The Economic Approach *to* Law

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CHAPTER 3

Applying the Economic Model of Tort Law

The preceding chapter focused on general principles of accident law that apply to a broad range of accident settings. In this chapter we apply these principles to several specific areas of tort law. We begin with products liability, or accidents caused by dangerous products. We devote the most attention to this topic, both because it has become an important area of tort law and the source of much dissatisfaction with the operation of the tort system, but also because it raises some new conceptual issues for the economic theory of accident law, the primary one being the distinction between accidents involving "strangers" and accidents involving parties to a contract. Following our discussion of products liability, we examine (in a more cursory fashion) workplace accidents, environmental hazards, and medical malpractice.

1 Products Liability

The number of products liability suits increased markedly during the decades of the 1980s and 1990s. To get an idea of the numbers involved, look at Table 3.1, which shows the number of products liability cases filed in U.S. District Courts from 1980 to 1998. Despite some fluctuations during the 1990s, the trend is predominantly upward, even when measured as a percentage of all civil cases filed during this period (see Figure 3.1).[1] One result has been an increase in the price of certain consumer products, another the withdrawal of some from the market altogether. These trends have led to a number of proposals for tort reform, some of which we discussed in the preceding chapter (for example, the call for a cap on punitive damage awards).

TABLE **3.1** **Data on Products Liability Cases Filed in U.S. District Courts, 1980–1998**

Year	*Total cases filed*	*Cases as a % of all civil cases*
1980	6,876	4.07
1981	8,028	4.45
1982	7,908	3.84
1983	8,026	3.32
1984	7,677	2.94
1985	12,507	4.57
1986	12,459	4.89
1987	14,145	5.92
1988	16,166	6.75
1989	13,408	5.74
1990	18,679	8.57
1991	12,399	5.97
1992	10,769	4.75
1993	16,545	7.24
1994	23,977	10.16
1995	17,631	7.38
1996	38,170	14.00
1997	23,294	8.79
1998	28,325	10.84

SOURCE: *Viscusi (1991, tables 2.1, 2.2);* Statistical Abstract of the U.S.*, various years.*

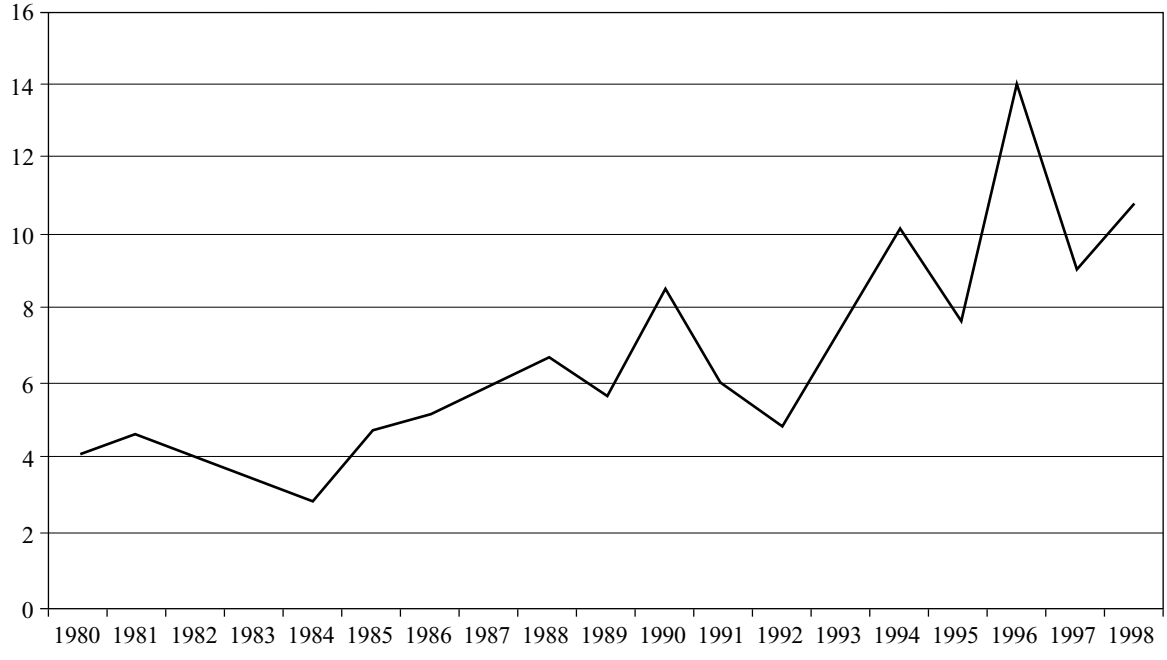

Figure 3.1
Products Liability Cases as a Percentage of All Civil Cases Filed in U.S. District Courts, 1980–1998

We begin our discussion of product-related accidents in this chapter by briefly reviewing the history of products liability law in the United States. We then extend the model from the previous chapter to show the impact of the market relationship between the injurer and the victim. Our objective is to explain the historical trends in terms of the economic model and to evaluate the current status of the law.

1.1 A Brief History of Products Liability Law

In contrast to the modern image of products liability law as protecting defenseless consumers against manufacturers of dangerous products, the law in the nineteenth century was based on the belief that excessive producer liability would burden society with high administrative costs and threaten the economic viability of business.[2] The past 150 years, however, have witnessed a gradual evolution in the law in the direction of greater producer liability. This has occurred in several distinct phases.

The first phase began in the mid-nineteenth century with the birth of the doctrine of "privity," which held that in the event of a product-related accident, the purchaser only had a cause of action against the immediate seller of the product—that is, the party with whom he had a direct contractual relationship.[3] For example, if an automobile accident occurred as a result of negligence on the part of the manufacturer, the victim could only seek recovery from the retailer.

Under privity, the allocation of risk from product-related accidents largely relied on contract rather than tort principles. Although we will see below that the chain of contractual relationships leading from the manufacturer to the ultimate consumer can theoretically serve to shift liability from immediate sellers back to the manufacturer, in reality, this shifting occurs imperfectly. Thus, the doctrine of privity effectively insulated most manufacturers from liability.

The privity limitation nevertheless endured through the end of the nineteenth century until it was finally overturned in 1916 in the famous case of *MacPherson v. Buick* (217 N.Y. 382, 111 N.E. 1050, 1916). The case involved an accident that occurred when one of the wheels on the plaintiff's car broke off, causing him to be thrown from the car. Since the plaintiff had bought the car from a dealer, the doctrine of privity apparently barred the plaintiff from recovering against the manufacturer. Judge Benjamin Cardozo rejected this position, however, based on the argument that the manufacturer could clearly have foreseen the possibility of injuries to individuals other than the immediate purchaser of the car (in this case, the dealer). This did not immediately imply liability on the part of the manufacturer, however. The victim also had to prove negligence by the manufacturer (which he succeeded in doing in *MacPherson*). Nevertheless, the transition from no liability to negli-

gence had occurred, thereby significantly expanding the scope of producer liability.

