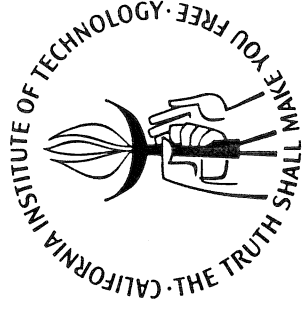


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PRODUCTS LIABILITY, CORPORATE STRUCTURE AND BANKRUPTCY:
TOXIC SUBSTANCES AND THE REMOTE RISK RELATIONSHIP

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ABSTRACT

This paper first develops criteria by which courts can distinguish between product related risks that profit maximizing firms can and cannot be expected to discover. It then argues that imposing the former -- "knowable" -- set of risks on firms reduces accident costs and creates no problems that corporate and bankruptcy law cannot adequately solve. In contrast, imposing the latter -- "remote" -- set of risks has no effect on reducing accident costs and tends to produce unsolvable problems of the kind that characterize the current asbestos cases. The paper concludes by arguing that courts are wrong to create these problems because the victims of remote risks lack a tenable distributional or moral claim to have private firms reimburse them.

Products Liability, Corporate Structure and Bankruptcy:
Toxic Substances and the Remote Risk Relationship

Alan Schwartz*

This paper addresses the interaction of three seemingly unrelated legal issues. Each of these issues within its respective field of law is minor. Their intersection, however, has posed a problem for our legal system that is of overwhelming magnitude. The three issues are: (1) In products liability law, should firms be made to bear risks that are difficult to foresee? If no one knew that widgets cause scrofula but they do, should widget manufacturers be liable to scrofula victims? (2) In corporate law, to what extent should limited liability isolate firm owners from products liability victims? Can Company X create a subsidiary to produce dangerous products and escape liability for the resultant injuries? (3) In bankruptcy law, at least after 1979, can persons exposed to dangerous substances assert claims in the manufacturer's bankruptcy if their injuries had not materialized by then. If Smith purchases a drug made by Company X in 1980, Company X files a bankruptcy petition in 1981, and the drug sometimes causes injury to users years after ingestion, may a so far healthy Smith assert a claim in X's bankruptcy?¹

These sleepy, seemingly unrelated issues recently have attracted attention because they turn out to be linked in the "toxic risk" context. Toxic risks have four salient characteristics: (i) The substances that create them are neither defectively made nor

designed, but cause harm because of their chemical nature: they cannot do good without also doing bad; (ii) The harms often materialize years or decades after persons are initially exposed; (iii) The existence and extent of the harms are difficult to predict; some substances turn out to be toxic while others do not; (iv) The harms measured in dollars can be large in relation to the value of the firms that sell toxic substances, because many people are vulnerable to them.²

The three legal issues are related to each other in the toxic risk context because of an obvious but overlooked fact: risks that are fully anticipated or minor seldom cause concern to firms or to the law. Toxic risks, however, are hard to anticipate and often major. For example, the Johns-Manville company now faces tort claims that exceed its value as a firm. This has led it into bankruptcy and to consider transferring its asbestos related activities to a newly created subsidiary.³ These seem poor substitutes for full insurance. Hence, Johns-Manville's current plight may have resulted from its failure to foresee the full extent of the harm that asbestos could cause. The asbestos cases thus raise troublesome corporate and bankruptcy law problems because of products liability law's prior resolution; the courts, that is, seemingly have imposed an unanticipated liability on the asbestos firms.

If the firms should have anticipated the asbestos risk, the problems are the necessary price of encouraging firms to discover harms, and of compensating victims for firm misbehavior. But suppose

that private firms would not normally discover the full extent of risks such as this. Then several interesting questions arise: Is it possible for courts to identify with acceptable precision those risks that firms would not discover? If so, should courts make firms bear such risks? Do the present strains in corporate and bankruptcy law trace to products liability law rules that make firms bear risks they would not discover? And if so, how strongly should the strains count against those rules? These questions are this paper's subject.

Part I defines a "remote" risk as the risk that a product is more dangerous than a firm would predict had it done the cost-effective amount of research into safety. A legal rule would impose remote risks on firms if it held them liable whenever their products turned out to be less safe than expected, and even though the firms had researched appropriately and warned on the basis of what that research disclosed. To adopt such a rule, Part I argues, raises a fairness concern because the rule would require firms to warn about danger levels that the firms could not be expected to discover. A "knowable" risk is the risk that a product is as dangerous (or less so) as a firm would predict on the basis of doing the cost-effective amount of research. Part I goes on to derive criteria that would enable courts to distinguish between remote and knowable risks with acceptable accuracy. Part II next shows that to hold firms liable only for failing to warn of knowable risks -- i.e., for failing to disclose what cost-effective research would reveal -- raises corporate and bankruptcy problems that current law largely solves; relatively

minor reforms could solve the rest. In contrast, imposing remote risks on firms can create difficulties both for the firms and for the victims that corporate and bankruptcy law cannot ease, as these laws now exist or could be made to exist.⁴ The fairness concern with imposing remote risks that Part I raises, together with the difficulties that Part II identifies, suggest that courts should not require firms to bear remote risks unless they have compelling instrumental or justice reasons to do so. But Part III argues that no one could plausibly have such reasons; rather, the victims of remote risks have only a humanitarian claim to relief that society should meet, but not through the vehicle of private law suits.

Before reaching the argument, two clarifying remarks are useful. First, this paper deals with the problem of remote risks in a general way. It therefore does not "solve" the asbestos cases. The asbestos manufacturers may have failed to anticipate the asbestos risk or the full advent of strict liability in tort, or both. I am not concerned with legal retroactivity.⁵ The full reach of strict tort liability is now known while toxic risks seemingly are becoming widespread, and many of them may be remote. Thus, the more important products liability question is what courts should do when harms materialize that were difficult to anticipate. I do use the asbestos problem paradigmatically, but only because that problem is well-known and relatively easy to follow.

More importantly, this paper attempts ideal theory, which is to say that it asks how courts should decide cases supposing the

judges to be situated in an otherwise just and well-ordered society. One could instead ask what courts should do with products liability problems given that our society is morally problematic. For example, do and should courts take products liability cases as an opportunity to ameliorate insufficient progressivity in the tax system? This opportunity would exist were corporate shareholders as a class wealthier than tort victims as a class, for then more vertical equity would be achieved by compensating victims through the tort system than through compensation plans funded from general tax revenues. I largely ignore such analyses here. This is because the costs of pragmatic solutions become apparent only in contrast to ideal ones, and these costs are my real concern. Specifically, this paper asks what can be set against the claim that were courts not to impose remote risks on firms, many toxic risk victims would receive nothing, when they simply must receive something.

I. Remote Risks

A. Remote Risks and the Law

Two products liability rules relating to toxic substances exist. Both exculpate firms if they warn adequately against the harm that a product may cause, but they differ in their definition of adequacy. One rule holds a firm liable if its warning did not correspond to the product's true propensity to harm, as determined on the basis of hindsight after harm has occurred. Under this rule, the firm's knowledge of dangerousness when it issued the warning is irrelevant.⁶ The second rule imposes liability only if a firm's warning did not correspond to what the firm knew or should have known about dangerousness at the production stage.⁷ This rule focuses attention on the firm's *ex ante* behavior. This paper argues that courts should use a modified version of the second rule.

Three objections are made to rules that exculpate firms which warn. One holds that warnings about dangerousness cannot be efficacious. This objection may rest on the difficulty of representing in words what really is a probability distribution of possible harms, or on notions of cognitive error--people perhaps cannot process or respond sensibly to information about differing likelihoods of personal danger. I will put this objection aside, not because it lacks force but because, if it is true, it impeaches any disclosure solution to products liability problems; disclosure solutions are beyond this paper's scope. Hence, I assume that "adequate" warnings provide consumers with sufficient information

about harm. A second objection runs only to the first rule: that rule requires a firm's warning to match the product's true degree of dangerousness, and the objection is, that the rule may require a firm to warn when it could not have warned because it would not have known of the danger at production time; requiring a firm to do what seemingly cannot be done is unfair. The third objection runs only to the second rule, which exculpates a firm if its warning corresponded to what it should have known about dangerousness *ex ante*. The objection is, that it is impossible to apply the standard "should have known" in a principled way. Part IA takes up the second and third objections, beginning with the latter.

One possible way to decide what a firm should have known is to ask whether the relevant risk was foreseeable, or "reasonably" foreseeable, but this method founders on a well-known description problem: whether a risk is foreseeable depends on how it is described, and the choice among possible descriptions is arbitrary. For example, the asbestos manufacturers in the 1930's knew that asbestos caused harm. If the asbestos risk is described as "the risk that asbestos is harmful to persons," it was foreseeable; indeed, it was foreseen. On the other hand, the manufacturers seemingly did not know that very grave harms could occur from relatively low levels of exposure. If the asbestos risk is described as "the risk that asbestos causes the harms that now are seen to result from low exposure levels," the risk was difficult to foresee, and perhaps not foreseen. No principled way to choose between these two descriptions or others exists.

A second way to decide what a firm should have known is not to ask whether a risk actually was appreciated but whether it was "discoverable" given the present level of scientific knowledge.⁸ This method also is arbitrary, because its use must necessarily presuppose a set of conditions under which research is conducted; there are many possible sets of conditions and no principled way to choose among them. Was an unanticipated risk "discoverable" given then current scientific knowledge if it would have been revealed only by a crash Government program--an asbestos Manhattan Project? Was a risk discoverable if a combined industry effort would have revealed it? If a single firm would have had it devoted twenty percent of income to a research effort? Thirty percent? No principled way to choose among these possible sets of research conditions exists.

The seemingly inevitable arbitrariness involved in distinguishing between risks of which firms should and should not have been aware has led commentators to argue for the rule that imposes risks on firms regardless of what they knew at production time, and some courts have been persuaded.⁹ Other courts have allowed juries to impose risks on firms when the evidence suggests at most that firms knew a risk existed, rather than that they knew its real extent.¹⁰ Yet the notion that firms are justifiably ignorant of some risks often seems intuitively plausible. No one would expect an aspirin manufacturer to take precautions against the possibility that aspirin will cause toes to fall off. Indeed, a rule that exculpates firms for risks of this type is implied by widely shared notions of fairness:

the aspirin manufacturers meant no harm and were not negligent; hence, they had no real chance to protect themselves against a large liability. If they are required to bear it, this must be because their fairness claim should be sacrificed to instrumental goals the state ought to pursue, or because it is subordinate to the moral claims of the victims. Is it possible, then, to make plausible a distinction between risks that should and should not have been anticipated in cases closer than that of the aspirin manufacturers? If so, should the manufacturers' fairness claim prevail in these closer cases? Part I considers the first of these questions.

