The Products Liability Revolution and Labor Markets*

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Abstract

This paper investigates the effect on wages of the expansion of products liability law, mainly in the 1960s and 1970s. The expansion of products liability law has two sorts of effects: a "labor supply-side effect," by which workers are willing to accept a lower wage in exchange for increased insurance through the tort system for on-the-job injuries, and a "labor demand-side effect," by which the value of workers' marginal product decreases to the extent the cost of the product they produce comes to include products liability costs.

The adoption of comparative negligence decreases wages by an average of 4%, two-fifths of which is a supply-side effect. The adoption of strict liability for manufacturing defects slightly increases wages on average; four-fifths of this is a supply-side effect. The expansion of the tort system affects not only wages but also employment in affected industries.

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1 Introduction

1.1 The purpose of this paper

In the 1960s and 1970s, U.S. state courts drastically expanded the liability of product manufacturers. Employees injured at their workplace by defective products, who could not sue their employers because of workers' compensation laws, became more able to sue the original manufacturers of these products, and through changes in legal doctrine, the frequency of such lawsuits and the amounts of money involved increased dramatically.

Such a development can be expected to have two effects.

First, employees who work in industries that produce dangerous products suffer because they become less productive. Each product they make is worth less to the employer, since the employer now internalizes the average per-product tort liability payment as a cost of production. So the value of their marginal product decreases, and we can expect their wage to decrease somewhat as a result (cf., e.g., Bertrand and Mullainathan (1999)).[1]

A second effect relates to the theory of equalizing wage differentials, which predicts that the presence of an on-the-job amenity tends to reduce wages and the presence of a disamenity tends to increase them.[2] In equilibrium, the wage at firms with an amenity will be less than the wage at firms without the amenity by the marginal worker's valuation of the amenity.

We can interpret the expansion of products liability as an amenity of the job, especially in dangerous jobs. When a state changes its products liability law, employees who use dangerous products on the job — potential plaintiffs

[1] The expansion of products liability law should also affect the number of workers employed in the industry, but this paper does not test this.

[2] See, e.g., Rosen (1986).

— benefit. If there were no wage adjustment for job-based amenities, then the marginal worker who lived in a less-plaintiff-friendly state and who was indifferent between working in the two states may now move. If the marginal worker was unemployed and was indifferent between working and not working because his potential job would be just too dangerous, he may now take a job. If the marginal worker was working in a safer industry, he may now move into the more dangerous industry. Thus, wages must adjust in response to amenities. We expect wages to fall in response to this new job benefit, especially in industries with high injury rates as a result of defective products.

Using CPS demographic and earnings data, BLS occupational injury data, and reconstructing the history of products liability from the LEXIS and Westlaw legal databases, this paper examines whether wages fall as products liability is expanded. The effect of products liability is identified by the timing of legal changes in different states and the injury rates in different industries over time. This paper finds that certain aspects of the tort system — definitely the adoption of comparative negligence, and possibly the adoption of strict liability for manufacturing defects, have a significant effect on wages. Also, demand-side and supply-side effects tend to be of the same order of magnitude. While comparative negligence by itself is probably not highly significant, it is much easier to measure than certain other doctrines, so it is less affected by attenuation bias, and it also magnifies the effect of every previously adopted doctrine that determines the amount of damages, so it is correlated with many similar legal changes.

1.2 A brief introduction to products liability

Traditionally, under English and American tort law, parties injured by a product defect could only sue the immediate vendor of the product. The original manufacturer was held to be too "remote" because he and the injured party were not in contractual "privity"; the classic statement of this principle is in the English case of *Winterbottom v. Wright* (1842).[3]

Over the years, the privity limitation was whittled away — for instance, the seller could be liable to a bystander if he knew the product was dangerous for its intended use and did not inform the buyer, or if the article was considered "imminently dangerous" to human safety. The "imminently dangerous" exception, which was designed for food, drink, drugs, firearms, and explosives, steadily expanded in a haphazard way.[4] The New York case of *MacPherson*

[3] The court wrote that allowing an action by a mail carriage driver against the original manufacturer of a mail coach "might be the means of letting in upon us an infinity of actions . . . . There is no privity of contract between these two parties; and if the plaintiff can sue, every passenger, or even any person passing along the road, who was injured by the upsetting of the coach, might bring a similar action. Unless we confine the operation of such contracts as this to the parties who entered into them, the most absurd and outrageous consequences, to which I can see no limit, would ensue."

[4] See Prosser (1955, § 84, p. 499). See also *Huset v. J.I. Case Threshing Machine Co.* (1903) for a description of the privity rule in America and its exceptions at the turn of the twentieth century.

v. Buick Motor Co. (1916) overthrew the privity rule entirely for "imminently dangerous" products (here, cars) and imposed general liability for negligence on Buick, the remote seller.[5] (This wasn't a job-related injury, but the same principle would have applied if MacPherson had been injured in the same way on the job.)

Eventually, jurists lost faith in even this broader negligence liability. In *Escola v. Coca-Cola Bottling Co. of Fresno* (1944), California Supreme Court Justice Roger Traynor, in a concurring opinion, suggested abandoning the negligence rule in favor of a rule of strict liability.[6] Product manufacturers, Traynor argued, were in a better position to design products to minimize losses, they were financially more able to spread losses, and a shift to strict liability would eliminate the proof complications inherent in negligence liability (in strict liability, the inquiry is the relatively straightforward question of whether the product caused the injury; in negligence, it is the more complicated one of whether the manufacturer exercised "reasonable care"). But this wasn't the law in California until Traynor stated the principle in a majority opinion in *Greenman v. Yuba Power Products, Inc.* (1962). Later — and especially with the statement of the rule of strict liability in the influential Restatement (Second) of Torts in 1966 — strict liability for product defects became widely accepted.[7] Priest (1985) explains:

> [T]hrough the late 1950s and early 1960s defective product cases were controlled by contract law with its privity requirement and, to a substantially lesser extent, by negligence law.
>
> During the four-year period 1960–64, however, the dominant sources of law for product injuries changed dramatically. Within this very short period the law addressing product-related injuries was irrevocably shifted to a course that, by the end of the decade, would render contract law obsolete and leapfrog existing negligence law entirely.

[5] *MacPherson* was quickly followed in other jurisdictions. See Epstein (1995, pp. 739–40).

[6] Traynor wrote: "I concur in the judgment, but I believe the manufacturer's negligence should no longer be singled out as the basis of a plaintiff's right to recover in case like the present one. In my opinion it should now be recognized that a manufacturer incurs an absolute liability when an article that he has placed on the market, knowing that it is to be used without inspection, proves to have a defect that causes injury to human beings."

[7] The Restatement (Second) of Torts § 402A states, in part:

1. One who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property, if
   (a) the seller is engaged in the business of selling such a product, and
   (b) it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold.
2. The rule stated in Subsection (1) applies although
   (a) the seller has exercised all possible care in the preparation and sale of his product, and
   (b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.

> The liability of manufacturers for product-related losses was vastly increased and the obligations of consumers vastly diminished.
>
> The new legal world that the revolution created dominates today's law of civil obligations. Modern strict liability is more than a single legal standard. It comprises a complex regime of legal doctrines and categories that, in large part, are entirely novel since the mid-1960s.
> . . .

The following are some of the legal changes that have come about since the 1960s. Tort law is mostly a state-law matter, and it is generally adopted in common-law fashion, by the precedential effect of the reasoning in judges' decisions in particular cases. Thus, different aspects of the tort system can be adopted at different times in different states — which is a useful source of econometric variation.

- As discussed above, strict liability was extended to "manufacturing defects" — when a product doesn't conform to its intended design, for instance if a soda bottle explodes unexpectedly.

- But what if a product that injures someone was manufactured exactly according to design? At first, courts were reluctant to inject themselves into the product-design process and second-guess the decisions of product manufacturers. For instance, according to the "patent danger" doctrine, if a characteristic of a product, such as a visible sharp blade without protection for the user's fingers, was "open and obvious," the plaintiff could generally not recover as a matter of law (the question didn't even get as far as the jury).[8]

  Eventually courts overcame their reluctance to become product redesigners,[9] but it took a while for them to settle on a way to operationalize the idea of design defect. The idea of consumer expectations was originally considered a pro-plaintiff move — a product could be considered defective if it was designed less safely than expected. But consumer expectations could also preclude a finding of design defect — for instance, if a consumer used a dangerous product with full knowledge of its dangerous properties.

  Most states eventually adopted a "risk-benefit" test, under which consumer expectations became only one of many factors that a jury could take into account. Under the risk-benefit test, all questions could get

[8] See, e.g., the 1951 case of *Campo v. Scofield*, where the New York Court of Appeals wrote: "Just as the manufacturer is under no obligation, in order to guard against injury resulting from deterioration, to furnish a machine that will not wear out, so he is under no duty to guard against injury from a patent peril or from a source manifestly dangerous . . . . In such cases, the manufacturer has the right to expect that . . . persons will do everything necessary to avoid [harmful] contact, for the very nature of the article gives notice and warning of the consequences to be expected, of the injuries to be suffered."