The next phase in the evolution of products liability law, which witnessed the transition from negligence to strict liability, occurred by two separate routes. The first was the result of a gradual increase in the standard of care owed by product manufacturers and sellers. A key case in this development was *Escola v. Coca-Cola Bottling Co.* (24 Cal.2d 453, 150 P.2d 436, 1944), which concerned an injury caused by an exploding Coke bottle. Although the plaintiff, who was a waitress in a restaurant, could offer no evidence of negligence on the part of the manufacturer, the court held the manufacturer liable based on the doctrine of *res ipsa loquitur*. Recall that under this doctrine, the fact of the accident itself is evidence of negligence—only a defective Coke bottle would explode. As noted in the previous chapter, the application of *res ipsa loquitur* in cases where due care does not entirely eliminate the risk of accidents amounts to a rule of strict liability.

The second route to strict liability occurred in the area of producer liability for breach of warranty. Under the theory of warranties, a branch of contract law, sellers were strictly liable for damages caused by products that failed to function as represented—considerations of negligence were irrelevant. However, the requirement of privity remained for these cases because warranties (implied or expressed) are a form of contract.

This changed with the 1960 case of *Henningsen v. Bloomfield Motors, Inc.* (32 N.J. 358, 161 A.2d 69, 1960). The case also concerned an automobile accident, this time caused by a failure of the steering mechanism. The new element of this case was that the sale contract between the plaintiff's husband and the manufacturer included a clause that expressly limited the latter's liability to the original purchaser and for only certain types of damages. The court rejected this type of contractual limitation, however, arguing that the implied warranty of fitness prevailed regardless of any expressed intentions of the parties to the contrary. Further, the court struck down the privity requirement, noting that, although the victim was not the purchaser, she was someone who "in the reasonable contemplation of the parties to the warranty, might be expected to become a user of the automobile. Accordingly, her lack of privity does not stand in the way of prosecution of the injury suit against the defendant Chrysler."

With the *Henningson* decision, the tort and contract theories of products liability had converged on a strict liability standard. This was explicitly recognized with the publication of the Restatement (Second) of Torts in 1965, Section 402A of which says:

(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 the product, and
(b) the user or consumer has not bought the product from or entered into any contractual relation with the seller.

Note that part (2)(a) excludes consideration of producer care (hence, liability is strict), while part (2)(b) eliminates privity.

To say that liability is strict, however, is somewhat misleading because, in addition to causation, plaintiffs must show that the product had a *defective design*, or, if it is *inherently dangerous* (like cigarettes or dynamite), that the manufacturer failed to warn consumers of the danger. Thus, there is an element of negligence in strict products liability because manufacturers can avoid liability by meeting the design standard or the duty to warn. Recent trends, however, have made it harder to meet these standards.

With the foregoing history as background, in the next section we develop a formal model of products liability with the objective of explaining the broad trend in the law toward strict producer liability. The crucial extension in the accident model from the previous chapter will be to explicitly account for the contractual relationship between the injurer (producer) and the victim (buyer).[4]

1.2 An Economic Model of Products Liability

We develop our analysis of product-related accidents in the context of a simple model of perfect competition.[5] As a benchmark, we first consider a product for which there is no risk of an accident. Let the aggregate inverse demand curve for the "safe" product be given by $b(q)$, which represents the amount consumers are willing to pay for a unit of the good as a function of the number of units purchased, q. A downward-sloping demand curve (reflecting diminishing marginal benefits) implies that $b(q)$ is decreasing in q, as shown in Figure 3.2.

On the supply side, we assume, for simplicity, that marginal and average costs are constant and equal to c.[6] Thus, the supply curve is horizontal at c. Equilibrium output for the safe product occurs at the point where demand equals supply, or at q^* in Figure 3.2, while the equilibrium price is equal to

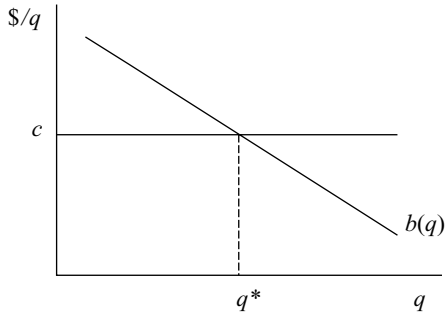

Figure 3.2
Equilibrium Output and Price for a Safe Product

the constant marginal cost, c. Algebraically, equilibrium output is defined by the equation $b(q^*) = c$.

1.2.1 Equilibrium Price and Output for a Dangerous Product

Now consider a product for which there is a risk of injury to the consumer, but which is identical to the safe product in all other respects. Assume that each unit of the product carries the same probability of an accident, p, and the same damages in the event of an accident, D. Thus, total expected damages are qpD (for now we suppress considerations of care, or the safety of the product). Note that this specification mirrors our discussion of activity levels in Chapter 2, where we assumed that expected damages were proportional to the injurer's (or victim's) activity level.

The existence of accident risk may affect either the demand or the supply sides of the market (or both), depending on how the law assigns liability between the manufacturer and the consumer. For purposes of the current discussion, we represent the liability rule as follows. Let s represent the share of accident costs borne by the manufacturer and $1 - s$ the share borne by the consumer, where s is between zero and one. Note that all of the rules from Chapter 2 emerge as special cases of this general formulation. For example, $s = 1$ corresponds to strict liability, $s = 0$ corresponds to no liability (also known as caveat emptor, or "buyer beware"), and conditioning s on the injurer's and/or the victim's care level can yield the various negligence rules.