Consider this definition: A firm should be considered justifiably ignorant of a risk if the product turns out to be more dangerous than a cost-effective research program would have predicted. The risk of such an outcome is defined as "remote". This paper's precise claim, then, is that courts should adopt a modified version of the second products liability rule: a firm should be held liable unless it warned on the basis of what it knew or should have known at production time; and it should have known the revelations of an optimal research program.

Making application of the legal rule turn on the concept of a remote risk has two virtues. First, this version of the rule eliminates the arbitrariness otherwise involved in distinguishing between risks of which firms should and should not have been aware. Legal outcomes would be a function of measurable entities--the costs of a research program, the nature of the injuries known or likely to

occur from a product, and so forth. To be sure, these entities sometimes may be more measurable in theory than in fact; the point rather is that when the distinction between types of risk turns on them, it becomes a distinction that is at least drawable in principle. Perhaps a better way to say this is to refer to the Learned Hand test in tort law which, put very simply, provides that a firm should be liable if the expected costs of an accident exceeded the expected costs of avoiding it. The only novelty of the approach suggested here will lie in giving content to this test in the research and development context: a risk is remote, put very simply, if the expected costs of a research project that might have disclosed how dangerous the product actually is exceeded the expected gain from knowing this. Second, the modified rule captures the fairness claim just described. The addressees of the sanctions that products liability law creates are firms; these firms are known to--indeed are supposed to--maximize profits. Hence, they will only know what cost justified inquiries could reveal. To hold them liable for not knowing more is to deprive them of a "fair chance" to protect themselves.

B. A Model of Risk Discovery¹¹

Products that create toxic risks seldom can be made differently. A firm can market a toxic substance with a warning adequate to its dangerousness or not make the substance at all. Often, though, the firm does not know how dangerous the substance is. This uncertainty creates difficulties of two sorts. First, suppose the firm believes that, on average, the substance will cause only

\$1,000 in accident related harms. Then, it could sell the substance with no warning or an innocuous warning--"This product may cause harm." Such a strategy is risky because the product could in fact be dangerous; in this event, the firm would bear the full cost because, under current law, an inadequate warning is treated as no warning at all.¹² Second, let the firm believe that, on average, the substance will cause \$5,000,000 in harms. Warnings are cheap to draft and distribute in contrast to this exposure, so the firm could then sell the substance with a strong warning: "This product is highly dangerous." Such a strategy is risky in a different way, for the substance may turn out to be safe. In this event, the strong warning would lose the firm sales, with no corresponding gain. The firm, though, has a third choice: rather than warn too softly or strongly on inadequate evidence, it could do research into the substance's actual dangerousness. If the firm obtained better information about how harmful its product was, it could then choose a warning level that would be more likely to minimize the losses to it from either over or underwarning. Hence, the gain to a firm from research is the expected additional profit it would earn from acting on more rather than less information about product safety.

If we suppose firms to be liable whenever they warn inadequately--if firms bear remote risks--would firms always research until they discovered all significant dangers? The answer is no. Rather, the extent to which a firm would research a product's dangerousness is a particular function of the expected benefits from a

research project, the apparent certainty with which these benefits would be obtained, and the costs of the research program. Under the legal rule now assumed to obtain, a firm is liable for all harm if it underwarns--if the product turns out to be more dangerous than the warning indicated. On the other hand, the firm would lose sales if it overwarned because some potential buyers would be frightened away. Thus, the firm faces a distribution of possible profits from the product's sale; it could earn much or little, depending on how suitable to the actual danger its warning is. Distributions commonly are characterized by two values, their mean, the average of all outcomes, and their standard deviation. Let m be the mean of the possible profit distribution from sale of a product whose harm causing properties are not fully known. The size of m is a function of how dangerous the firm perceives the product to be. To see why, suppose the firm believes the product is very dangerous and so gives a strong warning: "This one will just about kill you for sure." Then the firm will incur almost no liability but make almost no sales; its profits will be low. Let the firm instead omit a warning. Then sales will be up but the firm risks incurring large liabilities; indeed, the liabilities could be so high in relation to sales revenues that the expected profit from production is negative. Hence, whether the firm warns or not, the more dangerous it thinks the product is, the lower will m be, for m is the mean of the firm's beliefs respecting profitability. And conversely, m will shift up as the firm thinks its product is safe, for then it can give a softer warning, thereby

increasing sales, or can give no warning without risking as much in liability.

The standard deviation measures a distribution's spread; two-thirds of the outcomes in a normal distribution--the bell-shaped curve--fall within one standard deviation from the mean.¹³ Thus, the larger is a distribution's standard deviation, the wider is its width. Here let σ be the standard deviation of the possible profit distribution just described. Then σ is a measure of the uncertainty under which the firm operates. To say that a profit distribution has a large σ is to say that the firm is not at all sure just how dangerous its product is; profits from production could range from negative to lovely.

A research project to determine the product's actual dangerousness thus has two related functions: it is likely to shrink σ , for the spread of the profit distribution ordinarily will contract as the firm learns more about the product, and research also may shift m , for the mean of possible profits will change if the new information suggests that product is more or less dangerous than originally thought. Research into products such as toxic substances commonly proceeds in stages. At the first stage, the firm can perform a relatively inexpensive but low powered test, such as the Ames test for mutagenicity; at the second stage, it can begin animal testing; at the third it can commit to a major animal study, and so forth. The firm then has five options: (a) Not research at all, and not sell the product; (b) Not research at all, sell the product and warn on the

basis of its initial beliefs; (c) Research until completion, defined here as finding out precisely how dangerous the substance is; at completion all uncertainty respecting harm is removed; (d) Stop the research project before completion and not make the product; (e) Stop the research project before completion, make the product and warn on the basis of what it then knows.

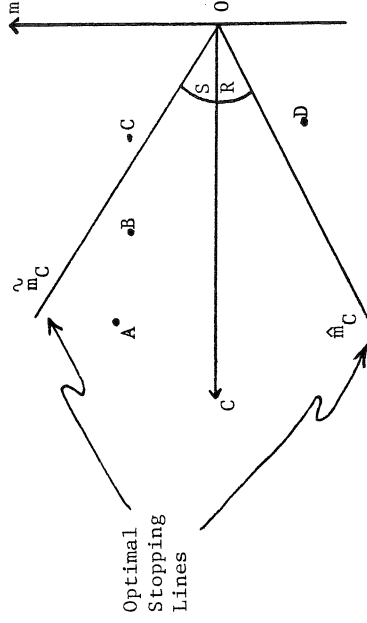
The firm's initial decision problem is whether to begin the research project at all; if it begins, the problem becomes whether to proceed to the next stage or terminate. This is an "optimal stopping problem", and to resolve it the firm needs an "optimal stopping rule". Such a rule maximizes expected benefits minus costs at each stage based on information available at that stage, and given that an optimal stopping rule will be used at all future stages. If C is the expected cost to completion of the project from any particular stage, and if the distribution of benefits from research is distributed normally, one optimal stopping rule might be: Proceed to the next stage if and only if $C \leq E[Z | Z \geq 0]$ - m . Here, Z is a random variable that represents the profits the firm will earn if it completes research and sells with perfect knowledge, and m , as said above, is the profit the firm expects to earn if it does no further research. Hence, the inequality simply tells that the firm should continue to research if research costs are less than the difference between the value to the firm of perfect knowledge-- $E[Z | Z \geq 0]$ --and the value to the firm of operating on the basis of what it then knows-- m .

In our circumstances, the requisite optimal stopping rule must

actually be more complex than this because the firm has a variety of choices. For example, early research results may disclose sufficiently bright prospects about the product so that, when further research costs are considered, the optimal strategy is to discontinue research and sell it. On the other hand, those results could be so discouraging as to justify neither further research nor sale. Each research stage will disclose a particular benefit mean. Then, we can consider two possible cut-off values for this mean. First, there must be an \hat{m}_C such that if the mean that research discloses, m , is less than or equal to \hat{m}_C , the project should be terminated and the product not made. A research result of this sort might indicate that the product is so highly carcinogenic that the chance of further research revealing safety is too small to be worth pursuing. Second, there must be an \tilde{m}_C such that when $m \geq \tilde{m}_C$, the research project should be terminated and the product made. A research result of this sort would indicate such a high degree of safety that the chance of further research altering this belief again is not worth pursuing. Then, only when $m > \hat{m}_C$ and $m < \tilde{m}_C$, should the firm continue to research. At each stage -- i.e., for each value of C -- an \hat{m}_C and an \tilde{m}_C exist, so an optimal stopping function also exists. Given it, the firm can calculate the expected net value of a research project at any stage. As the initial statement of an optimal stopping rule told, the value of a research project is a function of m and C . Thus we can write a valuation function for a project, $V(m_C, C)$, that gives the project's value when an optimal stopping rule is followed.

The operation of the optimal stopping rule and the valuation function can be clarified with a picture.

Figure 1



The vertical axis plots the set of possible benefit means that research discloses. The horizontal axis plots the successive stages of research. These stages are measured from left to right, so increased expenditures on research move the firm toward the vertical axis. Points A, B, C and D each represent estimates of expected profitability that various levels of research expenditure generate. A point on the vertical axis ($C = 0$) represents perfect knowledge of dangerousness and thus of profits from sales. The two rays, \tilde{m}_C and \hat{m}_C , are "optimal stopping lines"; each of them plots the set of cut-off points that tell the firm when further research is not worthwhile. The picture shows that it pays to stop researching when the expected profit from sale becomes high or low relative to the amount of additional research available to the firm. For example, let a

firm's initial estimate of profitability be at point A. There $\hat{m}_C < m < \tilde{m}_C$ so the firm will begin a research project. If early results reveal a profit mean such as B, the firm will continue to research. But if further results reveal that the firm is at points C or D, the firm would terminate the research project. At C, which is above the positive optimal stopping line, the likelihood that further research would reveal serious danger -- i.e., unprofitability -- is so low that the firm's best strategy is to market the product, warning on the basis of what it then knows. At D, the product is so likely to be highly dangerous that the firm's best strategy is not to make it at all.

The picture also shows that firms will almost never have perfect knowledge about safety; research results will cause a firm to hit one or the other optimal stopping line before the vertical axis is reached. This result is consistent with experience. Perfect knowledge about the harm causing propensities of complex products, such as toxic substances, simply does not exist. For example, scientists now identify actual carcinogens by observing how substances affect animals and persons, not from theories that predict dangerousness from the substances' chemical structure. The former method cannot yield certain answers when applied to new products.