[9] See *Micallef v. Miehle Co.*, the 1976 New York case overruling *Campo*.

to the jury, and the jury was almost always free to ignore consumer expectations of danger and award damages anyway. The test for whether a product design was defective increasingly became a cost-benefit analysis of the product and of different alternative designs suggested by the plaintiff's lawyer.

- If a plaintiff's own negligence contributed to his injury, the plaintiff could not recover. This doctrine of "contributory negligence" — a rule of no recovery for the negligent plaintiff — gave way in many jurisdictions to "comparative negligence" — under which a negligent plaintiff could still recover something, depending how negligent he was relative to the defendant.

- Punitive damages, while technically available since the 18th century, were rarely used and were reserved for the most egregious behavior. They eventually became more and more prevalent in products liability cases, and the outrageousness threshold decreased.

- Even when no alternative design could be shown to be superior — plaintiffs increasingly came to recover on the theory that the product was defective because of an inadequate hazard warning. Thus, hazard warning litigation came to import the ideas of strict liability and negligence from the rest of products liability law, rather than having to rely on the more difficult basis of contract and warranty law. Some courts adopted presumptions that manufacturers knew all the characteristics of their products and that consumers would always follow warnings if they were given; and some states, such as Pennsylvania and New Jersey, even adopted strict liability for hazard warnings: warnings were held to have been required even where the producer didn't know the hazardous characteristics of the product at the time the product was sold and used (as in the case of asbestos litigation).

Some commentators (see Henderson and Eisenberg (1990)) argue that a reaction to this expansion (or at least a decision not to continue the rapid pro-plaintiff expansion) began in the early 1980s, though this reaction is harder to trace because to the extent it occurred, it did not involve the wholesale reversal of earlier theories but rather manifests itself as a reduced likelihood of plaintiffs' prevailing at trial.

1.3 The likely impact of products liability

We should expect that the products liability system, in the aggregate, should have non-trivial effects. For instance, in the early 1990s, it was estimated that 17% of the price of transit on the Philadelphia mass transit system went to cover insurance costs for injuries to passengers, and 15%–25% of the cost of ladders was due to liability costs (Viscusi (1991, p. 8), citing *Wall Street Journal* articles).

As for more systematic data, general liability insurance premiums were about $20 billion for each year between 1986 and 1988, and this includes coverage for settlements. It has been estimated that the cost of all expenditures on tort litigation terminating in state and federal courts ranged from $29 billion to $36 billion in 1985 (Viscusi (1991), pp. 26, 28, and 76, citing Kakalik and Pace (1986, pp. 40–41, 66, and 68)). This number may include outlays that don't directly affect employers and employees, like the administrative costs of the court system, administrative costs of the insurance system (20% of premiums), and expenditures by plaintiffs' lawyers. But $20 billion seems like a not unreasonable estimate. Moreover, many firms — for instance, Ford Motor Company, and 47% of firms in the chemical industry — self-insure because liability insurance is not always offered (see Viscusi (1991, p. 25), on self-insurance, also discussing the "insurance crisis" and attributing it to the expansion of tort liability), so the total money passing through the system could be much higher.

Though only 13% of products liability claims are job-related, the dollar amounts involved in each claim are several times larger, since people injured on the job do not sue unless their losses are somewhat higher than the workers' compensation system will reimburse. The average loss is 7 times higher than the average loss from the non-job-related claim, and the average payment is 3.5 times higher than the non-job-related payment (which means job-related products liability claims account for 54% of losses and 37% of payments) (Viscusi (1991, p. 182)).

By comparison, note that the workers' compensation system took in $22 billion in premiums in 1980 (and $53 billion in 1990), and paid out $14 billion in benefits in 1980 (and $38 billion in 1990) (Statistical Abstract (2003), table 559).

So the amount of money passing through the tort system and the amount passing through the tort system in products liability claims are of roughly similar orders of magnitude. And the wage effect of workers' compensation as a whole has been estimated at about $1475 (in 1988 prices) (Moore and Viscusi (1989, p. 513)). So a wage effect of the products liability system in the hundreds of dollars may not be unreasonable.

2 Literature review

There has been a lot of theory on the effects of the tort system (Shavell (1987), Kaplow and Shavell (2001)), but not much has focused on the effects of the tort system on labor markets. Also, there has not been much empirical study of the effects of tort law. Viscusi and Hersch (1990) and Prince and Rubin (2002) show that product liability litigation affects stock prices, but they do not look at the effect of legal doctrine. Viscusi (1991) examines the effect of changes in tort doctrine on the organization of the insurance industry and the availability of liability insurance. Viscusi and Moore (1993) give theory and evidence on the effect of tort law on R&D and innovation. Higgins (1978), writing a decade after the start of the products liability revolution, explores the effect of the

timing of tort doctrine changes on injury rates and obtains mixed results on injury frequency.[10] Some empirical papers have disputed the theory that the tort system affects the injury rate (Priest (1988), Higgins (1978), Viscusi (1991, pp. 8, 19).[11]

Fishback and Kantor (1995) argue that employers passed most of the costs of state workers' compensation laws, which were adopted in most states in the 1910s and 1920s, on to their employees, so that in some industries, wages dropped by the full amount of the estimated benefit. They use the different timing of the adoption of workers' compensation in different states to identify the effect of the legal change. Fishback and Kantor's results are similar to those of Moore and Viscusi (1990) and Gruber and Krueger (1991), who studied the effects of workers' compensation on wages in the 1970s and 1980s.

Similar results have been found for judicial changes in the rules of compensation. Lott and Manning (2000) analyze the effect of the *Borel v. Fibre-board Paper Products Corp.* (1973) decision. *Borel* allowed workers exposed to carcinogens — the case itself involved asbestos — to bypass their employer, who was protected by workers' compensation laws, and sue the supplier of the hazardous inputs directly.[12] Lott and Manning find that "a worker facing the average exposures to carcinogens earned an additional $1,098 in 1970 [compared to 1984], measured in 1984 dollars. Workers in industries with exposure that is one standard deviation greater than the mean earned an estimated annual premium of about $2,983. Assuming a real interest rate of 3% and 40 years of work, these two levels of exposure produce present values of $25,364 and $68,907" (p. 118).

These papers find that a change in compensation that benefits workers is associated with significant reductions in wages. But they are not clean tests of equalizing wage differential theory.

Fishback and Kantor (1998) argue, with some historical support, that workers' compensation benefited not only workers but also employers, who (even aside from the possibility of paying lower wages) expected greater certainty and reduced administration costs.[13] If this is so, the value of workers' marginal

[10] In a related context, see the work of Schanzenbach (2003) on the labor-market effects of exceptions to the employment at will doctrine.

[11] Viscusi points out the old-products bias, which holds new products to a higher standard and thus encourages people to stick with their older products which have a higher injury rate; and he also notes that the expansion of the tort system happened on the heels of a huge drop in accident rates and that the biggest expansions happened when accident rates were already dropping quickly.

[12] Even with the expanded products liability system described in the previous section, the workers couldn't sue the input suppliers directly even before *Borel* because asbestos, and other hazardous chemicals, were considered "unavoidably unsafe products." The Restatement (Second) of Torts § 402A, comment k, says that an unavoidably unsafe product, "properly prepared, and accompanied by proper directions and warning, is not defective, nor is it *unreasonably* dangerous . . . . The seller of such products . . . is not to be held to strict liability for unfortunate consequences attending their use, merely because he has undertaken to supply the public with an apparently useful and desirable product, attended with a known but apparently reasonable risk" (emphasis in original). *Borel* was a failure-to-warn case, based on 30 years' worth of workers' exposure to asbestos, which opened the floodgates of suits against suppliers of asbestos and other hazardous products.

[13] They write: "If . . . employers . . . stood to gain from workers' compensation,

product may have increased, and so employers would have been willing to pay higher wages, partly offsetting the equalizing wage differential effect. Alternatively, if one does not believe Fishback and Kantor's historical story and believes instead that workers' compensation laws hurt employers (but were enacted anyway for the sake of workers or because of pressure from insurance companies), then one would expect employers to pay their workers less, again making it hard to identify the equalizing wage differential.

Equalizing wage differential theory predicts that if sunsets become more beautiful in California — not hurting employers in the slightest — wages will fall in California. Thus, we need to find something that helps workers without hurting their employers.

Workers' ability to sue their employers' input suppliers would fit the bill — provided the input suppliers cannot pass the tort exposure back on to the employers — but Lott and Manning's study of the effects of this legal change is not terribly compelling. Lott and Manning argue that the drops in compensation between 1970 and 1984 are due to the *Borel* decision in 1973, but they do not examine any years but those two. They may have good reasons for choosing these two years,[14] but many other changes occurred between 1970 and 1984. The *Borel* decision was a federal case applying Texas law, so to the extent their estimation is valid, Texas courts must have acquiesced in *Borel*'s reasoning, and other states must have adopted similar rules. This probably happened, but if so, Lott and Manning only have a single legal change identifying their equation.[15] Moreover, because asbestos manufacturers could pass the cost of liability on to their customers, thus affecting the profitability of the workers' employers, this is also not a clean test of equalizing wage differentials.