Consider first the impact of the accident risk on the demand side of the market. In comparison to the safe product, we would expect consumers to reduce their willingness to pay for a unit of a risky product by exactly the amount of their expected accident losses. Thus, if consumers will pay $b(q)$ for a unit of the safe product, they will pay $b(q) - (1 - s)pD$ for a unit of the risky product, where $(1 - s)pD$ is the uncompensated portion of their expected damages. This has the effect of shifting the demand curve down relative to that in Figure 3.2. This is illustrated in Figure 3.3 for the case of strict

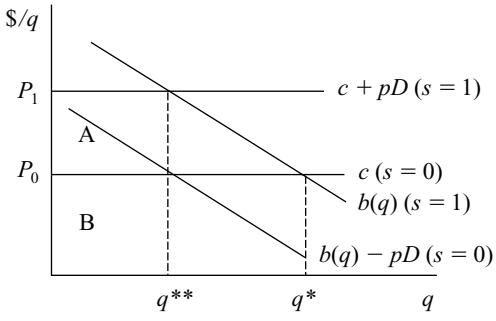

Figure 3.3
Equilibrium Output and Price for a Dangerous Product Under Different Liability Rules

liability ($s = 1$) and no liability ($s = 0$). Note that the demand curve for the risky product is equivalent to that for a safe product when the rule is strict liability because the consumer expects to be fully compensated in the event of an accident, but the curve shifts down by the full expected damages under a rule of no liability because the consumer expects to receive no compensation.

Now consider the impact of accident risk on the supply side. The marginal cost, or supply curve in this case will equal marginal production costs plus expected liability per unit of output, or $c + spD$. Thus, under a rule of no liability ($s = 0$), the supply curve corresponds to that for the safe product, but under strict liability ($s = 1$), the supply curve shifts up by the full amount of expected damages. These two curves are also shown in Figure 3.3.

As before, equilibrium output and price are determined by the intersection of the relevant demand and supply curves. Figure 3.3 shows the equilibrium under strict liability and no liability. The first thing to note about these two equilibria is that *they result in the same level of output, q*** (which is less than the equilibrium output of the safe product, *q**). This is not a coincidence. In fact the result can be stated more generally: *equilibrium output in the model with accident risk is independent of the liability rule*. To prove this general result, equate the algebraic expressions for demand and supply to get

$$b(q) - (1 - s)pD = c + spD. \tag{3.1}$$

But note that terms multiplied by s on the left- and right-hand sides cancel, leaving the condition for equilibrium output:

$$b(q^{**}) = c + pD \tag{3.2}$$

which is independent of s. Thus, no matter how the law assigns liability for accidents, equilibrium output occurs at the point where marginal consumption benefits for the good ($b[q]$) equals the *total* marginal costs, including marginal production and accident costs.

To see the intuition for this result, we first need to determine the equilibrium price. Note in Figure 3.3 that, unlike output, price is *not* independent of

the liability rule. In particular, under strict liability ($s = 1$), the price is given by $P_1 = c + pD$, the full marginal costs (including expected accident costs), whereas under no liability ($s = 0$), the price is $P_0 = c$, or simply marginal production costs. The difference reflects the fact that, under strict liability, the manufacturer is selling the consumer the product *bundled with an insurance policy for the associated accident risk*. Thus, the price reflects the marginal production costs (c) plus the expected damages (pD), where the latter in effect acts like an actuarially fair insurance premium. In Figure 3.3, the insurance component of the price is therefore the difference between P_1 and P_0, while area A is the aggregate expected damages that the manufacturer expects to pay out. Algebraically, area A is given by the insurance premium, pD, multiplied by the aggregate output, q^{**}.

In contrast, when the rule is no liability (caveat emptor), the price simply reflects the marginal production costs because the manufacturer faces no liability in the event of an accident. Area B thus equals aggregate production costs. Consumers nevertheless must still pay for the expected damages, but now they expect to pay it out of their own pockets when an accident occurs. This is what causes the demand curve to shift down when $s = 0$, with the result that the equilibrium output remains at q^{**}. Although consumers cannot look to manufacturers to insure them against product risk in this case, most will have purchased some form of health insurance that will cover any damages due to product-related accidents. The discounted price for the product provides funds that can be used to purchase this insurance.

Alternatively, consumers can "self-insure" by setting aside an amount pD for every unit of the dangerous product that they purchase. Over the long run, this will provide exactly enough money to compensate them for their losses (again, area A in Figure 3.3). The problem with this approach is that if the first unit purchased results in an accident, the consumer will not have had time to accumulate enough resources. This is one important reason why consumers are better off purchasing market insurance rather than self-insuring. Firms, especially small ones, are susceptible to this same problem, so under a rule of strict liability they too usually purchase market insurance to cover their expected tort liability.

Exercise 3.1

Let the aggregate inverse demand curve for a dangerous product be given by $b(q) = 20 - q$. Also, let

$c = \$5$

$p = .01$

$D = \$1{,}000.$

Derive the equilibrium output and price for the product under a rule of no liability ($s = 0$) and under a rule of strict liability ($s = 1$).

The discussion of products liability to this point, and in particular the fact that equilibrium output does not depend on the liability rule, represents an example of the Coase Theorem, discussed in Chapter 1. Recall that the Coase Theorem says that when parties to a legal dispute can bargain at low cost, they will allocate resources efficiently regardless of the particular assignment of liability. As Figure 3.3 and equation (3.2) show, the equilibrium level of output for a dangerous product occurs at the point where marginal consumption benefits equal total marginal costs, regardless of the liability rule. Output is thus invariant to the assignment of liability. The reason for this is the shifting of liability by means of the price.

As we will see below, however, when the price mechanism fails to function perfectly, the requirements for the Coase Theorem are no longer satisfied, and the liability rule will matter for efficiency. This was the case in the model of accidents between "strangers" in the previous chapter. "Strangers" in this sense means parties who had no contractual or market relationship prior to the accident. As a result, they had no opportunity to bargain over the allocation of liability, or at least the cost of doing so was prohibitively high. (When you get into your car, imagine the prospect of bargaining with all the motorists or pedestrians with whom you might have an accident.) In that case, the liability rule was crucial in determining the allocation of resources. Indeed, recall that our discussion of activity levels in the previous chapter ended with the conclusion that, for accidents between strangers, none of the standard liability rules could achieve efficiency of care and activity levels by both injurers and victims.

1.2.2 Care Choices by Manufacturers and Consumers

In focusing on equilibrium output, we have to this point ignored the care choices of the manufacturer and consumers. The question in this context is whether the irrelevance of the liability rule extends to care as well. In theory, the answer is yes, again as a result of the Coase Theorem. To see why, suppose initially that the rule is no liability. In the model of accidents between strangers, we saw that victims will take efficient care under this rule, but injurers will take no care. In the product model, however, suppose that the manufacturer and consumer can strike a bargain whereby the manufacturer agrees to produce a safe product in return for a higher price to reflect the extra cost.[7] If this bargaining exhausts all gains from trade, then the manufacturer will invest in safety to the point where the marginal reduction in accident risk just

equals the marginal cost—in other words, he will invest in the efficient safety level.

