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THE CAUSES AND EFFECTS OF LIABILITY REFORM: SOME EMPIRICAL EVIDENCE

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ABSTRACT

We provide empirical evidence both on the causes and the effects of liability reforms. Using a newly collected data set of state tort laws and a panel data set containing industry-level data by state for the years 1969-1990, we (1) identify the characteristics of states that are associated with liability reforms and (2) examine whether liability reforms influence productivity and employment.

We present two central findings. First, reductions in liability levels are associated with increases in measured productivity and employment in most industries that we studied. Second, liability reforms that reduce legal liability are generally positively correlated with measures of political conservatism.

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I. Introduction

In two waves, the first in the mid-1970's and the second in the mid-1980's, state legislatures and courts adopted reforms that sought to reduce the level of legal liability. A well-established empirical literature (e.g., Carroll (1987), Danzon (1986), and Kessler (1994)) suggests that these liability reforms have altered the outcomes of the legal system.

However, altered court outcomes may not influence aggregate economic performance; instead, impacts may be only distributive in nature. Considerably less empirical work addresses the causes or impacts of legal rules on economic outcomes.[1] In particular, the comprehensive literature on state and regional differences in productivity, output, and employment (e.g., Beeson (1987), Beeson and Husted (1989), Carlino and Voith (1992)) has given little attention to the influence of state-level liability reforms. In addition, although Epstein (1988) offers theoretical insight into the adoption patterns of liability reforms, the literature lacks detailed empirical analysis of the patterns' causes.

This paper attempts to fill the two gaps. We provide empirical evidence both on the cause and the effect of liability reforms. First, using a newly collected data set of state tort laws, we identify the characteristics of states that are associated with liability reforms. Second, using a panel data set containing industry-level data by state for the years 1969-1990, matched with data on state tort laws, we examine whether liability reforms influence productivity and employment in a number of industries.

We present two central findings. First, liability reforms that reduce legal liability are

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[1]With some notable exceptions. For example, Dertouzos and Karoly (1992) examine the impact of changes in wrongful termination law on employment, and Viscusi and Moore (1993) consider the influence of products liability law on research and development.

generally postively correlated with measures of political conservatism: more politically liberal states are less likely to adopt "tort reforms." In addition, states with high numbers of lawyers per capita are more likely to adopt liability reforms of all types, as are states with low numbers of doctors per capita. Second, the adoption of liability-reducing reforms is associated with increases in productivity and employment in most industries that we studied. In contrast, the adoption of liability-increasing reforms is associated with declines in macroeconomic measures of productivity and employment.

We proceed as follows. Part II describes the eight legal reforms that we examine. Part III discusses our data and two models. Part III(a) describes our political-economy model of the causes of liability reforms; Part III(b) presents our model of liability reforms' influence on productivity and employment. In Parts IV and V, we present our empirical results and conclusions.

II. Liability Reforms in the 1970s and 1980s

Until recently, judge-made common-law rules governed most states' liability systems. The traditional rules, which had remained relatively unchanged for many years, governed most aspects of procedure, burdens of proof, and damages. However, in recent years, states have changed several common-law rules. Both legislation and judicial decisions caused the reform tide to begin to rise in the late 1960's. The deluge then came: state legislatures flooded the statute books with two waves of liability reforms, the first in the mid-1970's and the second in the mid-1980s.

Most of the first wave's reforms applied only to medical malpractice actions: in the

1970's, some legislatures responded to doctors' claims that excessive legal judgments had caused their malpractice insurance rates to rise. The second wave was more general. In the 1980's, a broader group of doctors, manufacturers, and other producers asserted that a lawsuit deluge had increased their insurance and liability costs, and threatened their competitiveness and survival. Again, some legislatures responded.[2]

We investigate eight legal reforms, discussed in detail below. The second half of Table 1 presents, for each two year period from 1969 - 1990, the fraction of states adopting each reform.

1. Caps on Contingency Attorney Fees.

Traditionally, a client and his or her attorney were free to agree to any size attorney fee. Several states have altered this rule by imposing limits on the contingency fee fraction. This change to tort law may reduce liability by restricting plaintiffs' ability to obtain representation and sue, because contingency-fee attorneys bear fixed costs of representation.

2. Reform of the Collateral Source Rule.

The collateral source rule, an old common-law tort doctrine, states that the defendant must bear the full cost of the injury suffered by the plaintiff, even if the plaintiff were compensated for all or part of the cost by an independent or "collateral" source. This means that defendants liable for personal injuries, for example, must always bear the cost of plaintiffs' medical care, even if the treatment was financed by the patient's own health insurance. Either

[2]Several reports argue that increased liability caused insurance rates to increase. See U.S. Department of Justice (1986) and ABA (1987). In contrast, Abraham (1988) and other studies indicate that the insurance rate increases' causes were declines in interest rates; insurance firms raised insurance rates, not because of increased liability, but instead to compensate for the lower returns on their assets from lower interest rates.

the plaintiff enjoys double recovery (the plaintiff recovers from the defendant and his own health insurance for medical expenses attributable to the injury) or the defendant reimburses the plaintiff's health insurer, depending on the plaintiff's insurance contract and state or federal law. Reforms to the collateral source rule may reduce the extent of defendants' liability for plaintiffs' injuries in either case by reducing the defendant's responsibility to finance damages arising out of an insured injury.

3. Damages Caps.

Several states have placed dollar limits on the amount that a plaintiff can recover, either in total or for damages due to pain and suffering. For example, a reform statute might state that, regardless either of the severity of a plaintiff's injuries or of defendant's culpability, the plaintiff can recover no more than $250,000.

4. Periodic Payments.

At common law, a plaintiff would receive compensation for damages from future losses in a lump sum at the time of judgment, calculated by the jury without instruction or expert assistance. It has been argued that juries do not discount future losses; thus, requiring that future damages be paid periodically may reduce liability.

5. Reform of Joint and Several Liability.

Traditionally, if several defendants' acts combined to injure a plaintiff, then each defendant was liable for the judgment's full amount, regardless of how minor a defendant's contribution was to the injury. For example, if a first defendant was 95 percent responsible for a plaintiff's injury and a second was only 5 percent responsible, joint and several liability required the second defendant to pay the entire judgment if the first defendant lacked sufficient

resources to pay her or his share. The rule's rationale was that, if a defendant became insolvent, then other culpable defendants should suffer, not the innocent plaintiff. The elimination or qualification of the rule reduces defendants' liability by not holding any defendant liable for the acts of another defendant because of insolvency.

6. Punitive Damages Reform.

Several states have reduced liability by eliminating punitive damages or limiting them, by means either of dollar limits or of maximum ratios of punitive to compensatory damages. For example, a statute might limit punitive damages to $250,000, or might limit them to three times the amount that the jury awards in compensatory damages. Although we have tracked other punitive damages modifications, for clarity, we catalog as reforms only those statutes that either eliminate punitive damages or impose dollar or ratio limits on them.

7. Contributory Negligence to Comparative Negligence.

Regardless of a defendant's culpability, the common law doctrine of contributory negligence completely denied recovery to a plaintiff who had been at all negligent. Comparative negligence modified this sometimes-harsh result so that the negligent plaintiff's recovery would decline not to zero, but would decline only by plaintiff's fraction of the total negligence: if plaintiff had been 15 percent negligent and defendant had been 85 percent negligent, then plaintiff would recover 85 percent of her damages.[3] Comparative negligence increases defendants' liability as a class relative to contributory: under comparative, no plaintiff receives less compensation and some plaintiffs receive more.

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[3]Some states adopted "pure" comparative negligence: a plaintiff would recover for defendant's share of the negligence regardless of plaintiff's share. Other states enacted "modified" comparative negligence, which denies recovery to a plaintiff whose negligence exceeds 50 percent.