Using the timing of state-level products liability changes to identify wage differentials is a cleaner test of equalizing wage differential theory.

Because injured workers can collect tort judgments without reducing their workers' compensation payments,[16] workers benefit from the availability of

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then why did we see a governmental solution instead of a private movement to establish workers' compensation-like arrangements at the firm level? Under private schemes workers would have signed contracts with their employers in which the worker, before any accident occurred, waived his right to a negligence suit in return for a guaranteed set of accident benefits, regardless of fault. Part of the answer . . . is that the courts did not enforce [such] ex ante contracts . . . . Employers were clearly interested in establishing such contracts [but courts voided them and 28 states had done so by legislation at the time of the passage of workers' compensation laws]."

[14] They write: "The initial year of 1970 was chosen since it preceded both the *Borel* case's district and appeals court verdicts and yet was still relatively close in time to when the primary data that we will be using to measure exposures to carcinogenic material were gathered. The final year of 1984 was chosen since it was safely after the major changes in the liability laws had occurred, and it also represents the middle of a study that we use that identifies the rates of occupational cancers."

[15] The equation is also identified by different carcinogen exposures in different two-digit SIC codes, taken from two National Institute for Occupational Safety and Health studies, one in the early 1970s and another in the early 1980s.

[16] See Weiler (1989): "However sizable may be the funds expended through an administrative no-fault program such as workers' compensation (WC), from a legal perspective the latter is an island in the broader sea of tort . . . . [T]he tort system is still available in principle even to

product manufacturers' liability. (Today, personal-injury lawyers who take cases on a contingency-fee basis are widely available, but badly injured parties hired lawyers to sue manufacturers even in the 1960s and 1970s.) But because the employer is (mostly) protected by the workers' compensation system,[17] he is not directly harmed by lawsuits against product manufacturers. Consider a manufacturer who sells to a national market. If tort law changes in a single state, and the manufacturer cannot price-discriminate among states (otherwise one might buy a machine in one state and transport it to another), then he will only pass on a fraction of the additional cost to his client. So the client and its employees are minimally hurt and the product supplier presumptively bears the brunt of the burden, the benefits of which are enjoyed by the client's employee.[18]

Now consider the manufacturer's own employees in this idealized world where all manufacturers of dangerous products sell to a national market. Changes in any one state's rules will have a small effect on company operations, so the suppliers' employees' wages wouldn't change much by a labor demand effect; while if the manufacturer's home state becomes more generous, the equalizing wage differential effect will dominate, assuming that all the company's workers work and get injured within the state and sue under their home state's law. The availability of products liability is like a pot of free money for the worker, so if the theory is correct, we should be able to observe a drop in wages attributable to the products liability system and not to the decreasing value of the marginal product of labor.

In reality, manufacturers of dangerous products do not sell to a fully national market, so we expect to see both the labor demand and the labor supply effects.

3 Empirical strategy

Other things being equal, are wages lower when and where the tort system is more generous? The simplest equation we could use to test the hypothesis

victims who have been able to satisfy the precondition for entitlement to such administrative compensation . . . . For example, if a truck driver is injured in a highway collision with a vehicle which is carelessly operated by another driver, the employee's tort rights against this other driver are unimpaired by the WC system. Because such outside parties play no role in providing WC benefits, they can claim no reciprocal protection against tort suits . . . . The major burden of such employee suits is now borne by the manufacturers of vehicles, tools, machines, chemicals, and other products sold to employers for use in their operations."

[17] Weiler (1989) describes the limits to employer immunity — today, the employer is still liable, despite the workers' compensation system, for dignitary injuries and intentional misconduct, and employer immunity has been severely limited since the *Borel* decision in 1973.

[18] One potential problem is that the employer may also benefit from the expansion of products liability, to the extent that he subrogates the worker's claim to the extent of his workers' compensation payment (see Weiler (1989)). But the employee's benefit is presumptively greater than the employer's benefit, since the employer only recovers to the extent of his workers' compensation exposure, which only has the effect of wiping out the workers' compensation payment, while the worker may collect something much larger if his injury is more severe than workers' compensation can cover or if he collects punitive damages.

would take the following form:

$$\ln w_{ijkt} = \beta_0 + Tort_{kt}\beta_1 + \beta_2 Inj_{jt} + \beta_3 \ln WC_{kt} + I^j\beta_4 + I^k\beta_5 + I^t\beta_6 + X_i\beta_7 + \epsilon_{ijkt}$$

where:

- $\ln w_{ijkt}$ is the log wage of individual i in industry j, state k, and year t;
- $Tort_{kt}$ describes the tort system in state k and year t;[19]
- Inj_{jt} is the nationwide injury rate in industry j and year t;
- $\ln WC_{kt}$ is a measure of the generosity of the workers' compensation system (in this case, the log of the maximum workers' compensation benefit in state k and year t);
- I^j, I^k, and I^t are vectors of industry, state, and year dummy variables; and
- X_i is a vector of demographic characteristics, such as sex, race (in fixed effect form), age (and age^2), and education (and education^2).[20]

To characterize the generosity of the tort system, I focus on the five aspects of products liability law described in the previous section, and characterize $Tort_{kt}$ by a set of five indicator variables PD_{kt}, SL_{kt}, DD_{kt}, CN_{kt}, and HW_{kt}, which are equal to 0 or 1 depending whether state k, by year t, has adopted the following five doctrines:

- *PD: Punitive damages.* Punitive damages — the amount that a plaintiff can get over and above compensation for his injuries if the defendant acted maliciously — are an old doctrine,[21] though punitive damages awards are

[19] I implicitly assume that there are not different tort rules for different industries, though this is definitely false as to the pre-strict liability period, when there were different rules for "imminently dangerous" products and for food and drink. There remain specialized rules today like strict liability for "ultrahazardous activities," but doctrine has become more uniform across industries. In practice, it is hard to tell whether courts are applying a stricter standard to industries perceived to be more suspicious under the guise of applying a unified negligence inquiry.

I also assume that the timing of changes in state tort law is exogenous — while tort law has something to do with the policy preferences of judges, who are appointed by state governors and legislatures, the timing of judicial appointments is separate from the timing of economic shocks that might affect wages. The evolution of tort law seems more influenced by developments in legal academia, which, ensconced in its ivory tower, is largely unaffected by wage shocks.

[20] In this data set, I only observe each individual once, so the age and education variables are independent. This still leaves out much of inherent ability and other unobserved determinants of wage. Identification rests on the assumption that state populations are not changing systematically with tort laws; that is, that people's characteristics are balanced on average across "treatment" and "control" states.

[21] See *Pacific Mutual Life Insurance Co. v. Haslip* (1991): "Punitive damages have long been a part of traditional state tort law. Blackstone appears to have noted their use. Among the first reported American cases are *Genay v. Norris* (1784) and *Coryell v. Colbaugh* (1791)" (citations and internal quotes omitted).

thought to have increased in amount and frequency in recent decades, especially with the advent of mass tort suits. By far the largest number of punitive damage actions today arise in connection with products liability — mainly asbestos litigation.[22] I treat a decision that punitive damages are admissible in products liability cases, or a decision awarding punitive damages in a products liability case, as a move toward a more plaintiff-friendly tort system — not because it increases the likelihood of victory, but because it increases the amount recoverable if the plaintiff wins. We do not expect PD to have a positive coefficient, though it may be close to zero.[23]

- *SL: The adoption of strict liability for manufacturing defects.* If there is strict liability, then if the plaintiff can establish that the product is defective (i.e., not conforming to the manufacturing plan) and that this defect caused his injury, he does not need to establish anything further (such as the manufacturer's negligence) to recover. Because a plaintiff can recover more easily under strict liability than under negligence, it is tempting to treat a state's adoption of strict liability as a move toward a more plaintiff-friendly tort system,[24] though in reality it depends on many details of the negligence system that strict liability replaced,[25] alternatives to the tort

[22] Epstein (1995, p. 932).

[23] Such a measure is not ideal. First, unlike the three previous aspects of the tort system, an award of punitive damages or an announcement that they are admissible in a products liability case does not announce a new legal principle, but only confirms what many people may have already suspected — that the punitive damages normally available in every other case are also available in this sort of case. Second, some states have adopted legislative or judicial constraints on the circumstances in which punitive damages can be awarded or the amounts of punitive damages if they are awarded (e.g., no more than four times compensatory damages), so a list of states that have accepted punitive damages conceals a good deal of diversity.

[24] Shavell (1987) shows that under idealized conditions — for instance, if the legal system is costless and if courts can set the required standard of care under negligence at exactly the efficient level — a shift from negligence to strict liability will not change the standard of care, but it will reduce injurers' activity levels to the efficient level. Victims will get more compensation; and on the labor demand side, injury rates should fall, and so should manufacturers' profits and the value of their workers' marginal product.