A similar story holds for strict liability. Under this rule, the problem with the stranger model was too little victim care. To remedy this inefficiency, the necessary bargain would entail a promise by the consumer to use the product carefully in return for a price reduction by the manufacturer. Again, if the bargain exhausts all gains from trade, it will yield the efficiency level of victim care.

The preceding shows that the Coase Theorem holds for care as well as output, assuming that the market mechanism functions perfectly. In assessing whether these bargains will actually occur, however, the reader may have perceived an asymmetry in the two cases. Under no liability, the consumer will pay the higher price provided that she perceives that the product is indeed safer. In many cases, this will merely require careful inspection of the product prior to purchase. (In other cases, the increased safety will have to be taken on faith or may be misperceived, as discussed below.)

In contrast, the bargain under strict liability requires that the consumer must honor her promise to use the product carefully *after she has paid the lower price and taken possession*. Given the cost of care, this creates a situation in which the consumer may renege on her promise with little if any chance of detection by the producer. As a result, the producer is unlikely to be willing to engage in the proposed bargain in the first place. Such a "market failure" undermines the Coase Theorem in this case.

The preceding discussion suggests that a pure strict liability rule will probably not achieve efficiency regarding consumer care. That still leaves several candidates for a fully efficient rule, including no liability, the various negligence rules, and strict liability with contributory negligence. It turns out, however, that we can significantly narrow the list by considering another possible source of market failure—consumer misperceptions of risk.

1.2.3 Consumer Perceptions of Risk

Our discussion of the economic model of accidents, whether involving strangers or market participants, has assumed that the parties correctly estimate the risk of an accident. In fact, individuals tend to *misperceive* risk in a systematic way. Specifically, there is evidence that they tend to overestimate low probability risks and underestimate high probability risks (Viscusi 1991, 64). Since product accidents primarily fall in the former category (low probability risks), we would expect consumers to systematically overestimate them.

Let us consider how consumer misperception of risk, whether over- or underestimation, affects the analysis of products liability law (Spence 1977; Polinsky and Rogerson 1983). To begin, we initially ignore care and focus on

the determination of equilibrium output. Suppose that consumers potentially misperceive the probability of an accident, viewing it to be αp rather than p, where $\alpha > 1$ represents an overestimate, and $\alpha < 1$ represents an underestimate. Assume, however, that producers perceive p correctly, reflecting the superior knowledge they have about their product's risk, and assume that both consumers and producers correctly estimate the damages from an accident, D.

In this setting, the demand curve for an arbitrary legal rule becomes $b(q) - (1 - s)\alpha pD$, while the supply curve remains the same as before, $c + spD$. Equating these expressions yields the condition defining equilibrium output:

$$b(q) - (1 - s)\alpha pD = c + spD. \tag{3.3}$$

Note first that when $\alpha = 1$, (3.3) is identical to (3.1)—this is the case of no misperceptions where output is independent of the liability rule. However, when $\alpha \neq 1$, (3.3) and (3.1) will differ for any liability rule other than strict liability (that is, for any $s < 1$), meaning that equilibrium output in these cases will depart from the efficient level of output, q^{**}, depending on the specific liability rule and the nature of consumers' perceptions.

To illustrate, suppose that the rule is no liability ($s = 0$), which corresponds to the lower pair of supply and demand curves in Figure 3.3. Setting $s = 0$ in (3.3) yields

$$b(q) - \alpha pD = c. \tag{3.4}$$

If consumers overestimate risk, $\alpha > 1$, and the demand curve is below that in Figure 3.3. As a result, output is too low—consumers demand too little of the product. In contrast, if consumers underestimate risk, $\alpha < 1$, and the demand curve is above that in Figure 3.3. Output in this case is too high. This conclusion generalizes to the case of any $s < 1$; so long as consumers expect to bear some of their own losses, misperceptions will affect output in the directions just described, though the extent of the inefficiency decreases as s approaches one.

EXERCISE 3.2

Reconsider the example from Exercise 3.1, but now suppose that consumers misperceive risk. Assume that the rule is no liability ($s = 0$).

(a) Calculate the equilibrium output when consumers overestimate the risk to be .012 (rather than its true value of .01).
(b) Calculate the equilibrium output when consumers underestimate the risk to be .008.

The conclusion is different when the producer is strictly liable. In that case, we have seen that (3.3) reduces to (3.1) and output is efficient for any α. Misperceptions have no effect on output in this case because the consumer internalizes the expected damages through the market price, which accurately reflects the risk, given our assumption that producers have no misperceptions.

What this discussion shows is that when consumers misperceive risk, the liability rule matters for efficiency of the output level. The general conclusion is that *the party who more accurately perceives the risk should bear the liability in equilibrium*. This argument supports the historical trend toward strict liability in conjunction with the increasing complexity of most consumer products.

We now reintroduce care into the analysis. We saw above that strict liability induces efficient producer care but will not provide incentives for consumer care due to the high cost of enforcing contracts conditioned on consumer use of the product. Incentives for consumer care can be restored, however, by including a contributory negligence defense as discussed in the previous chapter.

1.2.4 A Note on Custom as a Defense

If a particular safety feature becomes widespread in an industry, it may achieve the status of "custom." The existence of industry custom provides a potential standard for applying a negligence rule in products liability cases.[8] For example, showing a manufacturer's failure to adhere to industry customs is an easy way for consumers to prove negligence, and courts have historically accepted such arguments. The question, however, is whether adherence to custom should be accepted as evidence that the manufacturer is *not* negligent.

The most famous custom case, *The T.J. Hooper* (60 F.2d 737, 2d. Cir. 1932) explicitly addressed this question. (Interestingly, the opinion was written by Judge Learned Hand of the *Carroll Towing* case.) The case concerned a tugboat that lost its barge and cargo during a coastal storm because it did not have a radio by which the captain could have been warned. The owner of the barge sued claiming negligence, but the tug owner argued that it was not customary for tugs to have radios, and hence his failure to have one was not negligence. Judge Hand rejected this argument, stating that

> in most cases reasonable prudence is in fact common prudence; but strictly it is never its measure; a whole calling may have unduly lagged in the adoption of new and available devices. It may never set its own tests, however persuasive be its uses. Courts must in the end say what is required; there are precautions so imperative that even their universal disregard will not excuse their use.

Judge Hand thus argued that cost-benefit principles trump custom in determining negligence. But why would market forces not compel an industry to adopt all cost-justified safety measures? (That is, why wouldn't the Hand test and custom arrive at the same solution?) The answer is consumer misperceptions of risk, which limit the ability of the market to enforce efficient safety standards. For this reason, custom is properly rejected by courts as a defense in products liability cases. (See the further discussion of this issue in the context of medical malpractice in Section 4.1 below.)