8. Prejudgment Interest.

The common law entitled a plaintiff to interest on the value of a loss only from the date of judgment, not from the time of the loss. If a plaintiff did not receive judgment until two years after a loss, the plaintiff received no interest on the loss for the two-year period. Several states have altered this rule to entitle plaintiff to interest either from the time of injury or from the time plaintiff filed suit, which increases defendants' liability.

Liability reforms, then, are of two kinds. Theory predicts that certain reforms will increase the level of liability by increasing the expected size of trial judgments and settlement amounts. We call these reforms "increase" reforms. In contrast, "decrease" reforms are predicted to decrease judgments' size. The eight reforms can be categorized as follows:

Decrease Reforms (hypothesized to decrease judgment size)	Increase Reforms (hypothesized to increase judgment size)
Contingency fee limits	Comparative negligence
Elimination of collateral source rule	Prejudgment interest
Limits on damage awards	
Periodic payments	
Punitive damages reform	
Elimination of joint and several liability	

Some states have enacted decrease reforms that apply only to medical malpractice tort actions; other states have enacted decrease reforms that apply to all legal claims. In contrast, the increase reforms that we track apply to all claims; none applies only to medical claims. Thus, we study 14 reforms: two generally-applicable increase reforms; six general decrease reforms; and six decrease reforms that apply only to medical-malpractice claims.

III. Models and Data

We model two processes: the process by which legal reforms are adopted, and the process by which legal reforms affect productivity and employment.

A. A Political Economy Model of the Adoption of Liability Reforms

Our political economy model of states' adoption of liability reforms has two purposes. First, we seek to measure the importance of various influences on the adoption of reforms. Second, in order to account for endogeneity in our productivity and employment models, we identify instrumental variables that associated with states' adoption of liability reforms but not with employment or productivity. The political economy model tests our instruments' power.

We model the enactment of liability reforms as the outcome of the interaction between the supply of and demand for the reforms. Those who bear the costs of the reforms determine the supply; those who benefit from the reforms determine the demand.[4] For example, attorneys might bear the direct costs of a cap on contingency fees. In contrast, groups that are often defendants, such as doctors and automobile manufacturers, might enjoy the benefits.

The market for reforms clears by means of legislation and judicial decisions: we assume that both lawmakers and judges respond to these political supply and demand forces.[5] When the political demand price for a particular legal reform exceeds the political supply price, the reform is enacted, and remains in effect until the demand price falls below the supply price.

We use the following variables to explain the political supply of and the demand for

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[4]See Stigler (1971), Posner (1974), and Edwards (1978).

[5]Other work employs this approach and these assumptions. See Edwards (1978) and Dertouzos and Karoly (1992).

legal reform, and hence the probability of reform.

Lawyers per capita. The greater the number of lawyers, the greater will be the political power that lawyers will exert against reforms that harm lawyers, and for reforms that help them. Decrease reforms may impose costs on lawyers because smaller judgments and settlements harm lawyers; increase reforms provide corresponding benefits to lawyers. An attorney who receives payment from a client under a contingency agreement suffers directly from smaller judgments that decrease reforms cause. In addition, smaller expected judgments deter potential plaintiffs from filing suit; expected judgments will exceed expected litigation costs in fewer disputes. The fewer lawsuits will harm all attorneys, whether they receive payment by the hour or under contingency agreements, and whether they represent plaintiffs or defendants. According to this reasoning, lawyers would want more increase reforms and fewer decrease reforms.

On the other hand, if all changes in the law, whether they increase or decrease liability, require lawyers to interpret and implement them, then lawyers may favor both increase and decrease reforms. Lawyers benefit from any change in legal regime if the change increases demand for lawyers' expertise.

Physicians per capita. As with lawyers per capita, theoretical predictions about the impact of a state's number of doctors per capita on the state's adoption of liability reforms are uncertain. Doctors will have greater political strength, all else equal, in states with high concentrations of doctors. Smaller judgments benefit doctors by reducing both pecuniary and nonpecuniary malpractice expenses, because smaller awards lead to fewer malpractice lawsuits. Accordingly, the greater the number of physicians in a state in comparison to the state's total

population, the greater physicians' political power both to obtain decrease reforms and to defeat increase reforms. On the other hand, doctors' risk aversion might cause them to oppose even decrease reforms: since the magnitude and even the direction of legal reforms' impacts can sometimes be indeterminate, doctors may prefer a sure status quo to changes that offer both benefits and uncertainty.

In addition, the preferences of the residents of a state may influence both the number of doctors per capita and the demand for legal reforms. If some states have high demand for medical services, and the market for medical services is not perfectly competitive, residents of states with a high number of doctors per capita may also demand less in the way of decrease reforms and more in the way of increase reforms in order to recapture some of the extra producer surplus that may accrue to physicians.

Importance of manufacturing exports. The political economy model predicts that a state that exports a large fraction of its manufacturing output should have less in the way of increase reforms and more in the way of decrease reforms. In states with high exports, consumers' demand for increase reforms will be lower. Some nonresident plaintiffs will choose to sue the state's firms within the state, and they will do so increasingly as the level of liability in the state rises. Thus, increase reforms may transfer relatively more from residents to nonresidents in states with high exports. Because the reforms benefit many nonresident plaintiffs, rather than just residents, resident voters will provide less support for the reforms. Likewise, consumers' supply of decrease reforms will be higher than in states with low manufacturing exports. This is because the costs to residents of decrease reforms will be lower; relative to low-export states, nonvoting nonresidents will bear a greater fraction of decrease reforms'

costs.

These forces help to explain why Hawaii has eliminated hotels' and other landowners' liability for injuries that arise from recreational use of lands and beaches.[6] Hawaii's limits help local hoteliers, but harm guests. Because hoteliers vote in Hawaii, demand for liability elimination was high.[7] In contrast, many hotel guests are nonresident, and do not vote in Hawaii. Thus, supply of the reform was also high; Hawaiian voters would bear few of the reform's costs. Hawaii adopted the reform because Hawaiians reap the reform's benefits; nonresidents pay the costs.

Liberal or conservative political attitudes. In general, Republicans and other conservative politicians both represent business interests and favor decrease legal reforms more strongly than do Democrats and other liberal politicians. Thus, states that have chosen Republicans or other conservatives as political representatives should be more likely to enact decrease reforms and less likely to adopt increase reforms. We use as proxies for a state's conservative or liberal political nature the party of the state's governor, and whether Democrats control one or both houses of the state legislature. Our other proxy for whether a state is likely to be pro-business or pro-consumer is the average Americans for Democratic Action

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[6]Hawaii Rev. Stat. §§ 520-1 - 520-8. See Viess v. Sea Enterprises Corp, 634 F. Supp. 226, 227-232 (D. Haw. 1986) (statute eliminates hotel's liability for injuries of hotel guest who fractured neck on hotel's beach). We discuss this statute only as a striking example of the political economy of liability reforms. Because the statute applies narrowly, we do not use it in our empirical models. Our models address only statutes that apply more generally.