[25] There is no reason to expect that courts set the standard of care under negligence at exactly the efficient level; if the negligence regime was based on too high a standard of care, a shift to strict liability might, overall, work in the other direction. Even if the standard of care is set at the efficient level under negligence, if courts are imperfect in applying this level of care, potential injurers similarly take too much care, so a shift to strict liability may help manufacturers.

system,[26] and the administrative costs of the alternative systems.[27] Thus, it is thus not clear what sign we should expect on SL.

- *DD: Design defect doctrine and consumer expectations.* As explained above, when consumer expectations stopped being a bar to recovery, courts were free to second-guess manufacturers' choices of product design using a risk-benefit test. We do not expect DD to have a positive coefficient.

- *CN: The adoption of comparative negligence.* Historically, a plaintiff could not recover if he was "contributorily negligent," that is, if he caused his own injury to any extent through his own carelessness.[28] Any amount of carelessness on the part of the plaintiff was enough to negate his entire recovery. This rule fell into increasing disfavor, until most states abolished the doctrine either by legislation or by judicial decree in favor of the rule of "comparative negligence," whereby a plaintiff could recover $(100-\alpha)\%$ of his damages if he himself was $\alpha\%$ negligent.[29] Before 1968, only five states had adopted some form of comparative negligence by statute, and 19 more did so between 1969 and 1973.[30] The most famous case to overthrow the contributory negligence doctrine was the California case of *Li v. Yellow Cab of California* (1975), where both parties were negligent:

[26] Even without strict liability in tort, plaintiffs have historically been able, to a limited extent, to sue sellers or manufacturers of defective products on an implied warranty theory (see, e.g., *McCabe v. Liggett Drug Co.* (Mass. 1953) — a contractual theory that generally boils down to strict liability, since the seller (or manufacturer) is held to guarantee that the goods he sells are free from defect and safe for their intended use (of "merchantable" quality), and this warranty is usually non-disclaimable (see Prosser (1955, § 84, p. 507–08)). To this day, for instance, Massachusetts has not formally adopted strict liability, but the contractual remedy for a defective product (at least in cases where an actual sale has taken place) is almost the same as the tort remedy under strict liability (see *Mason v. General Motors Corp.* (1986)).

[27] Strict liability may change litigation costs in an unknown direction: under strict liability, the inquiry shifts from establishing the injurer's negligence (did the manufacturer take reasonable care?) to establishing causation (did the product cause the injury?), which may be an easier inquiry, though even this is not clear in the products context, where the product is in the victim's control, not the manufacturer's, the whole time and it can be hard to say whether and to what extent the product was being intentionally misused. But even if establishing causation is easier than establishing negligence, more cases can go to trial under a strict liability regime than under a negligence regime.

[28] See the English case of *Butterfield v. Forrester* (1809) for a classic statement of this principle in English law: "One person being in fault will not dispense with another's using ordinary care for himself. Two things must concur to support this action, an obstruction in the road by the fault of the defendant, and no want of ordinary care to avoid it on the part of the plaintiff." See also Beach (1892, pp. 12–13): "The policy of the law in this respect is founded upon the inability of human tribunals to mete out exact justice. A perfect code would render each man responsible for the unmixed consequences of his own default; but the common, in view of the impossibility of assigning all effects to their respective causes, refuses to interfere in those cases where negligence is the issue, at the instance of one whose hands are not free from the stain of contributory fault."

[29] Some states adopted "impure" comparative negligence, which allows the plaintiff to recover $\alpha\%$ of damages, but only if $\alpha < 50$.

[30] See Epstein (1995, p. 381).

the plaintiff was trying to cross three lanes of oncoming traffic to enter a service station, while the defendant was running a yellow light at excessive speed at the time of the accident. I treat the adoption of comparative negligence as a move toward a more plaintiff-friendly tort system,[31] and thus, we expect CN to have a negative sign. The coefficient on CN captures more than just the basic effect of comparative negligence. First, attenuation bias should be smasller because comparative negligence is easy to measure: courts are generally explicit about adopting it, which is more than can be said about the other doctrines. Second, comparative negligence acts as a multiplier on whatever amount of damages was determined due to other doctrines. If damages are D, the amount recovered is αD. Thus, a doctrine that increases the amount recovered from 0 to αD in effect magnifies the effect of all previously existing doctrine. So the CN coefficient potentially captures many tort doctrines.

- *HW: Hazard warnings as a type of design defect.* The doctrine that classified inadequate hazard warnings as a species of product defect allowed plaintiffs to collect on a products liability theory even when there was no manufacturing defect and they could not show that there was a design defect by analyzing alternative designs. Viscusi (1991, pp. 8–9) argues that this, together with design defect doctrine, were two of the most significant products liability innovations. We expect this variable to have a negative coefficient, though it may also be near zero.[32]

Thus, the equation we are estimating takes the form:

$$\begin{aligned}\ln w_{ijkt} = \beta_0 &+ \beta_1 PD_{kt} + \beta_2 SL_{kt} + \beta_3 DD_{kt} + \beta_4 CN_{kt} + \beta_5 HW_{kt} \\ &+ \beta_6 Inj_{jt} + \beta_7 \ln WC_{kt} + I^j \beta_8 + I^k \beta_9 + I^t \beta_{10} + \beta_{11} Sex_i \\ &+ I_i^{race} \beta_{12} + \beta_{13} Educ_i + \beta_{14} Age_i + \beta_{15} Age_i^2 + \epsilon_{ijkt}\end{aligned}$$

where PD, SL, DD, CN, and HW represent the five aspects of the products liability system discussed above. We may find $\beta_1 < 0$, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 < 0$,

[31] Note, though, that the adoption of comparative negligence does not always help plaintiffs. In strict liability cases — where negligence is not ordinarily at issue — contributory negligence was never a defense. But in 1978, California allowed a plaintiff's (comparative) negligence as a defense in a strict liability products action. In *Daly v. General Motors*, the decedent was injured when his car struck a freeway divider; he was thrown from his car and sustained fatal head injuries. Plaintiffs argued that the door lock was defectively designed, but the defendant won the case after presenting evidence that the decedent hadn't locked the door or used his seat belt and was, moreover, drunk. The California Supreme Court held that the decedent's negligence was enough to reduce plaintiffs' recovery to zero. Today, most states have adopted the rule in *Daly* (see Epstein (1995, p. 858)), though in some states, plaintiffs' negligence is still not a defense in a strict liability action (see *Melia v. Svoboda* (1974), *Melia v. Ford Motor Co.* (1976)).

[32] While these doctrines may have significantly affected product and label design, it is not clear how much they would have helped plaintiffs, who already had other legal remedies (even if perhaps somewhat less effective) available to them for inadequate hazard warnings.

and $\beta_5 < 0$, though as discussed above, we may find that some are zero and it wouldn't necessarily be abnormal to find some positive. (In addition, since there may be a shift of jobs from dangerous jobs to safer jobs, these reforms may even make wages increase in some industries.)

More properly, the benefit of the products liability system to the worker is a function not only of whether a legal remedy is available, but also of whether it will be used. We suspect that an expansion of products liability would have a larger effect in industries with a higher injury rate, such as lumber and wood products, which had an injury rate of 39.4 per 100 full-time workers in 1967, and a smaller effect among workers in industries with a lower injury rate, such as security and commodities brokers, who had an injury rate of 0.4 in 1970, or in the legal services industry, which also had an injury rate of 0.4 in 1971, 1980, and 1981. Therefore, it seems appropriate to also estimate a second equation where add interaction effects of the tort system with the injury rate: $PD \times inj$, $SL \times inj$, and so on.[33]

In the equations above, we expect the coefficient of Inj_{jt} to be positive, since the injury rate is a disamenity of the job, and the coefficient of $\ln WC_{kt}$ to be negative.[34]

I use a few other empirical strategies here:

- To detect whether, as expected, expansions in the products liability system led to drops in employment in high-injury-rate sectors, I regressed $\ln workers_{jkt}$, the number of workers in the CPS data set in industry j, state k, and year t, on the five tort variables, the tort variables interacted with the injury rates, inj_{jt}, and the dummies I^j, I^k, and I^t.

- To separate supply-side from demand-side effects, I interact the tort variables with $I^{19/39}$, an indicator variable indicating whether the worker is in an industry manufacturing possibly dangerous products. As a proxy for being a product manufacturer, I have used membership in industries with SIC codes between 19 and 39. Then I also interact the tort variables interacted with the injury rate with $I^{19/39}$.

[33] Again, we may find the coefficients of these interaction effects to be negative, but for the same reasons as above, they could be zero or positive. Note that the injury rate, by aggregating large and small injuries, hides a great deal of heterogeneity; moreover, what we're mainly interested in is not all injuries, but injuries caused by defects in products, such as machines, and not by the inherent danger of the work environment or by the carelessness of the workers. Because we don't know how many injuries are caused by carelessness or the work environment, or how the proportion of injuries caused by machines has evolved over time, we may be misrepresenting the effect of the injury rate. In particular, there may be serious attenuation bias on the injury coefficient.

[34] Because it is unclear whether this year's or last year's injury rate, or this year's or last year's tort system, is relevant for determining today's wage, I have run the basic regressions using both current lagged injury rates and tort system variables.