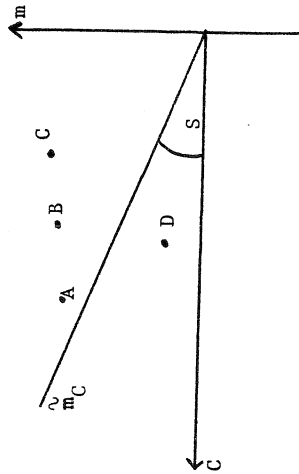
The two optimal stopping lines in Figure 1 are represented as rays out of the origin. To see why this is so, recall that we wrote a valuation function for a research project, $V(m, C)$, that gives its value when an optimal stopping rule is followed. This valuation

function is an expected monetary value that is measured in the same units as m , C and V .¹⁴ Research and development models commonly assume constant marginal rates of substitution between research inputs and outputs;¹⁵ for example, if inputs into research are doubled, research output doubles also. This means here that σ shrinks in direct proportion to the costs incurred in research. Now the valuation function for a project with constant returns is linearly homogeneous--a straight line. Then for a fixed σ we can write V in the functional form: $V(m, C) = mg(m/C)$, which is linear.¹⁶ We can let $\hat{m}_C = R$ and $\tilde{m}_C = S$ and solve for the optimal stopping function: this function actually will consist of two rays out of the origin--the "optimal stopping lines"--which are $\hat{m}_C = RC$ for all R and $\tilde{m}_C = SC$ for all S . These lines have slopes of R and S respectively.

Figure 1 shows that the slopes of the optimal stopping lines are important determinants of how much research is done. For example, the smaller is S in Figure 1, the flatter is the positive optimal stopping line, and the more likely is the firm to sell without doing very much research. As another illustration, observe Figure 2, in

which only positive values of m are considered.

Figure 2



Because S is so small, points A , B and C from Figure 1 lie above the optimal stopping line; if the firm is at any such point, it will sell without doing further research. Research would be done were the firm at Point D , but then the benefit mean must be low--i.e., early research results would indicate a relatively high likelihood of danger.

The slope S turns out to vary directly with the standard deviation of possible benefits, σ , and to vary inversely with research costs, C .¹⁷ This result is intuitively plausible. When σ is high, considerable uncertainty about a product exists, so the firm has an incentive to research, and when C is low, research is inexpensive, so again the firm is likely to do it. But if the firm perceives σ to be small or C to be high, and the product has a good chance of being profitable, the firm's best strategy is to sell it without full

research; in this circumstance, S is then small so the world looks to the firm like Figure 2.

To summarize, the model shows that the amount of research a profit maximizing firm will do regarding how dangerous a product is depends on three variables: the mean of the profit distribution if the firm were to sell without doing further research; the variance of this distribution--the amount of uncertainty about dangerousness; and research costs. For example, when a particular product is thought not to pose a great danger (the initial m is relatively high), this view is plausibly held (the initial σ is low) and a research project is expensive (C is high), a profit maximizing firm is likely to sell without strong warnings and without doing much research. If the product is in fact dangerous, the firm would not know it; in the language used here, the risk of such great danger is remote.

These criteria may illuminate the asbestos cases. The asbestos companies issued mild warnings to their own workers but warned no one else, nor did they perform tests to determine the actual harm that asbestos could cause.¹⁸ In the 1920's and 1930's, asbestos was thought to cause asbestosis, a serious but not invariably fatal disease. Persons thought to be at risk worked in asbestos "textile" factories--firms that manufactured asbestos. These workers were covered under Worker's Compensation Laws. Because asbestosis was thought to be caused only at high exposure levels, workers in other industries, such as those who installed asbestos in ships or buildings, were assumed not to be at risk.¹⁹ Hence, a firm that

failed to warn strongly could believe its expected tort liability from asbestos sales to be manageable. Not many workers were exposed; not all of them would become ill; not all who become ill would suffer horribly and die; and the victims were at least partially insured. Consequently, the mean of the possible profit distribution from selling asbestos without perfect knowledge of its dangerousness was relatively high. Further, there was little indication in the American medical literature that asbestos could cause widely spread harms, including cancer, at low exposure levels. Also, government regulations concerning permissible amounts of asbestos in work environments were unchanged between the late 1930s and the late 1960s. Thus, firms may have held their view of the profit mean with relative certainty, which is to say that the spread of possible profits from the sale of asbestos, σ , probably was perceived as small.²⁰ Finally, laboratory testing of carcinogenic substances neither was then nor is now well developed, nor are results on animals easily extrapolated to humans. Unsurprisingly, the true extent of the asbestos disaster was revealed only by a retrospective study of workers who had been heavily exposed in similar circumstances.²¹ An asbestos manufacturer would have had great difficulty conducting a retrospective study of workers whom it did not employ and whose exposure experiences differed widely among industries; and prospective tests for potentially carcinogenic substances are notoriously hard to do.²² Thus, for a given firm the costs of a project researching the dangerousness of asbestos, C , were likely high. The model just set forth shows that when σ is small and

m and C are high, firms are likely to warn weakly and do little research, even when they are required to bear all risks. Part IC next shows that the model also applies when firms operate under a rule that requires them to warn only of risks of which they should have been aware. The asbestos manufacturers operated under a rule much like this in the 1930s and 1940s. Therefore, that they acted in the way the model predicts--issuing weak warnings and not conducting tests--is unsurprising. The asbestos risk may have been remote.

The model used here supposed a particular kind of research project, that was conducted in stages and whose outcomes were normally distributed. Other kinds of projects are plainly possible. For example, research results sometimes are discontinuous; sudden breakthroughs occur. I have said nothing formal about research projects of this sort. Hence, the exercise here should be regarded more as an invitation to construct a family of models relevant to the toxic risk problem than as a complete description of the toxic risk research process. Nevertheless, many real research projects approximate the conditions of the model, and the conduct of most projects is likely to be a function of the mean of expected benefits, the distribution of that mean and the costs of research, interacting much as the model describes. Therefore, decisionmakers using these criteria could distinguish between remote and knowable risks with at least as much plausibility--i.e., in at least as principled a fashion--as obtains in the usual products liability design defect case.

C. LESSONS

In the model, firms bore remote risks; a firm knew it would be liable whenever its warning was inadequate to a product's actual dangerousness. The analysis implied that a substantial set of risks would remain incorrectly estimated under this assumption. A safety-based justification for imposing remote risks on firms must then be that the set of underestimated risks would grow were firms required only to warn of what they actually knew or of what optimal inquiries would disclose. This justification is false. Let a firm believe that (i) It will be held liable only for risks whose value it knows or can optimally discover; (ii) A court or jury will later independently decide what the scope of an optimal inquiry was; (iii) The court or jury can determine the precise values of m , σ and C as the firm did or should have viewed them ex ante. In these circumstances, the firm will research only when and for as long as the three decision variables m , σ and C direct it to; were the firm to do less, the court or jury would hold it liable, and the firm could not do more. The oversight function of the court and jury, that is, functions to induce the firm to behave optimally on the basis of what it knows, which is just the behavior the model describes. Therefore, imposing only remote risks on firms cannot reduce the set of risks that firms will discover; the modified second liability rule described in Part IA should govern.

This conclusion does not turn on the assumption that courts and juries can precisely determine m , σ and C as the firm saw or ought

to have seen them. If the more realistic assumption is made that a decisionmaker can measure these variables only roughly, firms will be induced to pursue excessive rather than inadequate research programs. To see why, one should realize that when these variables cannot be measured precisely, the decisionmaker may err. Thus, if courts seek to impose only knowable risks on firms, a firm nevertheless faces a positive probability of bearing a remote risk; it may be found liable for an inadequate warning though it acted optimally in not discovering the product's actual dangerousness. For toxic substances, this liability may be large. Also, the probability that the firm will incur liability is partly a function of the amount of research that it does; for if the decision variables cannot be measured precisely, the firm's ex post claim to have behaved optimally is the more persuasive the more research it actually did. When a firm faces a positive probability of being found liable though it behaved optimally, this liability is large, and its likelihood is partly a function of the firm's own behavior, the firm has an incentive to be more careful than a cost-benefit calculation alone would dictate.²³ In our terms, a firm will do more research than would be optimal if courts and juries could measure m , σ and C exactly.

It may be thought, then, that an efficiency justification for imposing remote risks on firms is not that this would prevent insufficient research into toxic risks but that it would prevent too much. Were all risks imposed on firms, a particular firm's liability would no longer be a function of how much research it actually did;

hence, it would do only the optimal amount. On the other hand, imposing remote risks increases the uncertainty under which firms must function, and may unduly restrict the number of firms. Also, as we will next see, the public goods aspect of research causes firms to do too little of it; consequently, whatever excess research is induced by the rule argued for is a useful counterweight. Therefore, efficiency concerns do not imply holding firms liable for remote risks.

To perceive the public goods problem that affects research, suppose: (i) There are $N = 100$ firms in an industry, each of them having an equal market share; (ii) All produce a homogeneous product--asbestos--that they believe may cause harm but they do not know how much; (iii) The mean of the distribution of benefits from perfect knowledge of danger is \$10,000,000 for the industry as a whole, which all firms know; this mean is called H ; (iv) The cost of a research project to discover the harm, C , would be \$1,500,000; (v) If a firm discovered the full extent of the harm, it would gain only the benefit to it of warning optimally; the discoverer could not tax other firms to recover a portion of the gains its research conferred on them. These other firms would have gains because the discoverer's warning would tell them as well as consumers just how dangerous the product was, and so they too could warn optimally.

In these circumstances, the research project should be done but no firm would do it. The expected social gain from research is \$10,000,000 while the social cost is only \$1,500,000; $H > C$. However, assumption (v) implies that a private firm would only do research if

$H/N > C$; each such firm would gain only the fraction H/N of the benefits research yields. Here any discoverer would gain only \$100,000, so $H/N < C$; no firm would do the research project, because its cost would exceed the firm's gain. Assumption (v) happens to be true. Also, toxic substance markets sometimes seem likely to resemble the world of assumptions (i)-(iv). Hence, whatever excessive research is induced by a rule imposing only remote risks on firms is desirable, given the tendency of firms to do too little research into toxic risks generally.²⁴

II. Corporate Structure and Bankruptcy

Analyses of the relationship between tort, corporate and bankruptcy law do not distinguish between remote and knowable risks. This failure underlies much of the difficulty that the latter two bodies of law have had in dealing with situations such as the asbestos cases. Part IIA thus puts remote risks aside, to consider the corporate and bankruptcy aspects of knowable risk impositions. It shows that when risks are knowable, in the sense Part I developed, the law now makes it difficult for firms to shift risks they can more cheaply bear or to avoid paying valid claims. Also, legal reforms that would altogether preclude these forms of misbehavior are relatively convenient to adopt. Such reforms include reducing the protection that limited liability confers on firm owners; increasing the reach of the successor liability doctrine; and preventing firms from discharging in bankruptcy claims based on injuries that have yet to arise. Part II.B then returns to the remote risk concern to show that imposing remote risks on firms creates two related difficulties: First, victims often will be undercompensated. Second, firms will attempt to avoid liability, and their efforts will cause substantial welfare losses. Current corporate and bankruptcy laws deal badly with these difficulties but neither the reforms just discussed nor others would help. The most important factor that drives the analysis Part II makes is that firms generally will or can be induced to insure against knowable risks, or not operate, while firms will not insure remote risks to their full extent. To summarize, Part II argues that,

when corporate and bankruptcy law aspects are considered, remote risk impositions not only may be unfair, as Part IA suggested, but also cannot serve the law's compensation and efficiency goals in the way that knowable risk impositions can.