[7]Hoteliers' demand would have been still higher if all potential plaintiffs were Hawaiian citizens. The greater the number of suits to which the reform applies, the greater the benefit to hoteliers. A fraction of suits of non-citizen plaintiffs will be tried in other states' courts in which the reform would not apply. In contrast, the reform would apply to most all suits by Hawaiians. However, if all plaintiffs were Hawaiian citizens, then supply would also be lower.

rating of the state's United States Senators. Americans for Democratic Action is a liberal organization that rates politicians based upon their voting records.[8]

We now develop the model formally. If $q = 1...14$ different legal reforms exist, a linear probability model of the determination of legal reform is:[9]

$$Z_{it}^{q} = a_i^{q} + b_t^{q} + X_{it}G^{q} + u_{it}^{q}, \tag{1}$$

where Z_{it}^{q} is a discrete 1/0, or "dummy," variable that indicates whether a given liability reform q was in place in state i during year t; a_i^{q} and b_t^{q} are state and year dummy variables, which vary across reforms; X_{it} is a vector of the variables discussed above that influence a state's propensity to reform its legal system; G^{q} is a parameter vector; and u_{it}^{q}

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[8]We also include an interaction term to control for whether Democrats control the governorship and one or both houses of the state legislature. Use of affiliation with the Democratic party as a proxy for liberalism is imperfect; southern Democrats can be more conservative than many Republicans. However, apart from ADA and other interest-group scores, no better data exist.

[9]We cannot model the enactment process as a simple logit or probit model, because such models give inconsistent parameter estimates in the presence of fixed-effects. See Chamberlain (1980) for discussion. We could model the process as a conditional logit model, but doing so would require assumptions surely violated by our data. See Card and Sullivan (1988) for an empirical application and discussion of this class of models.

is the error term. Because u_{it}^q in the linear probability model is heteroskedastic, we report White (1980) heteroskedasticity-consistent standard errors. In addition, we estimate (1) with four aggregate dependent variables: the number of increase reforms; the number of decrease reforms; a dummy variable that equals one if a state in a given year had adopted any increase reforms; and a dummy that indicates whether a state had adopted any decrease reforms.

B. The Influence of Liability Reforms on Employment and Productivity

We employ a log-linear model of liability reforms' influence on several industries' employment and productivity, with state- and time-fixed-effects:

$$\ln(P_{it}^j) = c_i^j + d_t^j + \lambda_H^j H_{it-1} + \lambda_R^j R_{it-1} + v_{it}^j, \tag{2}$$

and

$$\ln(L_{it}^j) = e_i^j + f_t^j + \delta_H^j H_{it-1} + \delta_R^j R_{it-1} + w_{it}^j, \tag{3}$$

where P_{it}^j represents productivity, as measured by output per worker, in state i and industry j during year t; L_{it}^j represents the size of the labor force; c_i^j and e_i^j are fixed state effects; d_t^j and f_t^j are fixed time effects; λ and δ are coefficient vectors; v_{it}^j and w_{it}^j are i.i.d. normal error terms; and H_{it-1} and R_{it-1} are the numbers of increase and decrease reforms that apply in state i and industry j during year t. The legal reform variables

are lagged one year; we assume that a liability reform's impact on productivity and employment will occur with a delay of at least one year. As we discuss below, we have adjusted the variables for differences in reforms' effective dates.

In order to investigate liability reforms' influence on economic growth, we also estimate equations (2) and (3) with the growth rates of both productivity and employment as the dependent variable.

We estimate equations (2) and (3) for 17 industries. All of these industries except manufacturing were selected because their outputs are likely to be the most responsive to legal reform. This is because, for each industry, production and consumption occur in the same state, so that the state in which production occurs is the same as the state in which liability accrues. That is, theory predicts that liability reforms in state i would have the greatest impact on productivity or employment in state i in those industries in which liability and production are locationally coincident. For example, Michigan's tort law would not be especially relevant to Michigan's automobile manufacturers. Instead, California law would be more important. Because the Michigan manufacturers sell more cars in California than in Michigan, the manufacturers defend lawsuits in California most often. In contrast, Michigan law will govern most all of a Michigan construction contractor's business; the structures that the contractor builds are all within Michigan.[10]

We also include the manufacturing sector as a check. Liability reforms' impact on manufacturing should be less pronounced than liability reforms' impact on more-local industries; because goods often sell in many states, the law of the state where a good is

[10]See Epstein (1988).

manufactured often does not govern a product-liability action that involves the good. Accordingly, we expect that the coefficients on the reform variables will be less substantial and less statistically significant for this industry than for other industries.

OLS estimates of (2) and (3) may be inconsistent, because $E(u_{it}^{q} v_{it}^{j}) \neq 0$ and $E(u_{it}^{q} w_{it}^{j}) \neq 0$ for some q, j; that is, the unexplained component of productivity or employment may be correlated with the unexplained part of liability reforms. For example, inconsistency could occur if liability reforms were not exogenous: although liability reforms may influence output and employment, output and employment may also influence liability reforms' adoption. A state that suffers an extraordinarily-deep recession may blame lawyers, and so enact decrease liability reforms.

To correct for this, we estimate (2) and (3) by instrumental variables. We use as instruments the variables in the vector X_{it}, which determine states' propensity to enact liability reforms. We assume that the instruments are uncorrelated with output and productivity.[11] In addition, we test the hypothesis that OLS estimates of the effect of legal

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[11]In order to eliminate correlation between the instruments and output and employment, we exclude lawyers per capita from the set of instruments X_{it} in estimation for the legal services industry; for the health care services industry, we exclude doctors per capita from the instrument list.

We assume that a state's political liberalism or conservatism, by any of the measures, is not correlated with the state's economic performance. We realize that this identifying assumption may be violated. In particular, certain California politician/law-school professors believe that Republican economic policies enacted at the state level promote economic growth. Other specifications that use only doctors per capita, lawyers per capita and the percentage of a state's manufacturing output that is exported as instruments give qualitatively similar results. Quantitatively, estimates of the influence of tort reform on employment and productivity is both larger and less precise in models that allow state political characteristics to affect both output and legal reform.

reform on productivity and employment are inconsistent. Under the null hypothesis that OLS is consistent, tests will fail to reject h_0: $\tilde{\lambda} = 0$ and $\tilde{\delta} = 0$ from the following OLS regression of productivity or employment on fixed effects, legal reforms, and estimated residuals from the regression of the number of increase and decrease reforms on the instrumental variables:

$$\ln(P_{it}^j) = c_i^j + d_t^j + \lambda_H^j H_{it-1} + \lambda_R^j R_{it-1} + \tilde{\lambda}_H^j(H_{it-1} - \Pi H_{it-1}) + \tilde{\lambda}_R^j(R_{it-1} - \Pi R_{it-1}) + v_{it}^j \quad (2a)$$

or

$$\ln(L_{it}^j) = e_i^j + f_t^j + \delta_H^j H_{it-1} + \delta_R^j R_{it-1} + \tilde{\delta}_H^j(H_{it-1} - \Pi H_{it-1}) + \tilde{\delta}_R^j(R_{it-1} - \Pi R_{it-1}) + w_{it}^j , \quad (3a)$$

where $\Pi = X(X'X)^{-1}X'$, with X defined to include state- and time-fixed effects.

C. Data

We use yearly data for 1969-1990, a period that extends from before the first wave of liability reforms until substantially after the second wave.

No reliable catalog of liability reforms existed. Thus, we assembled information on which states adopted the various liability reforms, and when they adopted them, by careful review of each state's statutes and published judicial decisions. Electronic research tools helped us to confirm our information. We identified both reforms that apply generally and reforms that apply only to claims for medical malpractice.