1.2.5 Recent Trends

Our conclusion to this point is that strict liability with contributory negligence is the most efficient liability rule for product-related accidents. Strict liability provides incentives for manufacturers to produce safe products and ensures that the market price accurately reflects the residual risk to consumers, while the contributory negligence defense gives consumers an incentive to use the product properly.

The general trend in the law toward strict liability during the first half of the twentieth century seems consistent with this conclusion. However, recent developments in the law appear to be stripping producers of some defenses against liability while holding them liable for some risks that were unforeseen or unknowable at the time of manufacture of the product. (An example is the risk from asbestos—see Section 3.3 below.) Some commentators refer to this emerging standard as "absolute" or "enterprise" liability. The economic model suggests that this could reduce efficiency for those products where consumer misuse is an important determinant of accidents (Priest 1988).

1.2.6 Evidence on the Impact of Products Liability Laws

Most economic analysis of products liability is theoretical, but a couple of studies have examined the effect of products liability laws on prices. For example, in a study of the market for childhood vaccines, Manning (1994) found that wholesale prices for several vaccines have increased dramatically in the past few decades as a result of increasing producer liability. Further, a substantial portion of this increase has been due to litigation costs. Manning (1997) similarly found a liability premium in the cost of prescription drugs in the United States as compared to Canada, reflecting the significantly higher liability costs in this country. Although these studies confirm the prediction of a higher product price in response to greater producer liability, they cannot tell us whether consumers have received their money's worth in terms of safer products, and/or more efficient insurance against risk.

1.3 Concluding Remarks

We conclude the discussion of products liability by emphasizing the reasons why contract law is not an adequate remedy for most product-related accidents. Although the injurer and victim have a contractual relationship, which we have seen can fully internalize the accident risks, we have also seen that various sources of market failure can inhibit this mechanism from functioning perfectly. These include consumer misperceptions of product risk and the inability of producers to monitor consumer use of the product. A further reason is simply the cost of writing contract terms in the presence of remote risks, which, as Landes and Posner (1987, 281) observe, "may well be disproportionate to the benefit of a negotiated (as distinct from imposed-by-law) level of safety."

These conclusions illustrate the general principle, asserted in Chapter 1, regarding the role of the law in internalizing costs. In particular, when bargaining between the concerned parties can occur smoothly, the specific legal rules do not matter for efficiency—the primary role of the law is to enforce whatever contracts the parties write. This is the insight of the Coase Theorem. However, when bargaining fails, the law needs to be more interventionist in assigning liability. According to economic theory, this is where contract law needs to give way to tort law. The history of products liability law in the twentieth century seems to provide an example of this transition, though some would argue that recent developments have caused it to overshoot the mark.

2 Workplace Accidents

This section deals with accidents in the workplace, including accidents in which workers are injured on the job as a result of unsafe working conditions or negligence by a fellow worker, as well as accidents in which a worker causes an injury to a nonworker (a stranger) in the course of his or her employment. Many of the issues raised by the first type of accident—those in which the victim is a worker and the injurer is the employer or another employee—have already been discussed in our analysis of products liability. For example, in a perfectly functioning labor market, the wage will adjust to reflect the legal assignment of liability between the parties. Thus, contract rather than tort law principles can, in principle, govern these accidents, though market failures of the sort discussed above may again interfere with the attainment of an efficient outcome. In contrast, accidents involving a worker and a nonemployee raise many of the same issues discussed in Chapter 2 in the

model of accidents between strangers. The emphasis in this section will therefore be on unique aspects of the law governing workplace accidents.

2.1 Respondeat Superior

Under the doctrine of respondeat superior, an employer is strictly liable for accidents caused by his employees' negligence when committed in the course of their employment.[9] One possible rationale for this rule is that employees will often lack the resources necessary to compensate victims' losses (that is, they will be judgment proof). The law therefore allows victims to reach into the "deep pockets" of their employers. While this "vicarious liability" of employers makes sense regarding the compensation function of tort law, it may be an impediment to efficient accident avoidance since it insulates the injurer from responsibility for damages.

It is possible, however, that the employer can use his contractual relationship with the employee to give the latter an incentive to be careful. For example, the employer can supervise employees and threaten to fire those who perform their duties in a careless manner. As Landes and Posner (1987, 121) note, "Making the employer liable for his employee's tort serves to enlist the employer as a substitute enforcer of tort law where the primary enforcement mechanism, a tort action against the immediate tortfeasor is unworkable."

2.2 Accidents in which the Victim Is an Employee

An important exception to the liability of employers for their employees' negligence concerns accidents in which the victim is also an employee. Historically, employer liability for these accidents was severely limited. The common law did impose a duty on employers to maintain a safe workplace and to warn of dangerous situations, but even an employer who was negligent in fulfilling these duties could defend himself by demonstrating contributory negligence or assumption of risk by the injured worker. As we saw in the previous chapter, a rule of negligence with a defense of contributory negligence provides efficient bilateral incentives for care, and, as we saw in the case of products liability, the wage will adjust to compensate workers for whatever losses they cannot recover from the tort system (as well as to achieve the efficient level of employment).[10]

A further defense was available to employers when an employee was injured as a result of the negligence of another employee. Although the doctrine of respondeat superior would seem to have imposed strict liability on the employer in this case, the so-called fellow servant rule actually absolved the employer of any liability, provided that the latter had not been negligent in hiring or inadequately supervising the negligent employee. The economic ra-

tionale for this rule is that it gives workers an incentive to monitor one another and to report careless behavior to the employer.

While the fellow servant rule might have been appropriate in small enterprises and shops where workers had close contact with one another, it seems less valid in large businesses where victims might be injured by the negligence of workers with whom they had never had contact (Keeton et al. 1984, 571). More cynical observers simply saw the rule as yet another pro-business rule that, like the privity limitation in products liability, insulated firms from liability. For whatever reason, the law governing workplace accidents changed dramatically in the early twentieth century.

2.3 Workers' Compensation Laws

Following the turn of the twentieth century, dissatisfaction with the common-law rules governing workplace accidents led to legislation by all states that instituted a form of strict employer liability. Employer negligence was no longer necessary for recovery, nor could the employer invoke contributory negligence or the fellow servant rule as defenses. The new laws differed from strict liability, however, in that the amount of compensation was set by fixed damage schedules for each class of injury. (A typical formula calls for replacement of two-thirds of wages for a set period of time.) In addition, agencies rather than the courts administered the rules.