A. Knowable Risks and the Externalization Problem

1. The Delayed Risk Concern

Persons and firms who insure fully against the accidents they may cause obviously can compensate victims. Also, although a person or firm who insures fully does not necessarily face the correct incentives to take care,^{24a} from the viewpoint of reducing accident costs no good reasons exist to create legal incentives to purchase less than full insurance; such incentives could never increase but are likely to reduce the level of care that would otherwise be taken. The law, however, creates incentives not to insure fully. Accident victims can draw primarily on an individual tortfeasor's tangible wealth to satisfy tort judgments entered against him, no matter how much greater than his tangible wealth those judgments may be. Victims cannot also draw on the human capital aspect of a tortfeasor's wealth, by forcing him to devote a fraction of his future earning capacity to paying compensation, because a bankruptcy option exists: when liability judgments exceed tangible wealth, the defendant can offer up only that wealth, and then have tort judgments discharged in bankruptcy. Hence, individuals have a form of limited liability, which dilutes their incentive to insure fully when the largest expected liability they face exceeds their tangible wealth. To see

how this dilution functions, suppose that Jones has \$10,000 in wealth and faces a linear insurance premium schedule, where \$.05 buys \$1.00 of coverage no matter how much coverage is taken. Then consider this table:

(1)	(2)	(3)	(4)	(5)	(6)
Tangible Wealth that Insurance Protects	Largest Expected Liability	Coverage Purchased	Premium Per Dollar of Coverage	Total Premium (3)x(4)	Effective Dollar of Protection (5) ÷ (1)
\$10,000	\$5,000	\$5,000	\$.05	\$250	\$.05
\$10,000	\$10,000	\$10,000	\$.05	\$500	\$.05
\$10,000	\$20,000	\$20,000	\$.05	\$1000	\$.10
\$10,000	\$40,000	\$40,000	\$.05	\$2000	\$.20
\$10,000	\$80,000	\$80,000	\$.05	\$4000	\$.40

Because the tangible wealth that insurance protects remains constant while the premium necessary to protect this wealth rises with coverage purchased, the price per dollar of actual protection also must rise: in the illustration, when the largest expected liability is fifty percent of tangible wealth, the price of protecting a dollar of this wealth is \$.05; when the largest expected liability is four times tangible wealth, the price rises to \$.20. Given limited liability, the incentive to insure thus varies inversely with: (a) the difference between the largest expected liability and tangible personal wealth, and (b) the probability that liabilities significantly exceeding tangible wealth will be incurred. Respecting this second factor, when the probability of such large liabilities is high, a person will believe herself likely to be in the state where insurance is relatively expensive per dollar of protection, and so has a lessened incentive to insure. On the other hand, if Jones does not

insure, she may actually become bankrupt. Persons dislike bankruptcy and strive to avoid it. Consequently, Jones faces conflicting incentives when the largest liability she may cause exceeds her tangible wealth, not to insure fully and to insure fully.

A recent paper, whose subject was the decision to purchase automobile liability insurance, showed that a person will insure if the premium he would pay to equalize his income in all possible future states of the world exceeds the expected value of the uncollectible claims against him if he purchases no insurance.²⁵ Thus, if the largest expected liability in the illustration above were \$20,000 and would be incurred with a probability of .01, Jones would insure if she valued never being bankrupt at more than \$100:.01 (\$20,000 - \$10,000). In formal terms, let L equal the largest liability against Jones if she negligently injures another and let W be Jones's wealth. Then let P be the premium she would be willing to pay to avoid bankruptcy and p be the probability that L is incurred. The expected value, e, of uncollectible claims above Jones's wealth is then $p(L - W) = e$, and Jones will insure against L if $P > e$. This model shows that the likelihood of purchasing insurance for an individual varies directly with the amount of wealth a person has (W) and his desire to keep it (P), and varies inversely with the probability of a crushing accident (p) and its size (L) in relation to one's wealth. To return to the illustration, when p is high and L - W is large, e also will be large. The larger is e the less likely is it that $P > e$, and so the less likely is it that Jones would purchase full insurance. The data show

that approximately twenty percent of persons fail to insure or underinsure for automobile accidents.²⁶

A difficulty with this model is that the risk premium, P , is unspecified; it is just a function of risk aversion. But P can be given more content if we consider an entrepreneur deciding whether to begin a corporation that has limited liability. This is because for a firm, unlike a private person, future existence (and, hence, all future earnings) depend upon avoiding bankruptcy. Much of the wealth of individuals is their human capital, their ability to work productively. As we have seen, the bankruptcy option permits persons to get a fresh start; hence, an individual whom liability judgments bankrupt may continue to draw on the human capital portion of her wealth as if those judgments had never been rendered. In contrast, a bankrupt firm must cease operations, for its wealth is largely its physical capital, which creditors can take. Firms are valued as perpetuities: if I equals net expected earnings per year and r is the firm's cost of capital,²⁷ the value of a firm's earnings in perpetuity, V , is equal to I/r . An entrepreneur who insures her firm against liabilities, even when those liabilities could exceed the firm's assets, thus secures I/r always. And so, the risk premium for an entrepreneur depends importantly on her firm's expected future earnings; the higher they are in relation to the wealth that must be contributed to begin the firm, the more likely is the firm to be fully insured, even against liabilities that will exceed this wealth.

This analysis has two useful implications. First, when a risk

is knowable, an entrepreneur who sets up a manufacturing firm is likely to have it insure fully, despite the existence of limited liability. This follows first because such firms commonly possess substantial wealth in the form of physical capital, and second because entrepreneurs will expect to earn a significantly higher return on this wealth than the risk-free return--the rate on Treasury bills. Otherwise, it is pointless to start the firm. When wealth is high, expected income thus is high in absolute terms. And when a firm has substantial wealth that is at risk to victims and earns a high income, it is likely to insure fully, unless its liability exposure greatly exceeds its wealth.

This analysis also suggests that when it pays not to insure fully, it often will pay not to operate the firm at all. A firm is less likely to insure when the probability of an accident (p) is high, it does not earn a large income and its liability exposure is very high in relation to its wealth. But when p is high, a substantial chance exists that crushing accident costs will materialize early, thereby providing the firm with only a brief period in which to recover startup costs and earn a profit. If its income is not large, this period will be too brief. For example, suppose that a firm requires \$100,000 of wealth to begin; it will earn a relatively high net income on investment of \$15,000 a year; its discount rate is .10; its assets depreciate at a real rate of 10% a year; accident costs that greatly exceed the firm's wealth will materialize in the very beginning of the third year, and it does not pay the firm to insure. Then, the expected value to an entrepreneur of operating the firm without insurance is negative by in excess of \$30,000.²⁸ The entrepreneur will not insure her firm against all accident costs, but will not begin it either. Therefore, when risks are knowable, manufacturing firms will generally insure fully or not operate.²⁹

An exception to this conclusion may exist if accident costs are likely not to materialize for several years after startup. Let an entrepreneur expect her firm to incur no accident costs for five years; in years six to infinity, accidents will happen, and in each of these years a positive probability will exist of incurring a liability that will exceed the firm's wealth. If it does not pay to insure, the

entrepreneur nevertheless would operate if she could earn enough in the accident-free period to recover startup costs and make a profit. That the risk of accidents is delayed is significant because, other things equal, the longer the accident-free period, the more likely it is that the strategy of operating without insurance will be profitable.

Operation of a firm without insurance when its potential liabilities exceed its assets is plainly undesirable because the firm externalizes risk to victims. The entrepreneur, when deciding what products to make, will not compare the accident costs of victims to her expected gains, but rather will compare only the value of the firm's wealth to those gains. As this wealth, by definition, is less than the victims' costs, entrepreneurs may produce too many defective products. Also, when entrepreneurs operate firms in a delayed risk context and do not insure, those firms often will have negative value; that is, the firms could not earn enough to justify operation if the firms could not externalize risk but instead had to bear it.

Operation of negative value firms is undesirable because these firms generate social costs that exceed their social gains. Thus, it is important to ask whether corporate and bankruptcy law actually do permit entrepreneurs to externalize risk to victims and to operate negative value firms, by establishing companies that function without insurance and that dissolve when accidents happen.

Part II.A2 next models the decision of an entrepreneur considering whether to establish a firm in a delayed risk context, and

if so whether to insure against the accidents the firm may cause. It formally derives the conclusions that were just set out intuitively. Readers who dislike models may move to subsection (3) without losing the thread.

2. A Limited Liability Risk Avoidance Model

The model assumes: (a) an entrepreneur, who may be a firm, wants to begin a business that will make a product; (b) the product causes injuries to users some years after sale; (c) the entrepreneur and insurance companies know this but consumers and workers do not; (d) the business that makes the product will not warn adequately against its risk; (e) a probability exists that the firm will incur a liability that exceeds its wealth in any year after the accident-free period ends; (f) insurance premiums are actuarially fair; the insurance company earns zero profits; (g) limited liability exists; (h) successor liability does not exist; a purchaser of the firm's assets is not liable for its torts; (i) contingent tort claims are nondischageable in bankruptcy. The model uses the following notation: I = a firm's expected net income per year; V = net present value of the firm; r = the firm's discount rate; W = the firm's wealth; t = number of years the firm can operate before it must begin to pay products liability costs; L = the largest liability it faces from accidents; p = probability that accidents in the amount of L will be incurred.

In the accident-free period, the firm earns income, valued at $\sum_0^t I/(1+r)^t$. After this period, the firm will earn income in each

year with probability $(1-p)$ and earn no income while losing all wealth with probability p (L is then incurred). It can be shown³⁰ that the value to the firm of operating in the years when accidents can happen is $\frac{I-p(I+W)}{(r+p)(1+r)^t}$. Hence, we can write the value of the firm without insurance as:

$$V_W = \sum_0^t \frac{I}{(1+r)^t} + \frac{I-p(I+W)}{(r+p)(1+r)^t} \quad (1)$$

If a firm insures fully, its income is constant over all future states of the world. Hence, its value is

$$V_I = \frac{I}{r} - \frac{pL}{(1+r)^{t+1}} \quad (2)$$

The second term is the present discounted value of a stream of insurance payments that must be paid beginning in the year $t+1$; each payment equals the risk (pL) of incurring liability.