I ran the regressions using OLS with the *cluster* feature of Stata to avoid grouped error terms. This leads to conservative (i.e., high) standard errors, since we only have 11 states, and the unobserved components of wages (which are contained in the error term) are correlated by state.

4 Data

Descriptive statistics for the main variables are presented in Appendix 1.

The main source for my data is the Current Population Survey (CPS). The March surveys contain demographic and occupational data. The CPS data runs from 1962 to 1998, but I have not used the years 1962 and 1963 because the education variable was not used in the March surveys in those years. The following variables were taken from the CPS:

- My variable $\ln w_{ijkt}$ was formed from the CPS variable $\_wklywg$, excluding observations where $\_wklywg = 0$.
- The dummy variables I^j were formed from the CPS variable *ind*, which is a code for the industry the individual worked in last week. The codes changed from year to year, in a way described in Appendix K of the March CPS manual, but I made them consistent by translating *ind* into a two-digit SIC code for those values of *ind* where the two-digit SIC code could be uniquely determined.
- The dummy variables I^k were formed from the CPS variable $\_state$, which is a code for the region of the United States where the individual lives. In 1964–67 and 1977–98, all states are identified uniquely, but in 1968–76, there are only 21 areas identified, and only 11 of those contain only one "state" (California, Connecticut, District of Columbia, Florida, Illinois, Indiana, New Jersey, New York, Ohio, Pennsylvania, Texas).[35] I ran the regressions on these 11 states.
- The dummy variables I^t were formed from the CPS variable $\_year$, which records the year of the observation (1964–98).
- Sex_i was formed from the CPS variable *sex*.
- The dummy variables I^{race_i} were formed from the CPS variable *race*, which can take on values 1 (white), 2 (black), and 3 (other).
- $Educ_i$ was created from the CPS variables $\_educ$ (1964–91) and *grdatn* (1992–98). Some information was lost in the transformation to a consistent variable — while $\_educ$ takes on 19 values and *grdatn* 17, my new $Educ_i$ takes on 12 values.
- Age_{it} was created from the CPS variable *age*.

The variable Inj_{jt} was mainly taken from the "Incidence rates of nonfatal occupational injuries and illnesses by selected industries and case types" tables

[35] The District of Columbia is considered a state in this paper.

in the Bureau of Labor Statistics' (BLS) *Occupational Injuries and Illnesses* books.[36]

The variable $\ln WC_{kt}$, maximum weekly workers' compensation benefit, was obtained from two publications, *Analysis of Workers' Compensation Laws* and its predecessor, *Analysis of Workmen's Compensation Laws*. Maximum benefit was chosen instead of, say, average benefit, so as to be exogenous.

The variables PD_{kt}, SL_{kt}, DD_{kt}, CN_{kt}, and HW_{kt} were constructed by my own legal research in the LEXIS and Westlaw legal databases. This process involves reading many cases in each jurisdiction. Because judge-made common law is precedent-based, a court applying a principle will usually cite a previous decision establishing the principle, and when a court overrules a principle, it will usually say so. I have tried to locate the year in each jurisdiction when a state's highest court adopted each of the principles under consideration (or when a state legislature adopted the principle by statute). The values of the variables, with accompanying notes, are presented in Appendix 2.[37]

5 Evidence and interpretation

5.1 The baseline regressions

All of the regressions were run with or without lags on the tort system variables and with or without lags on the injury rates. These changes did not appreciably change the results. Therefore, I report the results for the regressions without lags on either the tort system variables or the injury rates. (I flag cases where

[36] In 1971 and 1972, the books are called *Occupational Injuries and Illnesses by Industry*; from 1973 to 1991, the books are called *Occupational Injuries and Illnesses in the United States by Industry*; from 1992 to the present, the books are called *Occupational Injuries and Illnesses — Counts, Rates, and Characteristics*. Injury rates before 1971 were taken from the occupational injuries charts in BLS's yearly *Handbook of Labor Statistics*. In 1998, the incidence rate is the number of injuries and illnesses per 100 full-time workers and is calculated as $\frac{N}{EH} \times 200,000$, where N is the total number of injuries and illnesses, EH is the total hours worked by all employees during the calendar year, and $200,000$ is the base for 100 equivalent full-time workers working 40 hours per week and 50 weeks per year. The BLS volumes generally do not give injury rates by state.

[37] Reconstructing the history of products liability law in each state involving reading several cases for each principle in each jurisdiction; but in a precedent-based system of judge-made law, it is often difficult to pinpoint the precise moment that a doctrine was adopted. The court doesn't always say the ideal magic words, "we hereby adopt the principle of comparative negligence in this state." Sometimes the state supreme court talks as though the doctrine has always existed, especially when the doctrine has long existed in other states. Or the doctrine may have been adopted by intermediate appellate courts and never before reviewed by the state supreme court, so by the time the state supreme court gets around to saying something on the subject, the doctrine has already de facto been the law in the state for some time. This tends to be the case in Florida, where the state supreme court seems to let its intermediate appellate courts do a lot more of the work of making law than other states do. Moreover, courts aren't always conscientious about citing all the precedent they rely on, so it may appear that a principle is adopted in one case when in fact it was adopted a bit earlier. Finally, it's harder to show the nonexistence of a doctrine in a state; in these cases, I read enough cases from a wide enough period to be satisfied that the doctrine didn't exist in the state.

the specification makes a difference in the results.) Results (for the no-lag specifications) are shown in Appendix 3.

- The naive regression, estimating equation (1), shows that CN is highly significant and reduces wages by about 4.3%. All the other tort system variables are insignificant.[38]

- In equation (2), which interacts the tort system variables with the injury rate, only SL and CN are significant. Consistent with the previous regressions, CN has a negative interaction effect and an effect of -4.1% at the mean injury level. SL has a positive interaction effect and an effect of -0.3% at the mean injury level.[39]

5.2 Demand-side and supply-side effects

To try to separate demand-side effects from supply-side effects, the regressions were run with dummy variables indicating whether the observations came from manufacturing sectors or the firearms industry (SIC codes 19 through 39). The results are shown in Appendix 4.

- In the regression without injury rate interactions, CN is the only tort system variable that is significant.[40] For non-manufacturing industries, CN reduces wages by 3.3%, while for manufacturing industries, it reduces wages by 6.2%.

- Interacting the tort system variables with the injury rate, SL and CN are again significant. For non-manufacturing industries, CN has an effect of -2.7% (at the mean injury rate for those industries); for manufacturing industries, CN has an effect of -7.3% (at the mean injury rate for those industries). For non-manufacturing industries, SL has an effect of -1.0% (at the mean injury rate for those industries); for manufacturing industries, SL has an effect of $+2.2\%$ (at the mean injury rate for those

[38] If the tort system variables are lagged, CN has an effect of -3.9% (whether or not the injury rate is lagged). If the tort system variables are not lagged, CN has an effect of -4.3% (whether or not the injury rate is lagged). In all these regressions, the other tort system variables are insignificant.

[39] If injury rates are lagged, the same variables are significant, and the magnitudes are roughly the same: strict liability has a positive interaction effect and an overall effect of $+0.1\%$ at the mean injury level, while comparative negligence has a negative interaction effect and an overall effect of -3.9% at the mean injury level. (DD approaches significance here, with a negative interaction effect, but its p-value is still above 10%.)

If the tort system variables are lagged, we get the same results on the significance of those two variables and the signs of their interaction effects. SL has an effect of -0.5% and CN has an effect of -4.2%.

If both are lagged, we get the same results: SL has an effect of $+0.01\%$ and CN has an effect of -3.9%.

[40] HW is only significant with a p-value above 11%; the other variables are even more insignificant.

industries). Overall, the "supply-side effect" accounts for about two-fifths of the total effect for CN and about four-fifths of the total effect for SL.[41]

The first result is that certain aspects of the tort system — definitely the adoption of comparative negligence, and possibly the adoption of strict liability for manufacturing defects, have a significant effect on wages. The second result is that demand-side and supply-side effects tend to be of the same order of magnitude.

Overall, CN is significant, and on average, reduces wages by roughly 4%. Some of this drop in wages is due to the demand-side effect of workers' perceiving higher possible payouts from the tort system; some is due to workers' lowered productivity to the extent their own industry makes dangerous products. Extrapolating from the difference between industries that manufacture products and those that don't, the supply-side effect is about two-fifths of the full effect.

The significance of the CN variable does not necessarily mean that contributory negligence, by itself, changed wages. The adoption of contributory negligence is relatively straightfoward to measure — courts more often state, "We hereby adopt the doctrine of comparative negligence in this jurisdiction" — so it is less affected by attenuation bias than are the other variables. Moreover, because contributory negligence does not change substantive tort law — that is, it does not change who is found negligent — but only increases the amount that the plaintiff can recover, it interacts with every preexisting doctrine that affects liability. For instance, a doctrine that allows plaintiffs to win more easily would not help those plaintiffs who were also found negligent; when the plaintiff's negligence ceases to be a bar to recovery, the previously adopted doctrine automatically acquires additional force at the same time. Thus, in a sense, the adoption of comparative negligence is correlated with other legal changes, so we are potentially picking up the global effect of many tort doctrines.