In evaluating the efficiency of these laws, we can draw an analogy to products liability, where we argued that, although the price mechanism can in principle shift risks in such a way as to make the particular liability rule irrelevant (according to the Coase Theorem), market imperfections like misperceptions of risk make this mechanism unreliable in practice. In this setting, we argued that strict liability imposes the risk on the party who can best estimate it (the firm), and the wage or price can adjust appropriately.

A possible inefficiency in workers' compensation laws is the elimination of contributory negligence as a defense, which may result in too little care by workers. This problem may not be severe, however, for two reasons (Landes and Posner 1987, 310–11). First, employers can contract with workers to achieve the efficient level of safety by paying a higher wage for greater care. Second, the limitation on compensation mitigates the moral hazard problem associated with standard strict liability.

To see the latter point, suppose that in the event of an accident, a worker expects to receive fixed compensation equal to $\overline{D}$, while her actual damages would be $D(x, y)$, where, recall, x is the employer's care and y is the worker's care. The worker's choice of care will therefore solve

$$\text{minimize} \quad y + p(x, y)[D(x, y) - \overline{D}]. \tag{3.5}$$

It is possible to show that the victim will choose more care than under true strict liability (which, in this simple model, results in zero victim care), though she will choose less than optimal care. The victim has an incentive to take some care at the margin because by doing so, she reduces the amount of undercompensation.

Another inadequacy in workers' compensation laws is that the victim must prove that the injury is job-related. This is straightforward when the injury is the result of an accident, but for illnesses like cancer that have multiple causes, the burden is more difficult. The problem is one of "uncertainty over causation" as discussed in Chapter 2. Although this potentially attenuates the incentives for employers to provide a safe workplace, recall that efficient incentives can be maintained under two rules. The first imposes full liability on the employer if the conditional probability that the illness is work-related exceeds a threshold, and the second imposes liability on the employer in proportion to the conditional probability that the illness is work-related.

A further check on workplace safety is direct regulation by OSHA, the Occupational Safety and Health Administration. Established in 1970, this agency's goal is to assure "safe and healthful working conditions" for all workers. The most favorable evidence available, however, suggests that it has had only limited success in this effort. Specifically, Viscusi found that over the period 1973–83 OSHA regulations did not significantly reduce work-related injuries and illnesses, and they reduced lost workdays by only 1.5–3.6 percent (Viscusi 1986). One explanation for this is the high cost of monitoring compliance. Another may simply be that the threat of liability for workers' compensation had already given employers an incentive to take most cost-justified safety measures, so further improvements in safety were hard to come by.

3 Liability for Environmental Damages

This section discusses issues that arise in the use of tort law for internalizing environmental damages. The role of tort law in this context is generally limited to unanticipated releases of harmful substances like oil spills or toxic-waste leaks, referred to as "environmental accidents." In contrast, the continuous discharge of pollutants as the known by-product of a firm's production process is usually dealt with by means of Pigovian taxes or direct regulation. We will examine these regulatory approaches to environmental policy in Chapter 7 as part of a general discussion of the control of externalities.

3.1 Characteristics of Environmental Accidents

Environmental accidents are similar in many ways to other sorts of accidents, but they also present some unique problems. This section emphasizes those unique elements.

3.1.1 Multiple Victims

Many environmental accidents involve multiple victims. Examples include radiation discharges from nuclear power plants and oil spills. One problem created by the existence of multiple victims is that, while aggregate damages may be large, the damage suffered by any individual victim may be too small to justify the cost of filing suit against the injurer. This is referred to as the *dispersed cost problem*. To illustrate, suppose that n victims each suffer individual damages of D dollars, making aggregate damages nD. Also, let the cost to any one victim of filing suit be c dollars. If $D < c$, no victim will find it *privately* worthwhile to file suit, even though a suit is *socially* desirable, given that $nD > c$.

One solution to this problem is a class-action suit in which all of the individual claims are bundled into one suit. This not only overcomes the disincentive of individual victims to bring suit, but also it economizes on judicial resources by eliminating duplicative trials over the same set of factual and legal issues. In most cases, these benefits will more than offset the costs of identifying and notifying all victims (underinclusion), as well as preventing uninjured parties from claiming to be victims (overinclusion).

A second problem associated with multiple victims is that the likelihood of injurer bankruptcy increases. Suppose that the injurer has total assets of A out of which it can pay liability judgments. In the previous example, the injurer will not be able to cover all damages if $A < nD$, a situation that becomes more likely as n increases. Not only does this result in undercompensation of victims, we also saw in the previous chapter that it potentially reduces incentives for injurer care, depending on the liability rule. When the rule is strict liability, the possibility of insufficient assets generally reduces the incentive for injurers to take care because their expected liability is less than the full damages that they impose.[11] (In particular, the injurer expects to pay liability of A dollars when damages are $nD > A$ dollars.) In contrast, under a negligence rule the injurer may still have an incentive to take efficient care because by doing so he avoids *all* liability. Thus, if the savings in liability from choosing due care, equal to A dollars, is larger than the cost of taking the additional care, then the injurer will do so.

The preceding suggests that a move toward strict liability may have the un-

intended effect of creating incentives for firms engaging in hazardous activities to alter their organizational structure so as to use bankruptcy as a shield against liability. There is in fact evidence that firms engage in this sort of strategy by contracting out particularly hazardous aspects of their business into smaller firms (Ringleb and Wiggins 1990).

3.1.2 Causal Uncertainty

A second distinguishing feature of environmental accidents is that the particular cause of the accident may not be easy to identify. One circumstance in which this causal uncertainty arises is when there are *multiple injurers*. For example, several polluters may dump hazardous waste into a landfill, which eventually seeps into the groundwater. Another example, not in an environmental context, is when two hunters fire at what they think is a deer, and one of their bullets hits a third hunter.[12] This situation, in which the actions of multiple injurers contribute to a single harm, is sometimes referred to as a *joint tort*.[13]

To illustrate the problems created by joint torts, consider the following example of two injurers whose actions create a risk of damages to a single victim. Let $p(x_1, x_2)$ be the probability of an accident as a function of the expenditures on care by the two injurers, and let D be the fixed damages in the event of an accident. Note that this resembles our model of bilateral care except that now it is the two injurers who take care rather than the injurer and the victim. As before, the social problem is to choose the care levels to

$$\text{minimize} \quad x_1 + x_2 + p(x_1, x_2)D. \tag{3.6}$$

By analogy to the bilateral care model, optimal care by both injurers in this case requires that each face the victim's full damages at the margin. In general, this will not be possible given the constraint that the total liability payments collected from the injurers cannot exceed the damages suffered by the victim. To illustrate, suppose that the rule is strict liability and that each injurer is responsible for a share of total damages. Specifically, suppose injurer one pays a share s_1 and injurer two pays a share s_2 where $s_1 + s_2 = 1$. The problem facing each injurer is therefore to

$$\text{minimize} \quad x_j + p(x_1, x_2)s_jD, \quad j = 1, 2. \tag{3.7}$$

Like the judgment-proof problem, both injurers face less than full damages (that is, $s_j < 1$) and therefore take too little care. (Compare the problem in [3.7] to that in [2.10] in the previous chapter.)