The firm's strategy turns on a comparison of these values. If $V_I > V_W$ and V_I is greater than the value the resources at issue would have in another use, the firm will operate with insurance; if $V_I < V_W$ and V_W is the highest valued use of the resources, the firm will operate without insurance. Otherwise, the firm will not operate. It is useful to compare V_I and V_W .

$$\frac{I}{r} - \frac{pL}{(1+r)^{t+1}} < \sum_0^t \frac{I}{(1+r)^t} + \frac{I-p(I+W)}{(r+p)(1+r)^t} \quad (3)$$

Rearranging terms, we get

$$I[(1+r)(1-r)p - r(1+r)^{t+1}(r+p)] \stackrel{L}{<} \stackrel{W}{>} rp[L(r+p) - (1+r)W] \quad (4)$$

By inspection of (4), we see that the right hand side, V_W , will be negative if $L < W$, for L is weighted by $(r+p)$, which always is less than $(1+r)$, the weighting factor for W . This says that if the largest expected liability a firm faces (L) is less than the firm's wealth (W), it will never pay the firm to operate without insurance; the firm will either insure fully or not exist. When $L > W$, the right hand side is likely to exceed the left hand side, V_I , if: (i) $(L - W)$ is large; (ii) p is high; (iii) t is long; and (iv) I is large when t is long. The intuition underlying the first two conditions has been set out above. Respecting the third, the longer is the accident free period (t), the more likely is the entrepreneur to recover the wealth contributed to the firm and earn a profit. Then, the less likely is the entrepreneur to have her firm insure, for insurance is bought to protect W so that income (I) is earned. The desire for insurance is weakened a fortiori if I also is large when t is long, which condition (iv) states. Further, by inspection of (3) and (4) we see that V_W is likely to exceed zero when W is small. This says that the less wealth the entrepreneur must put at risk to victims, the more likely is operation without insurance to be its best strategy.^{30a}

These inequalities also reveal a striking fact: it can be that $V_I < 0$ while $V_W > 0$. In this event, the existence of limited liability and a delayed risk permit an entrepreneur to operate a negative value firm. Such a firm generates social costs that exceed its social gains, for $V_I < 0$ only when the present value of the firm's

income stream is less than the present value of the liability risks it creates.

In many cases, when V_I is less than V_W and V_W is positive, V_I will be negative; it is profit maximizing to operate without insurance because the firm could not survive if it had to take account of all risks that it creates. Consider this illustration: $I = \$10,000$; $r = .10$; $L = \$200,000$; $W = \$150,000$; $p = .10$; $t = 5$. Then,

$$V_I = \frac{I}{r} - \frac{r}{(1+r)^{t+1}} = -\$12,994.35. \quad V_W = \sum_0^t \frac{I}{(1+r)^t} +$$

$\frac{I - p(I+W)}{(r+p)(1+r)^t} = \$19,184.67$. The expected value to an entrepreneur of operating a firm without insurance is positive ($V_W > 0$), but the firm has negative value all costs considered. This firm should not operate, however, for two reasons: it externalizes risk to victims because its liability exposure exceeds its wealth, and it could not pay its way were it made to bear full liability costs ($V_I < 0$).

It is also useful to focus on W , the firm's wealth. In many cases, including those involving toxic products, no single suit will be for an amount that will exceed W . Rather, the firm will face a substantial set of suits whose total value will exceed its wealth or it will face almost no suits at all. For example, the firm's product causes cancer or it does not; if the former, there will be many suits; if the latter, none. The first "cancer suit" thus informs the firm that it is in that state of the world where its liability exposure exceeds W . The firm may then sell its assets, distribute the proceeds to its owners and dissolve. If the entrepreneur knows at the

beginning that potential victims would have difficulty enforcing judgments against the owners, she also knows that she will not lose W to victims when accidents happen. Rather, if \bar{W} is startup costs-- purchasing machines and the like---plus the good will that will be lost when the firm disappears, and if W' is the present discounted value of the proceeds the firm will receive when it sells its assets, the firm will lose $\bar{W} - W'$. This sum is less than W , because we implicitly assumed above that $W = \bar{W}$. And the less the firm will lose to victims when liability is incurred, the more likely is the firm to operate without full insurance.

In the world of this model, entrepreneurs may operate firms that externalize knowable risks to victims and often have negative value, if products liability costs do not materialize until years after startup. Does the law permit this behavior in our world?

3. The Possibility of Bad Behavior

(a) Limited Liability

That limited liability permits entrepreneurs to externalize tort risks to victims is well-known.³¹ The literature commonly refers to such victims as "unrelated" because they are assumed not to deal with firms before their injuries, and thus cannot compel firms to take risks into account through the mechanisms of wage or price bargains. Potential victims who do bargain with firms, however, also may be unable to compel firms to take risks into account if they are uninformed about accident probabilities. In both

cases, firms will consider risks only if accident costs are imposed on them through tort judgments. Limited liability reduces the force of this incentive because it permits entrepreneurs to put less wealth at risk to victims than the expected value of the accidents the firms may cause. It is shown here, however, that at least as regards manufacturing firms limited liability is a problem more in theory than in life. Entrepreneurs have strong incentives to insure such firms fully against all accidents, and full insurance altogether prevents risk externalization. These incentives, though, are diluted substantially when the harms attributable to a firm's actions do not materialize for several years: in such "delayed risk" contexts limited liability actually can create a pathological incentive for entrepreneurs to operate firms without insurance, and thereby externalize risk. Toxic substances represent the most significant case of delayed harm. Consequently, limited liability seems pernicious primarily in toxic substance markets.

(b) Successor Liability

When successor liability obtains, a buyer of a firm's assets is liable for the seller's products liability costs.³² The doctrine is useful because tort victims have difficulty suing the owners of dissolved corporations. Were a seller of corporate assets to remain in existence after the sale, suit would be easy; the seller would only have rearranged its assets, from old machines to cash or what the cash bought, and the victims could reach either. But if the seller dissolved, tort victims would have to locate and satisfy judgments

against its former owners. The longer is the period between dissolution and the materialization of accidents, the more difficult is this task. Also, many states severely restrict or prohibit suits against former owners on claims arising after dissolution.³³ The difficulties involved in suing former owners create an incentive for the owners to begin firms that externalize risk. The successor liability doctrine compensates for this perverse incentive.

To best perceive its function, recall that entrepreneurs are likely to operate without insurance if they can earn enough in the accident free years to recover the wealth they contributed to the firm and earn a profit. It is necessary, we said, to recover the value of the wealth originally contributed because when accidents occur this wealth is lost to victims. The difficulties involved in suing former owners falsify this statement. An entrepreneur who can operate until the first victims appear, sell her firm's assets and vanish with the cash does not lose the wealth she contributed to the firm plus good will; rather, she loses the difference between these things and the receipts from the asset sale. The smaller is this expected difference ex ante, the less wealth the entrepreneur expects to lose to victims. And the less wealth lost, the more likely will the firm be to operate uninsured.

Successor liability dampens the perverse incentive that the dissolution option creates. It does this by increasing the wealth that an entrepreneur will lose to victims, for its existence increases the difference between initial monies expended to start a firm and

monies later received on the sale of assets. This difference widens because a successor that is liable for its predecessors torts will pay less for its predecessor's assets, since they now come with accrued liabilities. Indeed, were a potential successor to operate the same business as the original company, it would be unlikely to buy the original company's assets at all. The original company will want to sell when accident costs begin to accrue. But if the successor is responsible for its predecessor's torts, it will have no accident free period; in its first year of operation, it would bear the accident costs that the original company caused in the first year of its operation but which did not accrue until later. And if, when these accident costs are taken into account, the original company would have negative value, so also the successor would probably have negative value. Hence, if the successor operated at all, it would seldom be with the original company's assets. Rather, the successor would purchase new capital, to obtain its own accident free period. If the original company's market for its used assets were limited to other companies in the same business, the original company thus seldom would have a market; the wealth it would lose to victims would commonly equal original monies expended plus goodwill. If the original company's assets could be used in a different business, a successor might earn enough with them to be a positive value concern, despite bearing its predecessor's accident costs; but because the assets are burdened by these costs, the successor will pay less for them than their earning power alone would warrant. To pay less for the assets,

as said above, will increase the original company's wealth that is at risk to victims and thereby decrease the likelihood that the firm will operate without insurance.

Successor liability unfortunately is less effective in practice than this analysis suggests. Some states do not impose it even when the successor uses the assets to make the same product as the original company; most states do not impose it if assets are sold for cash rather than stock; and no states impose it if the successor uses the assets to produce a different product than the original company.³⁴

(c) Bankruptcy

An entrepreneur would operate a negative value firm even were limited liability abolished and successor liability complete, if she could function until accident costs began to accrue and then have all such costs--the entire delayed risk--discharged. Current law precludes this strategy; the weight of authority holds that tort claims based on harms that have yet to materialize cannot be asserted in bankruptcy.³⁵ Claims that cannot be asserted cannot be discharged.

(d) Legal Implications

Relatively minor changes in corporate law would prevent entrepreneurs from operating firms that fail to insure fully against knowable tort risks. One such change is to abolish limited liability when a firm's assets, including insurance assets, are insufficient to satisfy tort claims and: (i) The firm knew or should have known that

it faced a positive probability of incurring a tort liability that would exceed its wealth; and (ii) if potential victims bargain with it, they are uninformed. The second condition actually is unnecessary, for the burden of the reform suggested here is to abolish limited liability whenever the tort system justifiably would hold the firm liable; and its rationale is that, as regards knowable risks, a firm's assets will be insufficient to meet tort claims only because its owners deliberately chose to operate in that way--to earn profits by externalizing risks. Also, the phrase "abolish limited liability" is used here as a shorthand for the congeries of civil remedies that the recent literature advocates to effectively impose tort or environmental risks on firms, such as holding the officers liable³⁶ or holding the owners in proportion to their capital contribution.³⁷ This paper's concern is not so much with how best to relax traditional corporate protections but with when they should be relaxed.

As an example of what I have in mind, the Johns-Manville Company once considered putting its asbestos related activities into a separately incorporated division. Such a stratagem should fail for harms traceable to sales made after the asbestos risk became knowable. Had Johns-Manville pursued it, it should have been made to satisfy all liability judgments for such sales that its subsidiary could not satisfy. Otherwise, such use of a subsidiary, or of "unrelated" divisions of a conglomerate, would wrongfully permit a company to externalize risk to victims.