Reforms differ in whether they apply to cases that go to trial after the reforms' adoption; to lawsuits that are filed after adoption; or to injuries that occur after adoption. In particular, reforms effective as to all subsequent filings and trials apply to some claims arising

out of existing injuries. If higher levels of liability result in increased precautionary behavior both before and after an injury occurs, then tort reforms that apply to claims arising out of existing injuries will be fully effective sooner than tort reforms that apply only to claims arising out of new injuries. Thus, we adjust for the reforms effective date, although the adjustment does not change the empirical results.[12]

Data on output by industry are from a recent data set from the Department of Commerce' Bureau of Economic Analysis. Bureau of Economic Analysis (1985) describes the data further. As Ciccone and Hall (1993) notes, "These data are conceptually far superior to those used in previous work on spatial differences in productivity."[13]

IV. Empirical Results

Tables 1 and 2 present descriptive statistics for several of the variables in our model. For every two years in the 1969-1990 sample period, Table 1 provides descriptive statistics both for the variables that we expect to influence the adoption of liability reforms and for the reforms themselves. The means of the variables that measure state politics vary substantially over the period. For example, the fraction of states that had both Democratic legislatures and Democratic governors rose to a peak of 54 percent in the post-Watergate years of 1975-1978. As the country became more conservative, this fraction fell, and descended to 26 percent by 1989-1990. Over the sample period, the numbers of doctors and lawyers per capita have increased substantially: average doctors per capita increased 69 percent; lawyers per capita

[12]We assume that reforms that apply to filing and injury influence the economy respectively one and two years later than statutes that apply to trials.

[13]Appendix A describes our data further.

increased 80 percent.

Patterns of adoption differed among the liability reforms. The fraction of states that had enacted the two increase reforms, comparative negligence and prejudgment interest, increased gradually over the entire period, except for a 20 percentage point jump in the states with comparative negligence in 1973-1974.

The fraction for generally-applicable attorney fee caps also increased gradually. In contrast, the remaining decrease reforms occurred in two waves. Many states enacted reforms that applied only to medical-malpractice suits in 1975-1976: fractions for medical-malpractice fee caps, collateral source rule reform, damages caps, and periodic payments jumped during those years. The second surge hit in 1985-1986 and continued through the decade's end. In the second surge, some states enacted general reforms; others chose reforms that controlled only medical-malpractice actions. Fractions for each general reform increased. Fractions of states that had enacted general or medical-malpractice reforms, which Part B of Table 1 reports, increased even more.

Table 2 presents means and standard deviations of output, employment, and productivity for each of the 17 industries that we consider. As we discuss above, we chose the industries because production and consumption for the industries tend to occur in the same state.

A. The Influence of Liability Reforms on Employment and Productivity

Table 3 presents IV estimates of (2), which models liability reforms' impact on productivity. The model addresses each of the seventeen industries separately, and includes state and time fixed effects. We use two aggregate measures of liability reforms as explanatory variables: each state's number of increase reforms and number of decrease reforms. Each row reports the industry, the influence of the number of increase reforms on that industry's productivity, the influence of the number of decrease reforms, and an F statistic that indicates whether to reject the consistency of simple OLS estimation. In order to save space, we do not report coefficients for the state and time dummies.

Reforms that decrease judgments are associated with increases in productivity. In thirteen of the seventeen industries, coefficients for decrease reforms are positive. Ten of the thirteen positive coefficients are statistically significant at a 90 percent level, eight of the ten also at the 95 percent level. Similarly, in eleven of the seventeen industries, the coefficients for decrease reforms are statistically significant. In all but one of the eleven, the relationship was positive.

In contrast, reforms that increase judgments are associated with decreases in productivity. In fourteen of the seventeen industries, coefficients for increase reforms were negative. Of the fourteen negative coefficients, eleven were statistically significant, ten of them at the 95 percent level. Likewise, coefficients for increase reforms were statistically significant in twelve of the seventeen industries. Of the twelve significant correlations, eleven were negative.

The magnitude of liability reforms' estimated impact on productivity is substantial. For

example, Table 5 suggests that, in a state with the average level of liability, the adoption of an additional decrease reform would cause an increase in output per worker of 3.1 percent in the retail trade industry, 7.6 percent in the miscellaneous repair services sector, and 8.9 percent in amusement and recreation. The impacts of increase reforms were equal or greater, although in the opposite direction.

As theory predicts, reforms' estimated impact on productivity is smaller and less significant in the health care and manufacturing industries. For the health care industry, the coefficients for both decrease reforms and increase reforms were small and insignificant.[14] This is consistent with doctors' responding to increased liability, not solely by reducing output as in other industries, but by performing additional procedures to protect themselves from liability. Doctors may often pass additional costs on to insurers. The net impact of the two opposing forces was insignificant.

In contrast to strong effects in other industries, decrease reforms' impact on manufacturing output was insignificant. Increase reforms are associated with lower productivity in manufacturing, even though much manufacturing output travels to other states, and so is not subject to local tort law. However, as theory predicted, the effect of increase reforms is smaller in manufacturing than in many other industries, and the coefficient is significant only at the 90 percent level.

The impact of both decrease and increase reforms on productivity in the legal industry is positive, but insignificant. The reforms affect legal productivity little, if at all. Even if

[14]In our health care estimations, we examined the impacts of all liability reforms that applied either to all claims or only to medical malpractice claims. For other industries, we considered only generally-applicable reforms.

decrease reforms reduce legal income in the short run, as judgments shrink and plaintiffs file fewer suits, the decrease reforms' coefficient's positive sign and insignificance suggest that the reforms' beneficial impacts on other industries may, in the long run, also benefit the legal industry. As output rises in other industries, the other industries use more legal services.

The third column of Table 3 suggests that, under the assumption of the exogeneity of the instruments, instrumental-variables is appropriate. For fourteen of seventeen industries, F-tests reject at the 95 percent significance level the hypothesis that ordinary least squares estimation would be consistent. For a fifteenth industry, transportation services, we reject OLS at the 90 percent level. We do not reject OLS only for two industries for which theory predicted ambiguous results: legal services and manufacturing.

Tables 4 presents results for the model of productivity growth. Liability reforms' impacts on productivity growth are consistent with their impacts on productivity levels, in both magnitude and direction. Reforms hypothesized to decrease judgments are associated with increases in productivity growth. For fourteen of seventeen industries, decrease reform coefficients are positive, although only one coefficient is significant.

In contrast, reforms that increase judgments are associated with lower productivity growth. Fourteen of seventeen increase reform coefficients are negative. Of the five statistically significant coefficients, all were negative. The coefficient for legal services is negative and significant: although reforms that increase judgments had an insignificant impact on legal services productivity levels, the reforms appear to retard the industry's growth.

As Table 5 indicates, estimated effects of liability reforms on employment follow the productivity models' patterns. States that adopt decrease reforms experience higher levels of

employment than states that do not; and states that adopt increase reforms experience lower levels of employment than states that do not. For fourteen of seventeen industries, decrease reforms' coefficients are positive. Twelve of the fourteen positive coefficients are significant, ten of the twelve at the 95 percent level. As theory helps to explain, the coefficients for legal services and manufacturing are insignificant. In contrast, for fourteen of seventeen industries, coefficients for increase reforms are negative. Seven of the negative coefficients are significant, six of the seven at a 95 percent level. Increase reforms reduce employment even in the legal industry; the industry's coefficient is negative and significant.

F-tests reject the consistency of OLS at the 95 percent level for thirteen of seventeen industries.[15]

Results for employment growth follow a slightly different pattern. The impacts on employment growth of reforms that decrease judgments differ among industries. However, reforms that increase judgments decrease employment growth. For sixteen of seventeen industries, coefficients for increase reforms are negative. Seven of the negative coefficients are significant, six of them at the 95 percent level. Every statistically significant coefficient is negative.

For nine industries, we reject OLS at a 95 percent level of significance.[16]

Our results are generally robust to changes in estimation method. We estimated our four productivity and employment models using OLS. OLS estimates of the impact of the number of decrease and increase reforms on productivity and employment were generally

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[15]We reject at 90 percent for a fourteenth industry: electric, gas, and sanitary services.