How are the shares determined in actual law? The traditional common-law rule is that the victim can collect her full damages from either injurer or from

both. In the latter case, the victim can obtain the judgment in whatever proportions she chooses, usually based on which injurer is best able to pay. Under this rule, each injurer must form an expectation about his share of damages, but the constraint that the shares must sum to one implies that neither injurer will generally expect to face full damages. As a result, they will both tend to take too little care.

The conclusion is different under a negligence rule. In this case, it is possible to show that if the due standard of care is set at the efficient level for each injurer, then in equilibrium they will both meet the standard. The intuition is the same as in our earlier discussions of the negligence—each injurer has an incentive to meet the due standard in order to avoid any share of the victim's damages.

A second source of causal uncertainty is when there is a *long latency period* between the exposure to a toxic substance and the emergence of the illness. The problem here is that when the illness emerges, there may be no way to tell whether it was due to the accidental exposure or to a normal "background" or "natural" risk.[14] This is the situation we examined in the previous chapter under the heading of "uncertainty over causation." We showed there that efficient incentives for injurer care can be achieved by using ordinary strict liability or negligence rules with no limitation on liability to reflect the background risk.

We also showed that it is possible to maintain efficiency if liability is limited in one of two ways. The first is a threshold rule that holds the injurer liable only if the conditional probability that he caused the accident exceeds an appropriately chosen threshold. The second is a rule that holds the injurer liable for the proportion of the damages that he caused in a probabilistic sense, conditional on the fact that the illness actually occurred.

All of the preceding rules assign liability only after an exposure victim has actually contracted the illness. Another approach to causal uncertainty is to allow all victims of the exposure to file for damages *at the time of exposure*. In this case, the risk is itself at tort (a "tort for risk"), and damages are calculated to reflect reduced life expectancy, future pain and suffering, and future medical costs resulting from the exposure.

To see how the proportional liability and tort-for-risk rules compare, suppose that damages from an illness, when contracted, are $150,000; the probability of getting the illness from the accidental exposure is .10; and the background probability is .05. The overall probability of developing the illness after exposure is therefore .15. Under the proportional liability rule, the share of damages the injurer pays equals the conditional probability that the exposure caused the illness, given that the illness has occurred. This probability is $(.10)/(.15) = 2/3$. Thus, at the time the illness occurs, the injurer pays $(2/3)(\$150{,}000) = \$100{,}000$. In contrast, under the tort-for-risk, the injurer

would pay damages *at the time of exposure* equal to the contribution of the exposure to the expected losses from the illness, or (.15 − .05)($150,000) = $15,000.

Although it may seem that the tort-for-risk rule imposes less cost on the injurer and therefore provides less incentive for care, recall that proportional damages are not paid to all victims, but only those who develop the illness. Thus, the injurer's expected cost under the proportional rule, as of the time of exposure, is (.15)($100,000) = $15,000. The two rules therefore provide identical (and efficient) incentives. The rules are not identical in all respects, however. The chief advantage of the proportional rule is that it saves on litigation costs since not all exposure victims end up filing suit. The advantage of the tort-for-risk rule is that it avoids the risk that the injurer will be judgment-proof at the time, possibly well in the future, when the illness occurs.

3.2 Superfund

An important area of environmental law concerns the cleanup of hazardous waste sites.[15] Despite the obvious risk to public health and the environment from these sites, there was little regulatory oversight of disposal practices prior to the 1970s. An important change occurred in 1980 with the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The primary objective of this legislation was to clean up hazardous waste sites quickly and effectively and to impose the cost (when possible) on the responsible parties. To fund the cleanup of sites, CERCLA established a "superfund" to be financed in part by taxes but also by damage actions brought by the Environmental Protection Agency (EPA) against responsible parties. It is the liability aspect of CERCLA that is of interest to us here.

The extent of liability under CERCLA is broad. First of all, liability is strict, and in the case of multiple polluters, it is "joint and several." This means that any one of them can be held responsible for the entire cost of cleanup. Thus, "disposal of a thimbleful of hazardous waste at a large disposal site exposes an entity to enormous potential liability" (Menell 1991, 109). The resulting uncertainty has led to dramatically higher costs of insurance for environmental liability, when it is available at all.

In addition to holding polluters strictly liable, CERCLA extends liability to "innocent" buyers of a contaminated site. Many have criticized this provision as discouraging transactions that would otherwise lead to the beneficial redevelopment of old industrial sites—so-called brownfields. This negative conclusion is not necessarily true. Recall from our discussion of products liability that, in the absence of misperceptions about risk, the equilibrium output of a dangerous product is independent of the allocation of liability between the buyer and the seller. The same is true here; if land prices accurately

reflect anticipated cleanup costs, then there should be no distortions in land transactions. However, if sellers have better information about the extent of contamination than do buyers, then too few transactions may occur as a result of adverse selection (Segerson 1997).

To illustrate, suppose that a contaminated site is worth V dollars to a buyer (developer) and R dollars to a seller, exclusive of cleanup costs, which equal C. Since someone must pay the costs whether or not a sale occurs, it is efficient for the buyer to acquire the site if $V > R$, which we assume is true. Let s be the share of costs that the buyer expects to incur. If P is the price, the buyer will purchase the site if

$$V - sC \geq P. \tag{3.8}$$

As for the seller, if no sale is made, she must pay the full cleanup costs (assuming she is solvent), yielding a value of $R - C$, whereas if she sells, she receives the price less her share of cleanup costs, or $P - (1 - s)C$. She will therefore sell if $P - (1 - s)C \geq R - C$, or if

$$P \geq R - sC. \tag{3.9}$$

A sale will occur if there exists a price that satisfies both (3.8) and (3.9); that is, if $V - sC \geq R - sC$, or if $V > R$, which is the condition for an efficient sale. This shows that, regardless of s, the efficient outcome will occur.