Successor liability also should be made complete for knowable

risks. Any purchaser of the bulk of a firm's assets should be liable for its torts. An objection to this proposal is that it would inject uncertainty into markets for capital assets, but this objection seems false. A successor often will use the assets to make the same product as its predecessor. If the risk is knowable to the latter, it will be knowable to the former, for the successor can learn both the rate at which accidents happen and its predecessor's sales history, and so be able to calculate its accident exposure. In this circumstance, successor liability only transfers risk from product and labor markets, where potential victims presumably cannot value it, to capital markets, where firms presumably can. The rule should be the same when the purchaser plans to use the assets for a different purpose than the seller. If the risk is knowable to the latter, it can be knowable to the former, and again the successor can learn its predecessor's sales history. Also, to make an exception for "unrelated business" is to assume the expensive and itself uncertainty producing task of deciding what activities are unrelated.³⁸ Since the successor can insist on an indemnification clause or the like, it seems best to make successor liability complete.

If limited liability is abolished, successor liability is complete and contingent tort claims cannot be discharged in bankruptcy,³⁹ a firm could not shift delayed, knowable risks to victims. Corporate and bankruptcy law thus would function to advance the goals that products liability law should serve.⁴⁰

B. Remote Risks

Part I showed that courts could distinguish adequately between remote and knowable risks, and that imposing all risks on firms would not enlarge the set of dangers that firms would discover. Consequently, rules that do impose all risks cannot be justified on efficiency or safety grounds. Such rules, however, may be implied by moral or distributional goals. Part III considers this possibility. Part IIB shows first that substantial efficiency costs are created by remote risk impositions.

Firms will underinsure remote risks. A risk is likely to be remote, Part I showed, if m , the mean of the profit distribution from sale of a product, is relatively high and σ , the distribution's standard deviation, is small. These conditions can be satisfied in two ways. First, the firm plausibly believes that the product will not cause high accident costs at all. For example, the firm expects accident costs to range between \$10,000 and \$100,000. The firm then will not purchase more than \$100,000 of insurance. If accident costs turn out to be \$1,000,000, the firm is underinsured. Second, the firm can conceive of accident costs as high as \$1,000,000 but plausibly believes that these large losses are unlikely. In this event, the firm also will be underinsured, though for a different reason: market insurance is overpriced. Insurance companies seldom have actuarial experience of new products or do their own research. One possible strategy for such a company would then be to accept our illustrative firm's estimate of the odds; in consequence, it would sell the firm

\$1,000,000 of coverage at a low rate. This strategy could create a serious adverse selection problem: firms with risky new products would portray themselves to insurance companies as selling safe new products; the companies, lacking research facilities, might be fooled. Insurance companies, however, are aware of adverse selection problems, and so would pursue a different strategy: to charge relatively high rates until they had a contrary accident experience. A firm that believed its product was quite unlikely to cause serious accidents then would have a strong incentive not to buy market insurance; rather, it would self insure for large, low probability harms--the \$1,000,000 above--until it had enough experience to convince an insurance company that its odds estimate was correct. But for remote risks, its estimate is false. For example, the firm may believe that the \$1,000,000 liability would be incurred with probability 0.0001 and set aside \$100 as a loss reserve, when that probability actually was 0.01, so that \$10,000 should have been set aside. Again, the firm is underinsured.

To describe a risk as remote is not to say that a firm had no idea at all that its product could cause great harm. A risk is remote either when a firm was this ignorant or believed great harm to be unlikely, and research to correct either impression was not cost justified. Firms can act only on the basis of what they best believe. Therefore, a firm that is ignorant of a risk's true extent or underestimates the likelihood that great harm will occur is unlike the firms described in Part IIA above; as we will see, this former firm

cannot be given incentives to insure fully. Also, when uninsured products liability costs, alone or when added to a firm's other debts, create a total liability that exceeds the firm's wealth, the firm will adopt resource wasting strategies to avoid paying compensation.

1. Corporate Law

Part IIA argued that limited liability should be abolished and successor liability made complete for knowable risks because then firms would have a greater incentive to act efficiently. Efficiency meant purchasing full insurance. To see why these reforms could not induce efficient behavior for remote risks, recall that a firm actually has two decisions, whether to insure and how much insurance to buy. When a firm's largest expected liability is less than its wealth, the firm always will insure (or not operate). When the largest expected liability exceeds its wealth, the firm will operate without insurance if to do so will generate higher expected earnings. Whether it will or not, in turn, is importantly a function of the size of the difference between the largest expected liability and the wealth victims can reach; the smaller is this difference, the less likely is it that operation without full insurance is profit maximizing. Abolishing limited liability and extending successor liability increase the amount of wealth that an entrepreneur must put at risk to victims and therefore shrink the difference between this wealth and the largest expected liability. As a consequence, these reforms would make it less likely that a firm would operate without insurance, whether risks were knowable or remote.

A firm that is induced to insure, however, will buy coverage against the largest expected liability that it anticipates. Since the firms modeled in Part IIA were assumed to have correct expectations respecting this liability, they then would purchase the correct coverage. But to say that a risk is remote is to say that the firm had false expectations: as we have just seen, the firm either had no idea at all that accident costs could be as high as they turned out to be or badly underestimated the likelihood of these high costs. Though the incentive of such a firm to insure could be increased by abolishing limited liability and extending successor liability, the firm could not be made to insure correctly.

In addition, to adopt these reforms when risks are remote would have substantial efficiency costs. Respecting the abolition of limited liability, entrepreneurs deciding to start firms would have an incentive to conceal their wealth from potential victims, for otherwise they could unexpectedly lose all. The costs of concealing wealth are a dead weight loss. Also, potential investors in firms would have an incentive to monitor the wealth of other potential investors, to ensure that these shareholders were sufficiently rich so that no one shareholder would bear a disproportionate share of liability costs.⁴¹ This monitoring too is a dead weight loss. Finally, investment in firms that produce toxic substances will itself be reduced:⁴² it would become more risky to contribute equity to such a firm, since the investor's personal wealth could be unpredictably destroyed. Because toxic substances such as drugs produce social

benefits, decreased production of them would create welfare losses. Expanding successor liability for remote risks would create uncertainty in the market for used corporate assets, which could significantly reduce sales. Possible buyers would be deterred because purchase would subject their companies to literally unpredictable, possibly large claims.

On the other hand, if the victims of remote risks are limited to a firm's assets, they will often be undercompensated, for the firm is underinsured. Hence, should the case for imposing remote risks rest largely on the necessity of compensating victims, that case is seriously compromised if limited liability and successor liability are retained in their current form. To decide what should ultimately be done, then, requires an analysis of the moral case for compensation, which is made below. The argument here shows only that pursuing this case through the vehicle of corporate law reform is likely to generate substantial inefficiencies.

2. Insolvency and Inefficiency

A firm may have negative value because it is made to bear delayed, remote risks. If so, it is insolvent in the balance sheet sense: its liabilities, including tort liabilities, exceed its assets. But the firm is not necessarily insolvent in the equity sense because it may be able to pay its debts as they mature, at least for a time. When equity insolvency has not arrived, a firm has a choice whether to dissolve or continue. This choice permits it to pursue either of two inefficient strategies, to liquidate when the firm's going concern

value exceeds its liquidation value or to do negative net present value projects with high early payouts. These strategies sometimes permit firms to create gains for current claimants--the debt and equity--at the expense of future claimants--the victims of remote risks. Under current law, the future claimants can block neither strategy because they have no say in a firm's operation. Subsection 2(a) illustrates when a firm may liquidate inefficiently; 2(b) illustrates the adoption of negative value projects.⁴³ Readers uninterested in the details may skip to 2(c) and 2(d), which summarize the data, show that current corporate and bankruptcy law permit both strategies, and argue that the strategies are difficult to prevent under any conceivable set of reforms.

(a) An Inefficient Liquidation

Consider a firm with this balance sheet:

Assets	Liabilities
Cash = 0	Bank debt = \$300 at nine percent
Present Value = \$600,	Period One Liability = \$ 27
Viewed as:	Period Two Liability = \$327
PV = \$600 + .5(\$300) + .5(-\$300)	Period One Claims:
= \$600	(a) General = \$50
Liquidation value = \$500	(b) Tort = \$50
	Period Two Claims Expected:
	(a) General = \$ 50
	(b) Tort = \$400

The firm may liquidate at once, after the first \$50 of tort claims tell that it is balance sheet insolvent (firm value is \$600; firm liabilities are \$777), or it may operate for one period. If it liquidates, it pays current general claimants \$50, current tort

claimants \$50, its bank \$327 dollars and its shareholders \$73, the amount left from the \$500 liquidation value.

The bank and shareholders could only do worse on continuance. The firm's \$600 present value is conceptualized as a sure receipt of \$600 in period two plus a 0.5 chance of earning or losing \$300 from future operations; this treatment is adopted to show that future operations have risk. The certain value to the bank from continuance is \$27, its first year interest. The bank's expected value from continuance is \$226.50, calculated as follows: The firm has a 0.5 chance of having only \$300 of wealth in period two (\$600-\$300). In this event, \$300 will remain to pay claims. As the bank is then owed \$327 and there will be \$777 of claims, the bank would receive 42% of \$300 or \$126. Hence, the bank has a 0.5 chance of getting \$126, which is worth \$63 *ex ante*. Were the firm instead to be worth \$900 in period two, the bank would be paid in full; a 0.5 chance of receiving \$327 is valued at \$163.90 *ex ante*. The sum of these alternatives is \$226.50. The total value to the bank from continuance is the expected value of \$226.50 plus the sure \$27, or \$253.50. This is less than the \$327 the bank would receive on liquidation, so it would refuse to make further loans and urge the firm to dissolve.

The equity would agree. Were the firm to continue, there is a 0.5 chance it would have only \$300 of wealth in period two; then its debts would exceed its assets and its equity would be worthless. Were the firm instead to have \$900, its assets would exceed its liabilities by \$123(\$900-\$777); a 0.5 chance of receiving \$123 in period two is

worth \$61.50. Hence, the expected value to the equity from continuance is $0.5(0) + 0.5(\$123) = \61.50 . Since the shareholders receive \$73 on liquidation, they too will want to dissolve. Enough funds are available on liquidation to pay the other current claimants, and the future claimants have no say. Consequently, the firm will vanish.

Liquidation is inefficient because the firm's going concern value exceeds its liquidation value by \$100. Also, since courts impose unknowable risks largely to compensate victims, and since future claimants will receive nothing, liquidation has moral costs. Here too the future claims actually had value. If the firm continued and was worth only \$300 in period two, the future claimants would be entitled to 51.5 percent; if the firm instead was worth \$900, the future claimants would be paid in full. As there is a 0.5 chance of either outcome, the expected value of continuance to them is \$277.25. Liquidation dissipates some of this value and transfers the rest to current claimants. In theory, the future claimants could bribe the debt and equity to continue; the former would be made better off by a payment of at least \$73.51 and the latter by a payment of at least \$11.51. The future claimants could make both payments and still hold claims whose expected net value is \$192.23. Subsection 2(d) will show, however, that coalition costs and freerider problems would prevent the future claimants from bribing the firm to continue.