[16]For three more industries, we reject OLS at the 90% level of significance: construction, motion pictures, and legal services.

similar to our instrumental-variables estimates. Holding constant time and state fixed effects, decrease (increase) reforms were generally associated with higher (lower) productivity and employment in the industries that we studied. However, the impacts of decrease and increase reforms are less uniform than in the instrumental-variables estimates. In addition, the magnitude of liability reform's impact on economic performance is smaller in the OLS regressions. To illustrate these patterns, Appendix B presents OLS estimates of reforms' impact on employment.

In addition, we estimated the four productivity and employment models with eight individual liability reforms as explanatory variables. Both OLS and instrumental-variables estimates were inconclusive. Comparative negligence tended to depress levels and growth of productivity and employment, for all industries, in both OLS and IV estimation. However, results for other reforms varied among industries and among models. Results for dummy variables that indicate whether a state had enacted any increase or decrease reforms were similarly inconclusive.

B. Political Economy Models of Liability Reform

Tables 7 and 8 report estimates of equation (1), our model of adoption of liability reforms. Table 7 reports estimates of the influences of several state characteristics on the probability of adoption of generally-applicable reforms. Each of the first eight columns reports the various characteristics' impact on the probability of adoption of an individual reform. For dummy explanatory variables, a coefficient of .01 indicates that the presence of that characteristic in a state increases by 1 percentage point the probability that the state had adopted that reform. For continuous variables, a coefficient of 1.0 indicates that an increase of

.01 in the variable corresponds to a .01 percentage point increase in reform's probability. The model controls for fixed state and time effects. However, in order to save space, the tables do not report the coefficients for the state and time dummy variables.

States' political characteristics influence adoption of many, but not all, of the liability reforms in the predicted manner. The first five characteristics, in the table's first five rows, measure the dominance of Democrats in a state's politics. The model measures the effect of each of these characteristic's impact relative to a state that has elected both a Republican governor and a Republican-controlled house and senate. The sixth characteristic, the average of the Americans for Democratic Action ratings of the state's U.S. Senators, measures the liberalism or conservatism of the state's federal representatives.

For several liability reforms, the coefficients for the political variables have the anticipated signs and are significant. This is especially true for decrease reforms that limit legal damages directly, such as damages caps, limits on punitive damages, and elimination of joint and several liability. For example, states with Republican-controlled legislatures or conservative U.S. Senators are more likely to adopt damages caps than liberal states. Democratic control of state politics is negatively associated with adoption of damages caps: all five coefficients for variables that measure Democratic control are negative; three of the five coefficients are statistically significant. Similarly, states with liberal U.S. Senators are less likely to adopt damages caps: the ADA coefficient is negative and significant.

Working control of a state's governorship and legislature is a more important determinant of the adoption of liability reforms than is the general liberalism that ADA scores measure. Holding constant state and time fixed effects and other political factors, a state with

a Democrat-controlled legislatures is 6.9 percentage points less likely to adopt caps on damages than a state with Republican governor and legislature. In contrast, a 10 percentage point upswing in a state's liberal attitudes--for example, a change in ADA scores from .8 to .9--would cause only a .85 percentage point decrease in the probability that the state adopts damages caps.

For both comparative negligence and prejudgment interest, which are increase reforms, coefficients on state political variables generally have the predicted positive signs, although few of the coefficients are significant. However, for prejudgment interest, the ADA coefficient is, contrary to our theoretical predictions, negative and significant.

The politics that underlie the adoption of attorney fee caps, collateral source rule reforms, and mandatory periodic payments statutes appear to be more complicated. States with split-party legislatures and Democrat governors are, other things equal, more likely to adopt these reforms than Republican-controlled states. In a state that splits power between Republicans and Democrats, these reforms, which limit liability only indirectly, may be a political compromise; the indirect reforms serve as a compromise between reforms, such as damages caps, that limit liability directly and no reform.

The last two columns of Table 7 present results from regressions that use as dependent variables the number of increase and decrease reforms. The signs on the political variables' coefficients generally fulfill our theoretical predictions: states with liberal, Democratic officials tend to adopt reforms that increase liability but to reject reforms that limit liability. In the model that uses the number of increase reforms as the dependent variable, all but one coefficient are positive; in the regression for number of decrease reforms, all but one

coefficient are negative.

The number of doctors per capita is negatively correlated with the adoption of both increase and decrease reforms. For each of five of six decrease reforms, the influence of the number of doctors on the probability of enactment is negative; three of the negative coefficients are significant. Similarly, the doctors coefficient for the aggregate variable is negative and significant. Thus, the data do not paint a picture of a powerful medical lobby imposing laws that transfer wealth from the public to physicians. However, the coefficients on the doctors variable are negative both for the two increase reforms and for the aggregate number of increase reforms.

A simple political economy model, which posits that states with a higher density of physicians will enact laws that result in greater transfers to doctors, cannot explain this result. However, a more complex model can account for the negative influence of physicians on all types of liability reform. First, if doctors are risk averse, they may oppose any liability reforms at all, if the impact of liability reforms is uncertain. Second, doctors may oppose increase reforms and favor decrease reforms, but only be politically effective in preventing increase reforms because of the different process by which states adopted the two types of reforms. States adopted most all of the six decrease reforms by means of legislation after pitched political battles, central opposing warriors in which were lawyers and doctors. In contrast, state courts often adopted the two increase reforms, comparative negligence and prejudgment interest, by means of judicial decision or court rule. Thus, because the adoption of increase reforms was less visible, individuals from states with high demand for medical services (and high numbers of physicians) who wished to transfer wealth from physicians to

the public may have focussed on preventing decrease reforms rather than enacting increase reforms.

The greater a state's number of lawyers per capita, the greater the state's tendency to adopt both increase and decrease reforms. For five of six decrease reforms, the lawyers coefficient is positive and significant. The lawyers coefficient for the sixth reform is insignificant. Similarly, the lawyers coefficient for the aggregate number of decrease reforms is positive and significant. In addition, the coefficients for both comparative negligence and the number of increase reforms are positive and significant; the coefficient for the other increase reform, prejudgment interest, is insignificant.

Again, a simple political economy model does not account for the positive association between the density of lawyers and all types of legal reform. However, if lawyers benefit from all changes to the legal system, because the changes increase the demand for legal services, then states with a higher density of lawyers would experience more frequent shifts in legal regime.

Table 8 reports results for liability reforms that apply to medical-malpractice cases, and for several other consolidated reform variables. The table indicates that medical decrease reforms are more strongly associated with states' political characteristics than are general decrease reforms. For example, in regressions for which the aggregate number of medical decrease reforms is the dependant variable, four of six measures of political liberalism are associated with fewer decrease reforms; three of the four coefficients are statistically significant.

As with the general reforms, medical reforms that limit liability directly -- such as

damages caps, periodic payments, and joint and several liability -- are most strongly linked to political characteristics. For each of the three reforms, the ADA coefficient is negative and significant, and most or all of the state-politics variables are negative. For example, all six of the political coefficients for medical damages caps are negative and statistically significant.

Just as for the general reforms in Table 7, coefficients for the variable that measures states' fraction of exported manufacturing output exhibit different signs for different industries. Also, as before, coefficients for the doctors variable are negative and significant. Coefficients for the lawyers variable again are generally positive and significant.

V. Conclusion

Using annual state-level data on seventeen industries' output and employment, we estimate the impact of liability reforms on levels and growth rates of productivity and employment. In addition, our political economy model investigates empirically the determinants of states' adoption of liability reforms. Throughout, we employ a data set that we have created of the times and places of liability reforms' adoption among the United States during the last three decades.