The effect of strict liability for manufacturing defects decreases wages on average for non-manufacturing industries (-1.0%) and increases them for manufacturing industries ($+2.2\%$), but has a positive interaction effect with the injury rate. First, as noted above, strict liability is not necessarily either a net benefit for injured parties or a net cost for firms, though it has often been portrayed that way. The effect of strict liability depends on, among other things, whether the previously existing negligence regime was strict or loose (see Shavell (1987)). Moreover, the legal regime before strict liability was a patchwork of doctrines that included strict liability for some products and negligence for others, with negligence being applied more or less strictly in different cases, and with uncertainty as to what products were in what category. So a negligence regime may be more beneficial to the worker (with the benefit increasing at higher injury rates), and thus a strict liability regime may show up

[41] If we evaluate everything at a single injury rate, say the injury rate for manufacturing industries, the effect of CN for nonmanufacturing industries is -3.0% and the effect of SL is $+1.8\%$. This yields relative supply-side effects of $\frac{-3.0\%}{-7.3\%} = 41\%$ for CN and $\frac{+1.8\%}{+2.2\%} = 82\%$ for SL.

as a similarly increasing cost to workers. Moreover, firms may benefit from a strict liability regime, since Shavell (1987) shows that a negligence regime in the presence of judicial error may lead to increased (and thus more expensive) levels of care; a strict liability regime alleviates these costs of judicial error. Thus, the effects we find here are plausible.

That the other tort system variables are insignificant is not necessarily surprising. First, they seem to have significant effects on employment in affected industries, and we do not have a particular view on how labor market effects should be divided between wage effects and employment effects. Second, as explained earlier, the "adoption" of punitive damages may not create any new law, since punitive damages are presumptively available in any case, and when courts allow punitive damages in products liability cases, they may simply be straightforwardly responding to the general increase in products liability cases. Similarly, the "adoption" of other doctrines may simply be a formalization of existing practice, and since it is also harder to detect the adoption of certain doctrines, the coefficients of those doctrines are subject to attenuation bias.

5.3 Effects on industry employment

I regressed the log of the number of workers in industry j, state k, and year t, on the tort variables (main effects and interacted with injury rates), injury rates, and industry, state, and year dummies. The results are shown in Appendix 5. We do not necessarily expect the coefficients on the main effects to be negative, since expansions of tort law that hurt employers may drive some people into unemployment but may move other people from dangerous jobs to safer jobs. Thus, the important coefficents are the ones on the interaction effects. All the tort system variables are significant, and all the interaction effects are negative, except the coefficient on SL (which makes sense, since as noted above, SL seems to be beneficial for employers) and the coefficient on CN (not unreasonable if most of the effect is on wages).

6 Conclusion

The expansion of the products liability system has been widely seen as a boon to plaintiffs and, to the extent defective products cause workplace injuries, as a boon to workers, who may find workers' compensation payments insufficient. But equalizing wage differential theory suggests that any benefit to workers will be at least partially offset by a wage reduction (a "supply-side" effect). Moreover, when product manufacturers are hurt by an expansion in products liability, the product of their workers is worth less, and this reduction in the value of workers' marginal product also translates into a wage reduction (a "demand-side" effect).

Using the timing of expansions of the tort system — which increased the generosity of products liability law in a way which helped workers — in different states from the early 1960s to the present, I have tried to identify the effect

of products liability law on a worker's wages as a function of the injury rate in the worker's industry. I have focused on five aspects of the products liability system — the allowance of punitive damages in products liability actions, the adoption of strict liability for manufacturing defects, the rejection of consumer expectations as a bar to recovery in design defect cases, the adoption of comparative negligence, and the adoption of strict liability for hazard warnings.

Overall, comparative negligence reduces wages by 4%, and two-fifths of this effect is the labor supply-side effect of workers' being willing to accept wages in exchange for a change to sue product suppliers. Strict liability for manufacturing defects has a smaller effect which, depending on the specification, can be either positive or negative; four-fifths of this effect is supply-side. The tort system also seems to affect industry employment.

6.1 The size of the effects

Are these effects large? A 4% drop in wage, with an average weekly wage of $327, comes out to about $680, and if the supply-side effect is two-fifths of this, that comes out to $272. This is not unreasonable, given (as explained above) that the total wage effect of the workers' comp system is over $1000, and the on-the-job products liability system pays out amounts of roughly the same order of magnitude. (Note, also, that Lott and Manning's (2000) results in the asbestos context are substantially larger). Moreover, note that:

- These reforms are correlated with other changes so we are picking up the effect not only of comparative negligence but also of other omitted legal changes.
- On-the-job injuries are low-probability events, and people overestimate such probabilities (cite this literature). So it would not be surprising if this amount exceeded the actual expected value of products liability payments.
- In the analogous area of workers' comp, Viscusi and Moore (1987, p. 260) find that "the observed rate at which workers are willing to trade off base wage rates for higher levels of workers' compensation greatly exceeds the actuarial rate of trade-off." They conclude from this that benefit levels are suboptimal in an insurance value sense (though perhaps not so when one takes moral hazard into account); and a similar result may be valid for products liability.

6.2 Normative implications

If true, these results do not discredit the tort system. As various writers have written in the context of workers' comp (Fishback and Kantor, Viscusi and Moore), the fact that wages drop may count in favor of a system: even if wages drop by 100% of the benefit conferred, workers' comp has substantial insurance value to workers, so workers are better off (and, moreover, workers' comp has a

significant effect on workplace safety (Moore and Viscusi)); and employers may also be better off since their total labor costs don't rise and in addition they get some protection against lawsuits. In the tort context, the cost-benefit analysis is different (for instance, the insurance value of the tort system is not so clear (Viscusi) and the tort system's role in promoting safety is disputed (Priest)); but in any case, without knowing the benefits of the tort system, we cannot compare the benefits against the costs. Moreover, any wage effect is a very incomplete measure of the costs of the tort system. The costs of the tort system to employer may dwarf these costs to employees; the tort system as a whole has general equilibrium effects which affect both employers and workers; and equalizing wage differentials only tell us about the marginal worker, not about the average worker. But at a minimum, the reduction in wages at least partially offsets the benefit of the tort system to the worker, and should be considered in an analysis of the tort system.

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48. Weiler, Paul C., "Workers' Compensation and Product Liability: The Interaction of a Tort and a Non-Tort Regime," *Ohio State Law Journal*, L (Fall 1989) 825–854.

49. Westlaw legal database, see westlaw.com.

50. *Winterbottom v. Wright*, 152 Eng. Rep. 402 (Ex. 1842).

8 Appendices

8.1 Summary statistics on selected variables

Variable	Obs	Mean	Std. Dev.	Min	Max
wklywg	814162	327.2228	417.1896	.1	134281
pd	814162	.6554064	.4752359	0	1
sl	814162	.9796502	.1411937	0	1
dd	814162	.5922728	.4914123	0	1
cn	814162	.6974632	.4593567	0	1
hw	814162	.1227115	.3281059	0	1
inj	764484	8.606477	4.949633	.4	39.2
maxwc	755832	273.7933	171.2119	35	815.08
sex	814162	1.447897	.4972782	1	2
*race*1	814162	.8764091	.3291144	0	1
*race*2	814162	.0953766	.2937346	0	1
*race*3	814162	.0282143	.1655846	0	1
age	814162	37.76902	13.52479	14	98
educ	814162	7.305305	2.314677	0	11
sic	814162	55.81626	21.94595	7	97

Notes:

- Dummy variables I^{state}, I^{year}, and I^{ind} are omitted, as are all composite variables (e.g., interactions).
- Variables *wklywg* and *maxwc* only appear in these regressions in log form: $lnwg = \ln wklywg$, $lnmaxwc = \ln maxwc$.
- *race*1 is white, *race*2 is black, *race*3 is other.

8.2 The state of products liability law in 11 states

	PD	SL	DD	CN	HW
California	1967	1963	1978	1975	1978
Connecticut	1979	1961	–	1977	1976
District of Columbia	1976	1970	1995	–	1976
Florida	1981	1976	1979	1973	1983
Illinois	1981	1965	1979	1981	1976
Indiana	1981	1965	–	1983	1975
New Jersey	1984	1960	1978	1973	1978
New York	1987	1963	1983	1975	1980
Ohio	1981	1966	1982	1980	1977
Pennsylvania	1973	1966	1975	1978	1971
Texas	1981	1967	1979	1977	1972

Legend

1. PD: year a state accepted the availability of punitive damages in a product liability case
2. SL: year a state adopted strict liability for manufacturing defects
3. DD: year a state accepted liability for design defects without regard for consumer expectations
4. CN: year a state adopted comparative negligence
5. HW: year a state started considering hazard warnings as a type of design defect

Notes

California

1. *Toole v. Richardson-Merrell Inc.*, 60 Cal. Rptr. 398 (Cal. App. 1967), allowed punitive damages in a prescription drug case.
2. *Greenman v. Yuba Power Products, Inc.*, 27 Cal. Rptr. 697 (1963).
3. *Barker v. Lull*, 573 P.2d 443 (Cal. 1978).
4. *Li v. Yellow Cab Co.*, 119 Cal. Rptr. 858 (1975).
5. *Barker v. Lull Engineering Co.*, 573 P.2d 443 (Cal. 1978) (endorsing a lower court case endorsing Restatement view).