(b) Adopting Negative Value Projects

The liquidation illustration was more favorable to tort claimants than real life sometimes is because it assumed that firms would take no steps to reduce their liquidation value or to increase the total claims on it. This assumption may sometimes be false when an entrepreneur discovers that he has inadvertently been operating a negative value firm. Consider a project that will generate \$200 in net revenue per year for two years but require a \$500 payout in the third year. If the firm's cost of capital is ten percent, the project's net present value is a minus \$28.83. The entrepreneur nevertheless might cause the firm to do the project if major tort claims would mature in the third year; he would pocket \$400 and then liquidate the firm. The future claimants would have to share the liquidation value with the artificially created \$500 claimant. Alternatively, a firm may harvest natural resources earlier than it should. For example, let a firm own a mine that will produce \$5,000 of coal if it is mined today; the firm expects coal prices to rise in response to rising oil prices but then level off. Its discount rate is ten percent, and it believes that the coal will yield \$7,000 if mined in a year, \$8,500 if mined in two years, \$9,500 if mined in three years and \$10,000 if mined in four years. Then, the firm should mine the coal in the third year because the present discounted value of that yield is \$7,142.86, which is greater than the present discounted value of any other yield. But if major tort claims will accrue in the third year, the firm will mine in the second, which does

not maximize value.⁴⁴

Such inefficient projects sometimes are available. One example is borrowing, which brings in money at once and requires later payouts. Lenders, however, may also discover that the firm is insolvent. A more realistic example would be for a firm to engage in a natural resource business that has a reclamation obligation that the firm plans not to meet. For instance, a firm might strip mine coal for a time, planning not to reconstruct the land. More simply, a firm when calculating a project's value should include the cost of replacing necessary machines. A negative value project can thus become positive if no replacement cost is assumed. Firms that plan to dissolve will not assume replacements. Thus, they may exhaust present or new assets, vanishing when these are gone.

(c) Data

Current claimants on a firm that learns ex post that it has negative value have incentives either to liquidate the firm though its going concern value exceeds its liquidation value or to have it pursue inefficient projects with high early payouts. Until recently, few firms have been in this situation, and these seem not to have been systematically studied. The anecdotal evidence, though, is consistent with the story. A group of current claimants against Johns-Manville have asked the bankruptcy court to liquidate the company, though management claims that its going concern value exceeds its liquidation value; rather, management's hope seemingly is to have the bankruptcy court eliminate or substantially reduce the future claims.⁴⁵ The

court's apparent lack of sympathy with this hope seemingly underlies the frequent claims that the company is stalling--refusing to propose a reorganization plan while continuing to use the protection of the bankruptcy court. Respecting possible motives for a stall, Johns-Manville has been accused of paying unusually high dividends, which redistribute wealth in favor of current claims and against future ones. Also, it allegedly is overcutting timber. This may be because it has no intention to replant, in which case it may be pursuing a negative value project with a high current payout; or it may be because it is harvesting too early, which also is inefficient.⁴⁶ The plausibility of the story told above together with evidence of this sort suggest at least the provisional accuracy of a prediction that ex post negative value firms will be run inefficiently.

(d) Legal Remedies

Current law cannot prevent inefficient liquidations when firms can pay off existing claimants. Today, a firm can liquidate privately or in bankruptcy. The latter route is open because future claimants now lack standing in bankruptcy proceedings, and so could not intervene to ask bankruptcy judges to require reorganization--i.e., continuance--rather than permit liquidation. The future claimants could be given standing in bankruptcy but, as Professor Rowe recognized, no way now exists to get equity solvent firms into bankruptcy if they do not want to go there.⁴⁷ If such firms could do better by liquidating privately than by being forced to continue, they would pay off current debt and vanish.

Future claimants could be authorized to trigger bankruptcy proceedings rather than wait for them. Too few claimants would take up the chance, however, to make this reform helpful. The set of future claimants is composed of persons who have been exposed to toxic substances. These persons would often regard the certain costs of a lawsuit to force a bankruptcy as higher than the uncertain gains. These gains are uncertain for three reasons. First, persons exposed to toxic substances suffer harm with a probability that is less than one and difficult to calculate precisely. Also, the harm will occur an undetermined time in the future. The gain to a future claimant from bringing a suit cannot exceed the expected value of his injury; when the probability and timing of injury are both uncertain so also is this expected value. Second, the expected value of the injury is higher than the expected gain that would be realized in bankruptcy. The value of a bankruptcy claim is partly a function of how many such claims there are. When a firm has a million dollars in assets and two million dollars in claims, each claim is worth seventeen percent more than if the asset value were unchanged but there were three million in claims. A future claimant would seldom know how many other such claims there were; hence, he would have difficulty valuing his claim in a bankruptcy, even if he could calculate its expected value independent of bankruptcy.⁴⁸ Finally, a future claimant, who is a consumer or worker, could not easily know whether the firm could pay his claim, which might be small or arise early, though the firm could not pay all. To force a bankruptcy, a future claimant would have to incur

certain expenses. That is, he would have to pay lawyers to bring a lawsuit that the firm would strongly contest. The very uncertain value of the gains from such a suit often may seem lower than these expenses.⁴⁹

In addition, to force a bankruptcy is to provide a public good. Once a bankruptcy has been triggered, no future claimant could be excluded from it, whether he contributed to the triggering law suit or not. When the costs of a bankruptcy suit exceed the expected gain to any individual claimant from bankruptcy, no bankruptcy would occur, even if future claimants could value their claims accurately. Rather, a suit would be brought only if a claimant coalition could be formed. The large number of future claimants, the difficulty of identifying them and of communication among them, and the incentive of each to let others finance the law suit make effective coalition formation unlikely.⁵⁰ And without such a coalition, future claimants also would not bribe firms to continue though their going concern value exceeds their liquidation value.

For all of these reasons, few future claimants would attempt to force bankruptcies or otherwise prevent firms from dissolving. And those that made determined efforts could be bought off. Hence, allowing future claimants to trigger bankruptcies would seldom prevent inefficient liquidations.

Allowing a public agency to force bankruptcies may have a better chance of success, but not much better because the agency often would not know when to act. Future claimants would have to come

forward to notify the agency; doing this raises many of the problems just discussed, for the future claimant actually is a person, who may be reluctant to become involved in an administrative proceeding when he is now healthy and may never suffer. The experience of the FTC and Justice Department in attempting to prevent rather than undo noncompetitive mergers also suggests that a public agency cannot be effective unless firms are required to report extensively to the government about proposed and present business activities. The market anticipates many of these activities, yet the firms that they would adversely affect seemingly lacked a sufficient incentive to notify the relevant government agencies. Also, the sanctions for failing to report are imposed on the offending firms. When firms are vanishing rather than continuing, however, sanctions for failing to report to a Federal agency their plans to vanish would be difficult to apply. Thus, a Federal agency too would seldom prevent inefficient liquidations.⁵¹

(e) Concluding Remarks

Imposing remote risks on firms generates particular efficiency costs, but these costs are not entirely absent when courts impose only knowable risks. A firm may fail to do the optimal amount of research; if so, it may warn inadequately and underinsure. When the knowable risk materializes, this firm too will face large uninsured liabilities that create incentives to liquidate inappropriately or waste wealth. However, the sanctions that now follow from knowable risk impositions, together with those that would follow from adoption of the reforms

Part IIA suggest, would ensure that there would be few such firms. In contrast, the particular efficiency costs that Part IIB describe are the inevitable accompaniment of remote risk impositions, for firms cannot insure against remote risks and so would have incentives to act inappropriately whenever these risks materialize.

III. The Case for Not Imposing Remote Risks

The case against judicial imposition of remote risks on firms follows from two basic assumptions. The first is that misfortunes which "life" visits on people should not be shifted directly to other people (or to firms) unless "good reasons" exist to shift them. Life obviously is partly constituted by human actions. And the good reasons can be instrumental--shifting losses is efficient--or moral--a particular set of unfortunates has a right to have others bear losses that first fall on them. The collectivity of course may have duties of justice or benevolence to unfortunates, but private citizens, if it assumed, cannot be made to bear the full burden, unless good reasons exist. One justification for this assumption is that shifting losses is costly. Costs should not be incurred without good cause. A second justification follows from our society's respect for and protection of individual autonomy. Such a commitment to individualism implies that a person's misfortune is his or her own affair, unless good reasons exist to make it another's affair. The second assumption follows from the view that at least some moral duties are derivable from role expectations. What a parent should do, that is, follows in considerable part from what our society expects parents to do.⁵² And the second assumption is that a corporation's role is to maximize profits, subject to its obeying the law and satisfying widely accepted moral constraints.

These assumptions are so deeply embedded in our culture that rejecting them would create major social dislocations. I shall rather

take them to hold, and claim that they imply a prohibition against courts imposing remote risks on firms. The first assumption alone can support this claim, for Part III argues that no good reasons exist to shift losses traceable to remote risks from unfortunates to firms. Indeed, good reasons exist not to. I have just shown that imposing remote risks has substantial efficiency costs. Also, the second assumption implies that a shift would be unfair. A firm would not have acted immorally in failing to discover a remote risk: discovery would not have been profit maximizing, nor do positive law or widely accepted moral notions direct firms to lose money at research. Consequently, to impose remote risks on firms is unfair because the firms are in justifiable ignorance of them. This fairness concern is heightened if courts become serious about imposing remote risks, because then they should abolish limited liability and extend successor liability. These actions would impose costs on shareholders and other firms--purchasers of corporate assets--who would seldom have had a voice in the original decision to produce. Thus, Part III concludes, good reasons actually exist not to impose remote risks, and no good reasons exist to impose them.

A. Instrumental Grounds

Products liability law holds firms liable to reduce accident costs and facilitate loss spreading. Part I showed that courts could distinguish adequately between knowable and remote risks and that firms required to bear only the former would discover no fewer dangers than firms which bore the latter; indeed, they might discover more.

In addition, to impose remote risks sometimes may inefficiently drive firms out of business. This could occur when a remote risk materializes such that victims' costs exceeded the value of firms in a market, but the product is viable with warnings. Viability is possible if peculiarly sensitive persons could avoid exposure and others could take appropriate precautions.⁵³ Then the product should continue to be produced with warnings, but the firms originally in the market are insolvent and may dissolve. Other firms will then enter, but these entry costs are a waste, for the original firms could have continued to produce had they been made only to warn after the risk became knowable. Thus, imposing remote risks does not advance and may actually frustrate the goal of reducing accident costs.