We present two major findings. First, IV estimates indicate that liability-reducing reforms are associated with higher levels of output per worker and employment, in a broad range of industries. In contrast, the adoption of liability-increasing reforms is associated with lower productivity and employment. As theory predicts, the estimated effect of liability reform is greatest in industries in which production and consumption occur in the same state.

Similarly, states with a greater number of liability-decreasing reforms exhibit higher

productivity growth, while states with a greater number of liability-increasing reforms exhibit lower growth in productivity and employment. However, the impact of reforms on growth rates of productivity and employment is somewhat weaker than their impact on productivity and employment levels.

These results are consistent with the hypothesis that reductions in liability from the current common-law levels improve efficiency. However, the results are also consistent with three other alternative hypotheses. First, the observed association between liability law and productivity and employment may be due to other state-level public policies that are correlated with both the instruments and the status of liability law but not captured by the fixed effects. For example, politically conservative states or states with high densities of lawyers may adopt policies other than liability reforms that increase employment or productivity. Second, even if there is no omitted variable bias, the results may be due to a "Delaware effect" in liability law whereby capital migrates from high-liability to low-liability states. If the Delaware hypothesis is true, then the observed positive association between output per worker, employment, and liability reductions could be due to zero-sum flows of capital among states rather than the more efficient use of resources. In this world, liability reforms affect the distribution of wealth but do not affect true productive efficiency. Third, the results may not account for externalities created by reductions in the level of liability. Specifically, firms from states with relatively low levels of liability may have relatively low costs because they do not bear the true costs of production; this could cause a positive association between observed productivity, employment, and liability reductions even if liability reductions result in the inefficient deployment of resources into externality-intensive uses.

Our second major findings address the political economy of the adoption of liability reforms. States' political characteristics tend to influence reforms' adoption in the manner that a simple political economy model predicts. States with Republican governors, Republican-controlled legislatures, or conservative U.S. Senators are, other things equal, generally more likely to adopt liability-decreasing reforms and less likely to adopt liability-increasing reforms. Political characteristics influence with special force states' adoption of reforms that limit legal damages directly, such as caps on damages. Among the political variables, Republican or Democratic control of a state's governorship or legislature has a larger impact than the conservatism or liberalism of the state's U.S. Senators.

However, simple political economy models can not explain the relationship between the number of doctors or lawyers in a state and the adoption patterns of liability reforms. Greater density of physicians is associated empirically with a lower likelihood of adopting both liability-increasing and liability-reducing reforms; however, a simple model would predict that physicians benefit from reductions in liability, and therefore that states with a greater density of physicians would enact a larger number of liability-reducing reforms and fewer liability-increasing reforms. Greater density of lawyers is associated empirically with a higher likelihood of adopting both liability-increasing and liability-reducing reforms; however, a simple model would predict that lawyers benefit from increases in liability, and therefore that states with a greater density of lawyers would enact a larger number of liability-increasing reforms and fewer liability-reducing reforms.

The failure of simple political economy models to explain completely adoption patterns of liability laws is evidence that further research into the forces that generate the empirical

regularities outlined in this paper remains to be done. Analysis of the choice and timing of state legislatures in the enactment of liability reform might provide a vehicle through which to test different theories of legislative (and, in some cases) judicial politics. In addition, better integration of our analysis of the impact of liability reform with models found in the regional economics literature may lead to a better understanding of the process by which the civil justice system affects state and regional economic outcomes.

Table 1: Average Level of State Characteristics Influencing Liability Reform and Liability Reforms in Effect, 1969-1990
(statistic for discrete variables is fraction of states in which variable is one)

Variable Name	69-70	71-72	73-74	75-76	77-78	79-80	81-82	83-84	85-86	87-88	89-90
Characteristics											
Split dem./rep. legislature	.12	.06	.02	.04	.08	.08	.06	.05	.06	.05	.04
Dem. governor only	.09	.14	.18	.10	.12	.16	.16	.16	.16	.08	.08
Dem. legis. only	.21	.14	.19	.20	.16	.19	.24	.18	.18	.29	.32
Split leg., dem. gov.	.04	.10	.10	.08	.08	.06	.04	.04	.18	.16	.18
Dem. gov. & leg.	.21	.35	.35	.54	.54	.41	.34	.49	.34	.28	.26
Avg. ADA of US Sen	.47	.43	.47	.46	.44	.47	.44	.48	.43	.53	.47
Pct. mfg. exported	.28	.28	.30	.31	.32	.33	.34	.33	.30	.30	.30
Doctors per 100 population	.13	.14	.14	.15	.16	.17	.18	.19	.20	.21	.22
Lawyers per 100 population	.15	.16	.17	.17	.20	.21	.22	.23	.25	.26	.27
Reforms In Effect											
A. General Reforms. (apply to all cases)											
Comparative negligence	.23	.32	.53	.65	.66	.70	.77	.83	.88	.88	.88
Prejudgment interest	.19	.23	.24	.27	.28	.33	.41	.43	.48	.53	.55
Fee caps	.03	.04	.04	.05	.06	.06	.08	.08	.10	.14	.14

Variable Name	69-70	71-72	73-74	75-76	77-78	79-80	81-82	83-84	85-86	87-88	89-90
Collateral source rule	0	0	0	0	0	0	0	0	.09	.35	.39
Damages caps	0	0	0	0	.02	0	0	0	.08	.23	.21
Periodic payments	0	0	0	0	0	0	0	0	.05	.13	.12
Joint and several liability	.01	.02	.07	.10	.11	.13	.14	.15	.31	.61	.69
Punitive damages	.10	.10	.10	.10	.10	.10	.10	.10	.13	.27	.30
B. Reforms that Apply to Medical Malpract. Actions. (apply to all cases or only to med. mal. cases)											
Fee caps	.03	.04	.04	.17	.22	.23	.23	.22	.27	.32	.32
Collateral source rule	0	0	0	.21	.34	.34	.29	.29	.39	.57	.61
Damages caps	0	0	.01	.19	.26	.25	.21	.20	.35	.54	.51
Periodic payments	0	0	0	.06	.10	.10	.08	.09	.25	.34	.38
Joint and several liability	.01	.02	.07	.10	.11	.13	.14	.15	.32	.63	.81
Punitive damages	.10	.1	.10	.10	.10	.10	.10	.10	.15	.31	.33

Table 2.
Means and (Standard Deviations) of Output ($millions in 1982 dollars), Labor Force (1000s of workers), and Productivity (output ($1000s) per worker) by Industry, 1972-1990.

Industry	N	Output	Labor Force	Productivity
Construction	950	3234.0 (3789.2)	116.0 (121.2)	27.5 (8.7)
Local and interurban passenger transit	931	138.7 (221.7)	7.0 (9.8)	18.8 (3.8)
Transport. services	902	180.7 (322.9)	5.5 (8.8)	31.8 (10.0)
Electric, gas, and sanitary services	931	1994.6 (2276.7)	17.7 (17.8)	104.8 (23.7)
Wholesale trade	950	4801.7 (6052.5)	112.7 (131.7)	40.6 (5.0)
Retail trade	950	6628.1 (7775.5)	367.0 (391.0)	17.5 (2.4)
Insurance agents, brokers, and services	950	393.1 (521.3)	16.3 (18.9)	22.5 (4.5)
Hotels and lodging places	950	537.0 (697.5)	26.6 (29.3)	18.1 (4.3)
Personal services	950	475.2 (547.7)	39.6 (43.1)	11.8 (2.0)
Business services	950	1914.3 (3134.2)	93.3 (138.9)	18.8 (4.4)
Auto repair, services, garages	950	523.4 (682.9)	19.9 (23.6)	25.5 (4.4)
Misc. repair services	950	212.0 (289.0)	11.9 (13.3)	16.6 (3.3)
Motion pictures	934	176.2 (711.9)	5.7 (14.1)	15.9 (8.7)
Amusement and recreation services	948	385.5 (643.8)	24.1 (30.2)	13.5 (4.0)
Health services	950	3012.1 (3872.5)	123.7 (143.9)	23.4 (16.2)
Legal services	950	714.2 (1198.5)	17.6 (25.5)	36.5 (5.4)
Manufacturing	950	14810.7 (16964.5)	398.34 (432.6)	35.9 (6.6)

Note: for some industries, the number of observations is less than 950 because labor-force data were unavailable for certain industries for certain years.