Connecticut

1. C.G.S.A. 52-240b (1979) expressly authorizes punitive damages awards in products liability actions, in cases of reckless disregard for the safety of product users.

2. *Hamon v. Digliani*, 174 A.2d 294 (Conn. 1961); *Garthwait v. Burgio*, 216 A.2d 189 (Conn. 1965) adopts 402A.

3. Declined to adopt in *Potter v. Chicago Pneumatic Tool Co.*, 694 A.2d 1319 (Conn. 1997), adopted a "modified consumer expectations test" which junks consumer expectations for complicated products but retains in other cases; this remains the rule in 2003, see *Moran v. Eastern Equipment Sales, Inc.*, 818 A.2d 848 (Conn. App. 2003).

4. C.G.S.A. 52-572*l* (1977).

5. *Tomer v. American Home Products Corp.*, 368 A.2d 35 (Conn. 1976) ("A product may be defective because a manufacturer or seller failed to warn of the product's unreasonably dangerous propensities.").

District of Columbia

1. *Knippen v. Ford Motor Co.*, 546 F.2d 993 (D.C. Cir. 1976), holds that a showing of actual malice can support a punitive award in an automobile injury case, but denying punitive damages in this case.

2. *Cottom v. McGuire Funeral Service, Inc.*, 262 A.2d 807 (D.C. App. 1970) says, "For present purposes we are not required to adopt the theory of strict liability in tort with all its implications." But the case does allow a nonpurchaser to recover damages from the wholesaler of a product, which comes out to the same thing.

3. *Warner Fruehauf Trailer Co. v. Boston*, 654 A.2d 1272 (D.C. App. 1995).

4. D.C. has not adopted comparative negligence doctrine, see *Appleton v. U.S.*, 69 F.Supp.2d 83 (D.D.C. 1999).

5. *Burch v. Amsterdam Corp.*, 366 A.2d 1079 (D.C. 1976).

Florida

1. *American Motors Corp. v. Ellis*, 403 So.2d 459 (Fla. App. 1981), allowed punitive damages in an automobile injury case.

2. *West v. Caterpillar Tractor Co., Inc.*, 336 So.2d 80 (Fla. 1976).

3. *Auburn Machine Works Co. v. Jones*, 366 So. 2d 1167 (Fla. 1979).

4. *Hoffman v. Jones*, 280 So.2d 431 (Fla. 1973).

5. *Giddens v. Denman Rubber Manufacturing Co.*, 440 So. 2d 1320 (Fla. App. 1983) (Florida Supreme Court never seems to have explicitly endorsed this, but gives lower courts a lot of leeway).

Illinois

1. *Turney v. Ford Motor Co.*, 418 N.E.2d 1079 (Ill. App. 1981) held that punitive damages could be awarded in a tractor injury case, but did not award them in this case.

2. *Suvada v. White Motor Co.*, 210 N.E.2d 182 (Ill. 1965).

3. *Anderson v. Hyster Co.*, 385 N.E.2d 690 (Ill. 1979), citing *Rios v. Niagara Machine & Tool Works*, 319 N.E.2d 232 (Ill. 1974) (stating principle but ruling against defendant).

4. *Alvis v. Ribar*, 421 N.E.2d 886 (Ill. 1981).

5. *Lawson v. G.D. Searle & Co.*, 356 N.E.2d 779 (Ill. 1976) (quoting with approval jury instructions relying on Restatement).

Indiana

1. *Gorman v. Saf-T-Mate, Inc.*, 513 F.Supp. 1028 (N.D. Ind. 1981) allowed punitive damages in a motor boat accident case.

2. *Greeno v. Clark Equipment Co.*, 237 F.Supp. 427 (N.D. Ind. 1965).

3. Product Liability Law adopted in 1982 enshrines consumer expectations. This also seems to be the previous rule, see *Conder v. Hull Lift Truck*, 405 N.E.2d 538 (Ind. App. 1980); *Bemis Co. v. Rubush*, 401 N.E.2d 48 (Ind. App. 1980); *Gilbert v. Stone City Construction Co.*, 357 N.E.2d 738 (Ind. App. 1976).

4. Ind. Code 34-4-33-1 et seq. (1983?).

5. *Nissen Trampoline Co. v. Terre Haute First Nat'l Bank* (Ind. 1975).

New Jersey

1. *Fischer v. Johns-Manville Corp.*, 472 A.2d 577 (N.J. Super. 1984). This case also has a useful list of cases from other states which I have relied on.

2. *Henningsen v. Bloomfield Motors, Inc.*, 161 A.2d 69 (N.J. 1960); while this is a warranty case, it abolishes privity and extends the no-privity exception from foods and other limited categories to all products. Because Henningsen was written before *Greenman* and 402A and doesn't mention

strict liability in tort, and because cars, which were at issue in *Henningsen*, are often considered under the dangerous-instrumentality exception to the privity requirement, *Santor v. A & M Karagheusian, Inc.*, 207 A.2d 305 (N.J. 1965), could be a good alternative candidate, but *Santor* is a property damage case involving carpets — not inherently dangerous — and by *Santor* it's clear that *Henningsen* is about tort and isn't necessarily about inherently dangerous products.

3. *Cepeda v. Cumberland Engineering Co.*, 386 A.2d 816 (N.J. 1978).

4. N.J.S.A. 2A:15-5.1 (1973) allows comparative negligence for cases where defendant's negligence exceeds plaintiff's.

5. *Cepeda v. Cumberland Engineering Co.*, 386 A.2d 816 (N.J. 1978) (adopting Restatement language); see also *Suter v. San Angelo Foundry & Machine Co.*, 406 A.2d 140, 194 n.5 (N.J. 1979) (Clifford, J., concurring) (discussing adoption of Cepeda in context of defective warnings); *Freund v. Cellofilm Properties, Inc.*, 432 A.2d 925, 929 (N.J. 1981) (discussing defective warning cases as though they were now common).

New York

1. *Bikowicz v. Nedco Pharmacy, Inc.*, 517 N.Y.S.2d 829 (A.D. 1987).

2. *Codling v. Paglia*, 345 N.Y.S.2d 461 (1973), claims to first adopt strict tort liability as a general principle (rather than as a set of exceptions to a negligence rule). But *Goldberg v. Kollsman Instrument Corp.*, 191 N.E.2d 81 (1963) had already imposed liability on an airplane manufacturer for the wrongful death of a passenger; the court didn't call it strict liability, but said that "strict tort liability" was a more accurate phrase, citing *Greenman* and 402A.

3. *Voss v. Black & Decker Manufacturing Co.*, 450 N.E.2d 204 (N.Y. 1983).

4. N.Y. C.P.L.R. 1411 (1975).

5. *Robinson v. Reed-Prentice Division of Package Machinery Co.*, 403 N.E.2d 440 (N.Y. 1980).

Ohio

1. *Leichtamer v. American Motors Corp.*, 424 N.E.2d 568 (Ohio 1981), allowed punitive damages in an automobile injury case.

2. *Lonzrick v. Republic Steel Corp.*, 218 N.E.2d 185 (Ohio 1966).

3. *Knitz v. Minster Machine Co.*, 432 N.E.2d 814 (Ohio 1982).

4. R.C. 2315.19 (1980) allows for comparative negligence if plaintiff's negligence was less than defendant's negligence.

5. *Temple v. Wean United, Inc.*, 364 N.E.2d 267 (Ohio 1977).

Pennsylvania

1. *Hoffman v. Sterling Drug, Inc.*, 485 F.2d 132 (3rd Cir. 1973), allowed a punitive damages charge to go to the jury in a prescription drug case.

2. *Webb v. Zern*, 220 A.2d 853 (Pa. 1966).

3. *Berkebile v. Brantly Helicopter Corp.*, 337 A.2d 893 (Pa. 1975).

4. 42 Pa.C.S.A. 7102 (1978).

5. *Incollingo v. Ewing*, 282 A.2d 206 (Pa. 1971).

Texas

1. *Rawlings Sporting Goods Co., Inc. v. Daniels*, 619 S.W.2d 435 (Tex. App. 1981), affirmed a punitive award against a football helmet manufacturer.

2. *McKisson v. Sales Affiliates, Inc.*, 416 S.W.2d 787 (Tex. 1967).

3. *Turner v. General Motors Corp.*, 584 S.W.2d 844 (Tex. 1979).

4. *General Motors Corp. v. Hopkins*, 548 S.W.2d 344 (Tex. 1977).

5. *Technical Chemical Co. v. Jacobs*, 480 S.W.2d 602 (Tex. 1972).

