payment.

a. Other law change includes non-economic damage cap, punitive damage cap, csr\_tort, jsl\_tort & law on information closure

b. Other covariates include allegation nature, patient gender, patient age, experience of physician and square of experience





Appendix Table A2. The Impact of Apology Law on # of Cases by Size of Payments (% Change)

	<i>1st Quantile</i> (\$775-\$22,500)		<i>2nd Quantile</i> (\$22,500~\$84,322)		<i>3rd Quantile</i> (\$84,322~\$229,288)		<i>4th Quantile</i> (>\$229,288)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Apology Law	0.032 (0.084)	0.075 (0.056)	0.186 (0.096)*	0.27 (0.104)**	0.369 (0.122)***	0.392 (0.129)***	0.008 (0.142)	0.152 (0.145)
Other Law Change <sup>a</sup>	X	X	X	X	X	X	X	X
Other Covariates <sup>b</sup>		X		X		X		X
State Fixed Effects	X	X	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X
N	867	867	867	867	867	867	867	867
R-squared	0.94	0.94	0.93	0.94	0.93	0.94	0.92	0.93

Note: Each column shows the results from a separate Diff-in-Diff regressions. Standard errors are clustered at the state level. The dependent variables are Log (Number of Cases by severity of outcome) in a state-year.

a. Other law change includes non-economic damage cap, punitive damage cap, law on medical malpractice disclosure, csr and jsl tort

b. Covariates include Population, % Black, % White, and # of Physicians

Appendix Table A3. Poisson Model of the Impact of Apology Law on Medical Malpractice Cases by Severity of Outcomes

	<i>Insignificant Injury</i>			<i>"Somewhat" Significant Injury</i>			<i>Major Permanent Injury/Death</i>		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Apology Law Change	-0.006 (0.089)	-0.016 (0.088)	-0.026 (0.062)	0.17 (0.108)	0.15 (0.110)	0.161 (0.096)*	0.188 (0.107)*	0.164 (0.107)	0.221 (0.089)**
Other Law Change <sup>a</sup>		X	X		X	X		X	X
Other Covariates <sup>b</sup>			X			X			X
State Fixed Effects	X	X	X	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X	X	X	X
N	255	255	255	255	255	255	255	255	255

Note: Each column shows the results from a separate Diff-in-Diff regressions. Standard errors are clustered at the state level. The dependent variables are Log (Number of Cases by severity of outcome) in a state-year.

a. Other law change includes non-economic damage cap, punitive damage cap, law on medical malpractice disclosure, csr and jsl tort

b. Covariates include Population, % Black, % White, % of population that are 65 or above, and # of Physicians

Table A4. Threat to Validity (% Change)

Dependant Variable	<i># of Cases</i>		
	(1)	(2)	(3)
Apology Law Change	-0.053 (0.045)	-0.055 (0.046)	-0.03 (0.050)
Other Law Change <sup>a</sup>		X	X
Other Covariates <sup>b</sup>			X
State Fixed Effects	X	X	X
Year Fixed Effects	X	X	X
N	911	860	860
R-squared	0.96	0.96	0.96

Note:

The dependent variables are Log (Number of Cases) in a state-year. The number of cases in a state-year is based on the year of settlement.

a. Other law change includes non-economic damage cap, punitive damage cap, law on medical malpractice disclosure.

b. Covariates include Population, % age 65 or above, % Black, % White, and # of Physicians.