Table 3: Instrumental-Variables Estimates of Effects of Liability Reforms on Productivity (Standard Errors In Parentheses)

Industry	No. of increase reforms	No. of decrease reforms	F(2,950): Reject OLS? (.05 level)
Construction	-.212** (.043)	.034 (.032)	17.38 yes
Local and interurban passenger transit	-.117** (.035)	-.006 (.027)	9.07 yes
Transport. services	-.194** (.056)	.076* (.042)	2.77 no
Electric, gas, and sanitary services	.130** (.053)	-.073* (.041)	5.99 yes
Wholesale trade	-.044** (.021)	.059** (.015)	10.34 yes
Retail trade	-.043** (.018)	.031** (.013)	3.63 yes
Insurance agents, brokers, and services	-.121** (.029)	.054** (.022)	12.27 yes
Hotels and lodging places	-.041 (.031)	.097** (.023)	10.57 yes
Personal services	-.111** (.023)	-.018 (.017)	21.23 yes
Business services	-.216** (.049)	.079** (.037)	17.10 yes
Auto repair, services, garages	-.055** (.022)	.043** (.017)	5.59 yes
Misc. repair services	-.080** (.032)	.076** (.024)	7.80 yes
Motion pictures	-.001 (.053)	.079* (.041)	3.26 yes
Amusement and recreation services	.011 (.032)	.089** (.024)	7.66 yes
Health services	-.028 (.018)	.009 (.008)	3.66 yes
Legal services	.010 (.025)	.026 (.027)	1.10 no
Manufacturing	-.043* (.023)	-.003 (.018)	.86 no

**Significant at .05 level.
*Significant at .10 level.

Table 4: Instrumental-Variables Estimates of Effects of Liability Reforms on Productivity Growth (Standard Errors In Parentheses)

Industry	No. of increase reforms	No. of decrease reforms	F(2,950): Reject OLS? (.05 level)
Construction	-.036** (.015)	-.007 (.011)	5.20 yes
Local and interurban passenger transit	-.027 (.020)	.009 (.016)	.56 no
Transport. services	-.022 (.041)	.049 (.030)	1.86 no
Electric, gas, and sanitary services	.019 (.037)	.005 (.028)	.49 no
Wholesale trade	-.028** (.010)	.003 (.007)	4.70 yes
Retail trade	-.003 (.007)	.007 (.005)	1.10 no
Insurance agents, brokers, and services	-.017 (.018)	.023* (.013)	1.22 no
Hotels and lodging places	-.031** (.014)	.003 (.010)	3.02 yes
Personal services	.003 (.010)	-.011 (.007)	.91 no
Business services	-.024 (.023)	.003 (.017)	.38 no
Auto repair, services, garages	-.017 (.011)	.013 (.008)	1.73 no
Misc. repair services	-.010 (.017)	.008 (.013)	.27 no
Motion pictures	-.018 (.052)	.002 (.040)	.33 no
Amusement and recreation services	-.004 (.018)	-.009 (.014)	.96 no
Health services	-.011 (.008)	.004 (.004)	.37 no
Legal services	-.031** (.013)	.003 (.014)	2.81 no
Manufacturing	-.028* (.016)	.004 (.012)	1.69 no

**Significant at .05 level.
*Significant at .10 level.

Table 5: Instrumental-Variables Estimates of Effects of Liability Reforms on Employment (Standard Errors In Parentheses)

Industry	No. of increase reforms	No. of decrease reforms	F(2,950): Reject OLS? (.05 level)
Construction	-.216** (.073)	.170** (.054)	8.74 yes
Local and interurban passenger transit	-.051 (.067)	.291** (.053)	25.08 yes
Transport. services	-.090 (.065)	-.002 (.049)	.66 no
Electric, gas, and sanitary services	-.016 (.042)	.061* (.033)	2.56 no
Wholesale trade	-.079* (.041)	.105** (.031)	8.24 yes
Retail trade	-.132** (.040)	.132** (.030)	22.03 yes
Insurance agents, brokers, and services	.007 (.036)	.060** (.027)	5.69 yes
Hotels and lodging places	-.204** (.059)	.118** (.044)	9.40 yes
Personal services	-.022 (.046)	.181** (.034)	36.40 yes
Business services	.005 (.044)	-.060* (.033)	1.07 no
Auto repair, services, garages	-.053 (.039)	.125** (.029)	16.68 yes
Misc. repair services	-.115** (.051)	.179** (.038)	25.56 yes
Motion pictures	-.229** (.075)	.255** (.058)	26.70 yes
Amusement and recreation services	-.095 (.064)	.234** (.048)	26.37 yes
Health services	-.041 (.031)	.011 (.014)	1.26 no
Legal services	-.073** (.034)	-.004 (.037)	3.51 yes
Manufacturing	.074* (.043)	.052 (.032)	8.06 yes

**Significant at .05 level.
*Significant at .10 level.

Table 6: Instrumental-Variables Estimates of Effects of Liability Reforms on Employment Growth (Standard Errors In Parentheses)

Industry	No. of increase reforms	No. of decrease reforms	F(2,950): Reject OLS? (.05 level)
Construction	-.063** (.030)	-.007 (.023)	2.81 no
Local and interurban passenger transit	-.029 (.023)	.001 (.018)	1.33 no
Transport. services	-.026 (.037)	-.055** (.028)	3.82 yes
Electric, gas, and sanitary services	-.039** (.019)	.032** (.015)	3.51 yes
Wholesale trade	-.036** (.016)	.017 (.012)	3.40 yes
Retail trade	-.012 (.008)	-.012** (.006)	5.86 yes
Insurance agents, brokers, and services	-.014 (.020)	-.032** (.015)	3.33 yes
Hotels and lodging places	-.044** (.020)	.021 (.015)	3.10 yes
Personal services	-.030** (.011)	.008 (.008)	4.77 yes
Business services	-.053** (.022)	-.007 (.016)	5.12 yes
Auto repair, services, garages	-.005 (.013)	-.010 (.010)	1.69 no
Misc. repair services	-.025 (.017)	-.015 (.013)	4.27 yes
Motion pictures	-.023 (.031)	-.044** (.024)	2.36 no
Amusement and recreation services	-.022 (.015)	.014 (.012)	1.33 no
Health services	-.002 (.008)	-.007** (.003)	.65 no
Legal services	-.018** (.009)	.001 (.010)	2.73 no
Manufacturing	.010 (.011)	-.003 (.008)	1.14 no

**Significant at .05 level.
*Significant at .10 level.

Table 7: Effects of State Characteristics on the Probability of Liability reform, 1969-90. General Reforms and Numbers of Increase and Decrease Reforms. (Standard Errors In Parentheses)