It should be easy to see, however, that if the parties hold different assessments of the size of C, this conclusion will no longer hold. Suppose, in particular, that the seller has a better assessment of C due to private information. In that case, the efficient transaction will only occur if the seller bears full liability (that is, if $s = 0$) since the buyer's criterion in (3.8) will be independent of C (except insofar as it is reflected in the price). Note that this conclusion mirrors the above argument that strict products liability is efficient because it imposes liability on the party with better information about risks (the seller). However, it appears contrary to the imposition of liability for environmental contamination on "innocent" buyers ($s = 1$).

Under the original provisions of CERCLA, lenders could also be held liable for cleanup if the owner was insolvent (Segerson 1993). Again, if credit markets operate perfectly, this creates no distortions and in fact helps to mitigate the incentive problems due to insolvency of the injurer. However, if there is asymmetric information between the borrower (injurer) and lender, an adverse selection problem of the sort described above arises. In addition, if the injurer makes some or all of its abatement (care) decisions *after* the loan is made, and the terms of the loan cannot be made contingent on the level of care (for the same reason that the seller of a dangerous product cannot condition the price on the buyer's care after purchase), then the injurer will have an incentive to underinvest in abatement.

The discussion in this section has pointed to several problems in use of tort liability and its statutory counterpart for internalizing environmental harm. In some cases, these problems can be overcome by redesigning liability rules in ways that we have discussed, but in others, a liability approach is inherently flawed. As a result, an efficiently designed approach to the control of environmental externalities will likely involve a combination of liability and safety regulation, a topic to which we return in Chapter 7.

3.3 Case Study: Asbestos

Asbestos is a product that was widely used in the United States in a variety of industrial settings, as well as in schools and homes. The link between exposure to asbestos and severe illnesses like lung cancer, asbestosis, and mesothelioma, however, apparently was not known until the 1930s. Tort suits against asbestos manufacturers began in the 1970s, slowly at first, but by the 1990s, they had expanded to the point where they comprised a substantial fraction of all products liability cases filed in this country.

Asbestos litigation involves several of the problems that we have identified with the use of the tort system for internalizing risk (Dewees 1998). These problems largely stem from the long latency period of asbestos-related illnesses, usually ten to thirty years. First, it is difficult for plaintiffs to prove causation given the existence of multiple background risks unrelated to exposure. Second, plaintiffs may be unable to establish which of several manufacturers or suppliers was responsible for their exposure. And even if they could, the responsible party may have gone bankrupt by the time the illness arises. As we have seen, these factors weaken the deterrence function of tort law.

Asbestos is also an interesting case study because it combines aspects of products liability, workplace safety, and environmental risk. Initially, workers' compensation provided the sole remedy for work-related exposures to asbestos, but since compensation is limited, plaintiffs' lawyers early on sought to circumvent that system. They succeeded in 1973 by suing manufacturers (rather than employers) under products liability principles.[16] This success resulted in a surge of tort claims in the 1970s that has continued into the 1990s. (See Figure 3.4, which shows the trend in asbestos cases filed in U.S. District Courts from 1974 to 1998.) Evidence that manufacturers knew of the risks of asbestos and failed to warn workers in many cases resulted in punitive damage judgments against defendants. The resulting financial pressure caused several bankruptcies, the most notable being that of the largest manufacturer, the Manville Corporation, in 1982.

Today, the risk of new asbestos exposures has been greatly reduced, partly as a result of this litigation. One could therefore argue that the law has suc-

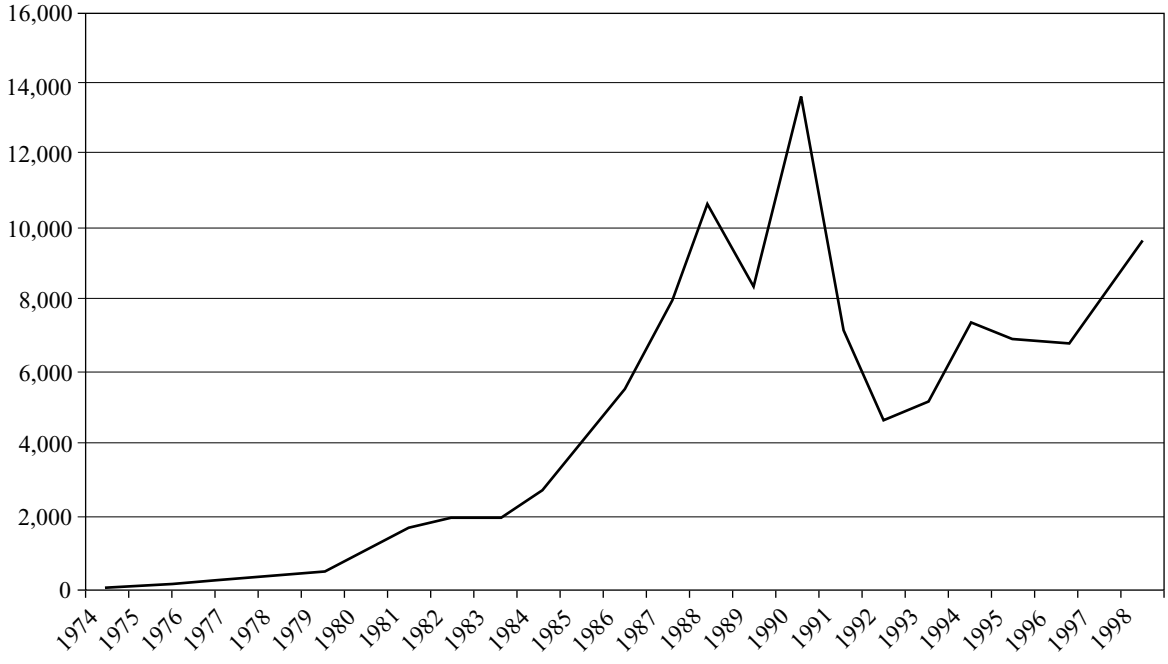

Figure 3.4
Asbestos Cases Filed in U.S. District Courts, 1974–1998

ceeded in its deterrence function. Most would agree, however, that it has been much less successful in compensating victims, while at the same time imposing high costs on the legal system.

One reform that could improve the compensation function of tort law in mass-exposure cases would be to allow victims to file at exposure for expected damages, rather than having to wait until actual symptoms arise. The advantage is that all victims would receive some compensation, which they could use to purchase health insurance or precautionary medical treatment. The drawback is the likely "flood" of litigation (Robinson 1985). To date, some states have taken the limited step of allowing exposure victims to collect medical monitoring expenses, but none has gone so far as the allow a full-blown "tort for exposure."[17]

4 Medical Malpractice

Following the trend of other forms of tort litigation, patient claims against physicians for malpractice have risen significantly in recent decades. Begin-