8.3 Basic regression results

Note: Only variables summarized in Appendix 1 are listed here. Regressions where the tort system is lagged or the injury rate is lagged are omitted from this appendix. The tort system variables, tested collectively, are significant in each regression.

Equation (1): Main effects for tort system variables

Regression with robust standard errors	Number of obs = 728472
	F(9, 10) = .
	Prob > F = .
	R-squared = 0.5380
Number of clusters (state) = 11	Root MSE = .6726

$\ln wg$	Coeff.	Robust Std. Err.	t	$P > \|t\|$
pd	.0156333	.0143593	1.09	0.302
sl	.0065556	.0083884	0.78	0.453
dd	.0104813	.0171782	0.61	0.555
cn	−.0425251	.0150188	−2.83	0.018
hw	−.0011812	.0158374	−0.07	0.942
inj	.0054026	.0004966	10.88	0.000
$\ln maxwc$	−.018713	.0158639	−1.18	0.265
sex	−.4186711	.0110597	−37.86	0.000
$race1$	.0936733	.0099976	9.37	0.000
$race2$	.0311491	.0138867	2.24	0.049
$educ$	−.0157853	.0074159	−2.13	0.059
$educ^2$	.0093175	.0005381	17.32	0.000
age	.1062956	.0015968	66.57	0.000
age^2	−.0011253	.0000193	−58.24	0.000

Equation (2): Interactions between tort system variables and injury rate

Regression with robust standard errors	Number of obs = 728472
	F(9, 10) = .
	Prob > F = .
	R-squared = 0.5381
Number of clusters (state) = 11	Root MSE = .67251

$\ln wg$	Coeff.	Robust Std. Err.	t	$P > \|t\|$
pd	.0208009	.0200647	1.04	0.324
sl	−.0502735	.0185806	−2.71	0.022
dd	.0441472	.0268859	1.64	0.132
cn	−.0220675	.015642	−1.41	0.189
hw	−.0198157	.0241062	−0.82	0.430
$pd \times inj$	−.0005032	.0012692	−0.40	0.700
$sl \times inj$	.0054432	.0014193	3.84	0.003
$dd \times inj$	−.00407	.0021333	−1.91	0.086
$cn \times inj$	−.0022483	.0011793	−1.91	0.086
$hw \times inj$	.0020325	.0018637	1.09	0.301
inj	.0003348	.0007555	0.44	0.667
$\ln maxwc$	−.0181089	.0164703	−1.10	0.297
sex	−.4186644	.0110719	−37.81	0.000
$race1$	.0939742	.009979	9.42	0.000
$race2$	.0311385	.0138377	2.25	0.048
$educ$	−.0158092	.0073999	−2.14	0.058
$educ^2$	.0093215	.0005328	17.49	0.000
age	.1062345	.0015936	66.66	0.000
age^2	−.0011246	.0000193	−58.37	0.000

p-values and effects (if p-value < 0.1)

- for both PD variables: 0.5151
- *for both SL variables:* 0.0066; effect at mean injury: $-.00342666$
- for both DD variables: 0.2083
- *for both CN variables:* 0.0355; effect at mean injury: $-.04141737$
- for both HW variables: 0.5701

8.4 Regression results, controlling for manufacturing industries

Equation (1): Main effects for tort system variables

Regression with robust standard errors	Number of obs = 728472
	F(9, 10) = .
	Prob > F = .
	R-squared = 0.5381
Number of clusters (state) = 11	Root MSE = .67253

$\ln wg$	Coeff.	Robust Std. Err.	t	$P > \|t\|$
pd	.0160901	.0121925	1.32	0.216
sl	$-.0018705$	.0151101	-0.12	0.904
dd	.0219738	.0203414	1.08	0.305
cn	$-.0333204$	.0163661	-2.04	0.069
hw	$-.0155597$	.0173458	-0.90	0.391
$pd \times I^{[19,39]}$	$-.0013761$	.0128101	-0.11	0.917
$sl \times I^{[19,39]}$	.0281777	.0409045	0.69	0.507
$dd \times I^{[19,39]}$	$-.0425397$	.0246598	-1.73	0.115
$cn \times I^{[19,39]}$	$-.0283371$	.0112073	-2.53	0.030
$hw \times I^{[19,39]}$	.0515725	.0223	2.31	0.043
inj	.004809	.0004575	10.51	0.000
$\ln maxwc$	$-.0190602$	.0163927	-1.16	0.272
sex	$-.4185501$	.0111013	-37.70	0.000
$race1$	.0934533	.0098769	9.46	0.000
$race2$	.0306817	.0139415	2.20	0.052
$educ$	$-.0160768$	.0073608	-2.18	0.054
$educ^2$	.0093392	.0005311	17.58	0.000
age	.1062623	.0015956	66.60	0.000
age^2	$-.0011249$	.0000193	-58.27	0.000

p-values and effects (if p-value < 0.1)

- for both PD variables: 0.3987

- for both SL variables: 0.5182
- for both DD variables: 0.2717
- *for both CN variables:* 0.0015; effect for manufacturing industries: −.06165749
- for both HW variables: 0.5701

Equation (2): Interactions between tort system variables and injury rate

Regression with robust standard errors	Number of obs = 728472
	F(9, 10) = .
	Prob > F = .
	R-squared = 0.5381
Number of clusters (state) = 11	Root MSE = .67251

$\ln wg$	Coeff.	Robust Std. Err.	t	$P > \|t\|$
pd	.0157845	.0207952	0.76	0.465
sl	−.048083	.0235816	−2.04	0.069
dd	.045709	.025865	1.77	0.108
cn	−.0238884	.0165288	−1.45	0.179
hw	−.0213587	.0216307	−0.99	0.347
$pd \times I^{[19,39]}$	.0076366	.0274931	0.28	0.787
$sl \times I^{[19,39]}$	.0025945	.0493284	0.05	0.959
$dd \times I^{[19,39]}$	−.0457241	.0335774	−1.36	0.203
$cn \times I^{[19,39]}$	−.0264513	.0166539	−1.59	0.143
$hw \times I^{[19,39]}$	.0704065	.0316748	2.22	0.050
$pd \times inj$	−.0000503	.0020867	−0.02	0.981
$sl \times inj$	.005336	.0015268	3.49	0.006
$dd \times inj$	−.0033516	.0019404	−1.73	0.115
$cn \times inj$	−.0004658	.0020555	−0.23	0.825
$hw \times inj$	.0013419	.002017	0.67	0.521
$pd \times inj \times I^{[19,39]}$	−.0006402	.0015019	−0.43	0.679
$sl \times inj \times I^{[19,39]}$	.0001589	.0022198	0.07	0.944
$dd \times inj \times I^{[19,39]}$	.0014417	.0026426	0.55	0.597
$cn \times inj \times I^{[19,39]}$	−.001355	.0012186	−1.11	0.292
$hw \times inj \times I^{[19,39]}$	−.0031314	.0021816	−1.44	0.182
inj	.0069317	.0011569	5.99	0.000
$inj \times I^{[19,39]}$	−.0124952	.0018687	−6.69	0.000
$\ln maxwc$	−.017949	.0170449	−1.05	0.317
sex	−.418489	.0111176	−37.64	0.000
$race1$	.0939289	.0099985	9.39	0.000
$race2$	.0310195	.0138879	2.23	0.050
$educ$	−.0158895	.0072931	−2.18	0.054
$educ^2$	.0093274	.0005235	17.82	0.000
age	.1062112	.0015918	66.72	0.000
age^2	−.0011243	.0000192	−58.45	0.000

p-values and effects (if p-value < 0.1)

- for all four PD variables: 0.7545
- *for all four SL variables:* 0.0100
  effect at mean injury rate for nonmanufacturing industries: −.01016538
  effect at mean injury rate for manufacturing industries: +.2217102
- for all four DD variables: 0.3391
- *for all four CN variables:* 0.0000
  effect at mean injury rate for nonmanufacturing industries: −.02719866
  effect at mean injury rate for manufacturing industries: −.07276023
- for all four HW variables: 0.2168

8.5 Regression results for number of workers

Number of obs = 18484
F(123, 20501) = 539.39
Prob > F = 0.0000
R-squared = 0.7832
Adj R-squared = 0.7818
Root MSE = .63008

$\ln workers$	Coeff.	Std. Err.	t	$P > \|t\|$
pd	.2205473	.0319466	6.90	0.000
sl	.3508799	.0519225	6.76	0.000
dd	.0885225	.030864	2.87	0.004
cn	−.2080011	.0339534	−6.13	0.000
hw	.0934535	.0367137	2.55	0.011
$pd \times inj$	−.0168421	.0026389	−6.38	0.000
$sl \times inj$	.0075814	.003648	2.08	0.038
$dd \times inj$	−.0096756	.0028259	−3.42	0.001
$cn \times inj$	.0029071	.0027419	1.06	0.289
$hw \times inj$	−.0060349	.0028434	−2.12	0.034
inj	.0027283	.0038239	0.71	0.476

p-values

- for both PD variables: 0.0000
- for both SL variables: 0.0000
- for both DD variables: 0.0028
- for both CN variables: 0.0000
- for both HW variables: 0.0381