	Reforms									
Variable Name	Compar. negl.	Prejudg. interest	Atty. fee caps	Collat. source rule	Damages caps	Periodic payments	Joint & several liabil.	Punitive damages	No. of increase reforms	No. of decrease reforms
Split dem./rep. legislature	.020 (.050)	.076* (.045)	-.009 (.028)	-.005 (.034)	-.086** (.023)	-.033* (.020)	-.063 (.042)	-.027* (.018)	.096 (.073)	-.223** (.090)
Dem. gov. only	.013 (.038)	.011 (.035)	.028 (.017)	.042 (.028)	-.028 (.024)	.031** (.012)	-.035 (.031)	-.045* (.024)	.025 (.056)	-.007 (.073)
Dem legis. only	.015 (.048)	.063 (.047)	.009 (.027)	.020 (.033)	-.069** (.023)	-.012 (.021)	.012 (.037)	-.015 (.020)	.078 (.076)	-.056 (.088)
Split legis., dem. gov.	.023 (.044)	.014 (.040)	.042* (.024)	.103** (.035)	-.047** (.024)	.049** (.021)	-.042 (.037)	-.007 (.025)	.037 (.064)	.097 (.094)
Dem. gov. & legis.	-.001 (.050)	.049 (.051)	.010 (.029)	.051 (.035)	-.018 (.026)	-.027 (.026)	.003 (.040)	-.038* (.021)	.047 (.079)	-.018 (.100)
Avg. ADA of US Sen.	-.050 (.054)	-.290** (.046)	.035 (.026)	-.046 (.037)	-.085** (.031)	.002 (.021)	-.097** (.043)	.075** (.030)	-.340** (.072)	-.118 (.099)
Pct. mfg. exported	.932** (.244)	-.698** (.170)	.020 (.158)	.158 (.141)	.024 (.109)	.192** (.073)	.388* (.234)	-.279** (.117)	.233) (.267)	.502 (.393)
Doctors per 100 population	-5.112** (.912)	-2.078** (.866)	.388 (.535)	-3.030** (.809)	-1.686 (1.242)	-.309 (.552)	-7.054** (.910)	-1.608** (.715)	-7.191** (1.304	-13.299** (2.658)
Lawyers per 100 population	2.436** (.574)	-.184 (.651)	1.46** (.418)	2.965** (.540)	2.577** (.515)	.833** (.394)	3.039** (.620)	-.542 (.426)	2.252** (.939)	10.332** (1.648)
N	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Adj. R^2	.651	.762	.719	.428	.316	.246	.639	.784	.755	.633

**Significant at .05 level.
*Significant at .10 level.

Table 8: Effects of State Characteristics on the Probability of Liability reform, 1969-90. Medical Malpractice Reforms and Other Consolidated Indicators. (Standard Errors In Parentheses)

	Reforms									
Variable Name	Medical fee caps	Medical collat. source rule	Medical damages caps	Medical periodic payments	Medical joint & several liabil.	Medical punitive damages	Medical, no. of decrease reforms	General, any increase reforms	General, any decrease reforms	Medical, any decrease reforms
Split dem./rep. legislature	.046 (.051)	.022 (.051)	-.176** (.046)	-.049 (.038)	-.061 (.042)	-.025 (.021)	-.242* (.126)	.053 (.053)	-.067 (.045)	.120** (.051)
Dem. gov. only	-.019 (.037)	-.020 (.046)	-.083** (.040)	-.030 (.049)	-.030 (.031)	-.047** (.024)	-.233* (.131)	-.005 (.037)	-.029 (.032)	.001 (.040)
Dem legis. only	.092** (.045)	.030 (.049)	-.140** (.044)	.015 (.043)	.013 (.037)	.022 (.024)	.063 (.128)	-.008 (.048)	.013 (.041)	.206** (.046)
Split legis., dem. gov.	-.037 (.041)	-.053 (.052)	-.137** (.042)	-.026 (.039)	-.047 (.037)	-.002 (.026)	-.303** (.132)	-.052 (.041)	-.029 (.040)	-.074 (.049)
Dem. gov. & legis.	.091* (.047)	.076 (.052)	-.131** (.047)	.040 (.045)	.006 (.039)	.008 (.025)	.090 (.135)	-.010 (.051)	.016 (.042)	.197** (.050)
Avg. ADA of US Sen.	-.003 (.051)	.067 (.055)	-.184** (.052)	-.112** (.048)	-.082* (.043)	.091** (.031)	-.223 (.152)	-.161** (.050)	-.171** (.047)	-.184** (.055)
Pct. mfg. exported	-.089 (.185)	-.509** (.215)	.015 (.200)	.161 (.167)	.423* (.236)	-.183 (.114)	-.171 (.548)	.866** (.228)	-.001 (.176)	-.813** (.206)
Doctors per 100 population	-.345 (.998)	-4.130** (1.057)	.071 (1.23)	-2.714** (.862)	-6.801** (.915)	-2.222** (.721)	-16.142** (3.002)	-2.146** (.921)	-3.825** (1.209)	-2.310* (1.255)
Lawyers per 100 population	2.861** (.601)	5.392** (.568)	.720 (.625)	1.442** (.625)	2.540** (.614)	.114 (.453)	13.068** (1.907)	-.238 (.655)	.878 (.596)	1.094* (.625)
N	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Adj. R^2	.589	.601	.570	.449	.642	.757	.680	.640	.719	.663

**Significant at .05 level.
*Significant at .10 level.

Appendix A

Sources of Data

We obtained information on liability reforms from state statutes and judicial decisions. Appendix C lists the reforms by state and adoption date. Data on output by industry are from the Bureau of Economic Analysis, U.S. Department of Commerce. Data on employment are from the Bureau of Labor Statistics. Data on state and federal politics are found in primary sources.

Manufacturing output by state exported to other states: total exports by state from the Statistical Abstract for the years 1969, 1971, 1975, 1976, 1980, 1982, 1984-1987, and 1990, with linear interpolation in intervening years. Total manufacturing output obtained from the Department of Commerce, as part of the GSP data set.

Lawyers per capita: by state, for 1970, 1980, 1985, and 1988, from American Bar Foundation, Chicago, Illinois, The 1971 Lawyer Statistical Report, 1971; The Lawyer Statistical Report, 1985; Supplement to the Lawyer Statistical Report, 1991. See also Statistical Abstract. We calculated intervening years by linear interpolation.

Physicians per capita: by state for the years 1970, 1975, 1980, 1985, and 1990 from the Statistical Abstract and from Physician Characteristics and Distribution in the U.S., annual (American Medical Association, Chicago, Illinois). We calculated intervening years by linear interpolation.

Appendix B

Ordinary Least Squares Estimates of Effects of Liability Reforms on Employment
(Standard Errors In Parentheses)

Industry	No. of increase reforms	No. of decrease reforms
Construction	-.028** (.014)	-.002 (.010)
Local and interurban passenger transit	-.003 (.011)	.039** (.009)
Transport. services	-.015 (.016)	-.032** (.012)
Electric, gas, and sanitary services	-.009 (.009)	.001 (.007)
Wholesale trade	-.010 (.008)	.002 (.006)
Retail trade	-.017** (.006)	.004 (.005)
Insurance agents, brokers, and services	-.008 (.008)	-.004 (.006)
Hotels and lodging places	-.008 (.011)	.017** (.008)
Personal services	.001 (.007)	.009 (.006)
Business services	-.022** (.010)	-.015* (.007)
Auto repair, services, garages	-.003 (.007)	.001 (.005)
Misc. repair services	-.038** (.008)	.001 (.006)
Motion pictures	-.022* (.011)	-.003 (.009)
Amusement and recreation services	-.052** (.011)	.011 (.008)
Health services	-.006 (.006)	-.001 (.005)
Legal services	-.002 (.007)	.005 (.005)
Manufacturing	-.020** (.009)	-.008 (.007)

**Significant at .05 level.
*Significant at .10 level.

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