The damage judgments flowing from remote risks also are not spread; rather, they represent direct transfers from shareholders to victims. Loss spreading is justified on prospective grounds. A firm will insure against risks and pass part of the insurance cost to users. In this way, as courts often say, losses are borne by those who benefit from the product, the firm and its customers. Because firms have not insured fully against remote risks, they cannot spread the losses from them in this fashion.

Courts sometimes suggest that firms will reflect the cost of judgments for remote risks in future prices.⁵⁴ Were this true, at least part of the normative case for loss spreading would have to change, for those who benefited from the product that caused harm, the past users, would pay nothing, while those who did not benefit, the

future users, would be largely responsible. But in fact the cost of past judgments will not be reflected in future prices at all. A cost change will not affect price unless it causes a firm's marginal cost curve to shift. When a firm discovers that it must make a set of liability payments to remote risk victims, it incurs an immediate cost, the present discounted value of the payment stream. This cost is unrelated to production, and so will never shift the firm's marginal cost curve.⁵⁵ Hence, to impose on firms risks that they cannot profitably discover is to compel direct wealth transfers from shareholders to victims. The case for imposing remote risks must rest on the moral desirability of these transfers.⁵⁶

B. Justice Grounds

A tort plaintiff may rest a claim for relief on any of three aspects of justice: retributive justice, which would support imposing liability to punish the defendants's morally culpable behavior; distributive justice, which would support imposing liability to produce a fairer distribution of wealth; and corrective or compensatory justice, which would support imposing liability to rectify a loss that the defendant wrongfully caused. A justice as retribution case seems groundless because a plaintiff would be suing in strict liability, which does not require a finding of fault, let alone immoral fault, to sustain an imposition of liability.⁵⁷ The victim of a remote risk also lacks tenable distributional and compensatory justice claims.

(1) Distributional Justice

Courts deciding products liability cases explicitly refuse to justify outcomes on distributional grounds.⁵⁸ Though this denial is sometimes insincere, it is always correct. To make out a distributional justice case, a claimant must show that an existing distribution of wealth should be altered in his favor. A refusal to impose remote risks on firms benefits shareholders at the expense of victims. Hence, a victim must claim that it is unjust to burden victims as a class rather than shareholders as a class, or that it is unjust to burden him rather than the particular shareholders of the firm he sues. The former claim is weak because the classes victim and shareholder are too much alike. Many shareholders are not rich and many victims are not poor. Also, many shareholders are potential victims; a substantial portion of firm wealth is held by employee pension funds and insurance companies. Further, many victims have at least partial insurance while shareholders, ex hypothesi, have none because the risks were remote. Finally, redistributing wealth to victims cannot be justified by the notion that, other things equal, money should be transformed from large groups to small ones, if the small ones need help. Often, as in the Johns-Manville case, the number of potential victims may approximate the number of shareholders. Therefore, a plaintiff's claim for relief based on his membership in the victim class does not implicate the justice of society's basic institutions in the way claims that wealth should be transferred from the more to the less well off do.

A victim must instead argue that it is unjust for him rather than the particular shareholders of the defendant firm to bear the costs of a remote risk. Distributional justice theories, however, do not support such fine-grained distinctions among persons. Rawls' theory, for example, claims only that society's "basic structure" should be just; society should ensure an equal distribution of "primary" goods and that any other distinctions in the basic structure are to the advantage of the worst off group.⁵⁹ The basic structure is composed of such principal institutions as "parliaments, markets and systems of property"; these derive from "a public system of rules".⁶⁰ If the basic structure is just, then individual distinctions are likely to be made correctly. Rawls thus explicitly states that it is a "mistake" for a theory of justice to consider the "relative positions of individuals."

"If it is asked in the abstract whether one distribution of a given stock of things to definite individuals with known desires and preferences is better than another, then there is simply no answer to this question."⁶¹

Hence, a victim cannot justify a transfer from a particular set of shareholders to himself on Rawlsian grounds.

Utilitarian distributional theories also cannot justify such a claim. This is not because interpersonal utility comparisons between shareholders and victims cannot be made rigorously; such comparisons may be made in an acceptably rough and ready way, if one had enough

information about the parties' particular circumstances. But getting this information in the context of lawsuits as these now are run is difficult to do. And the effort would also permit courts and other strangers to investigate the personal lives of litigants more thoroughly than current conceptions of privacy permit. Indeed, these privacy concerns imply that utilitarian distributinal justice claims also are out of place when a particular individual claims money from another. Rather, utilitarianism seems better suited to evaluating society's basic redistributinal decisions. To do this requires interpersonal utility comparisons between large, disparate groups, such as rich and poor, that can be drawn on the basis of what people in general are like, and without the particular personal information on which individualized interpersonal utility comparisons must rest.⁶²

(2) Compensatory Justice

The compensatory justice approach to tort law is concerned to compensate only persons whose harms are causally linked to the wrongful conduct of others. Those injured in this way have a right to redress; the injurers have a duty to pay it.⁶³ A plaintiff must then prove, to establish a compensatory justice case for relief, that defendant caused his injury, and did so wrongfully. Commentators sometimes claim that these two elements are difficult to establish in the typical strict products liability case.⁶⁴ Courts, however, use language that is consistent with the existence of a justice based view of strict liability. I shall first spell this case out for ordinary products liability claims, and then argue that while its causal aspect

also supports imposing remote risks on firms, its wrongful behavior aspect does not.

It is useful to begin with the issue of a causal link between the defendant's conduct and the plaintiff's harm. A set of plausible causal candidates usually exists for complex events such as accidents; the law's task is to choose "the cause" from among this set. To do this is to engage in what Morton White has called "causal interpretation."⁶⁵ This is a problematic enterprise, for, just as several interpretations of a novel can be "correct," in the sense that they logically follow from admissible literary stances, so also several causal interpretations of a complex event such as a war can be correct, in the sense that they logically follow from admissible interrogatory purposes. Also, just as there often is no principled way to choose among admissible literary stances or interrogatory purposes, there often is no principled way to choose among causal interpretations. The enterprise of choosing "the cause" thus has an irreducibly arbitrary aspect.

This difficulty makes lawyers impatient with causal analysis, but they nevertheless use it, much in the way M. Jourdan spoke prose. Causal interpretation is an ingrained part of the process of using language to describe and explain events. And judges unsurprisingly have intuitions about the causes of products liability accidents; these intuitions are, as it were, part of the system's raw material. Hence, I shall say a few words about causal analysis generally and then attempt to identify the causal intuitions that seemingly are at

work in the cases.

It helps to start with the notion of a minimally sufficient condition. Suppose that an appliance in a private home sparks, sets a nearby flammable curtain on fire and ultimately the house is burned down. Had the world run on from the moment before the appliance sparked, and had it not sparked, there would have been no fire.⁶⁶ But the same could be said for the presence of the flammable curtain; had the world run on from the moment after the spark, and had there been no curtain or had the curtain not been flammable, there also would have been no fire. Hence, at least the spark and the curtain are causal candidates for the fire, and by this logic so is the presence of oxygen in the air and the absence of an effective sprinkler system. On the other hand, houses can burn down if none of these causal candidates but oxygen is present. A gas heater could explode.

This analysis can be formalized to tell a causal story. Let E be the event "house burned down at time t "; F be the "causal background" or "field" against which the story is played out (the field includes such common features as the presence of oxygen, that the house is on this planet, that electricity runs through wires, and so forth); A be the sparking appliance; X be the other causal candidates present on the occasion at issue (the flammable curtain, the absence of sprinklers); Y be the disjoint set of other causes of a house fire not present here (the gas heater explosion). Then we can write: (a) In F all (AX or Y) are followed by E, and (b) In F, all E are preceded by (AX or Y). Here, the set of events and states of the

world that constitute "AX" aggregate to a minimally sufficient complex condition of the event E. And Y also would have been a minimally sufficient condition of the event E, except that Y did not happen but AX did.⁶⁷

The particular factor A, the sparking appliance, is thus a necessary part of the minimally sufficient condition AX of the fire, but the complex condition is not itself necessary to the event; houses also can burn when gas heaters explode. Hence, A is what John Mackie called an "inus" cause of the fire, a necessary part of a condition of an explanans that is sufficient but not necessary for the explanandum to occur.⁶⁸ The flammable curtain, however, is also a part of X, and thus it too is an inus cause. The difficulty is to choose which of them, or the absence of sprinklers, is "the cause."

This choice can be made functionally. If one's object is to reduce the frequency of the event to be explained, and if fewer such events would occur if appliances never sparked, then the sparking appliance (A) is the fire's cause.⁶⁹ Products liability law seeks to reduce accident costs. Therefore, it could choose the cause in this fashion; that is, it could identify causes on a cheapest cost avoider basis, and courts often do pick causes in this way. But functionalism cannot exhaust the set of causal explanations here for two reasons. First, courts also use nonfunctionalist causal language; a manufacturer is said to put a dangerous article in the stream of commerce and, in consequence of doing this, is held liable.⁷⁰ This approach sometimes works at cross purposes with, and often seems to

proceed independently of, a cheapest cost avoider analysis. Second, a functionalist analysis is irrelevant to the remote risk issue, for the instrumental purposes that products liability law pursues--reducing accident costs, spreading losses--are not served by imposing remote risks on firms.

Another way to choose the cause from among a set of inus causes is to ask what the chooser wants to explain. Most choosers want to explain unusual or extraordinary things. It then follows, for example, that the cause of a trainwreck "cannot be a normal or usual feature of the operation of trains or of some particular train . . . the cause of an abnormal event is itself abnormal."⁷¹ But in what way is an event abnormal? A person's death may be abnormal to his friends if he were young and died in a car accident, yet the death may be normal to a highway patrolman if it occurred at dusk at the end of a Labor Day weekend. Because an event may be regarded as abnormal in different ways, depending on one's point of view, and because there may be more than one admissible point of view, an event may have more than one cause. The notion of cause as "abnormalism" is nevertheless constraining, for few events can be regarded as abnormal from a wide variety of viewpoints.⁷² The causal analysis of everyday life, which abnormalism attempts to capture, thus would make a causal attribution with virtual unanimity if the explanandum were "Houses on island all washed away" and if the set of inus causes in the relevant explanans included "Giant tidal wave."

An abnormalism theory of cause explains much in products

liability law. To see how, it is helpful to borrow from Bruce Ackerman's notion of legal conversation.⁷³ Ackerman distinguishes between the conversations of "reactive"--he seems to mean traditional--and "activist" lawyers. The latter see a world that needs improvement; they want to explain its unsatisfactory state as a step to reforming it. From this viewpoint, what is to be explained, to be talked about, is not so much an accident itself as how the accident could have happened. This leads the activist lawyer to include as causes such features as the technology set--the Government may not have funded safety research sufficiently--and the plaintiff's behavior--he could have discovered the need for a protective guard.

A reactive lawyer supposes the world to be a satisfactory place, by and large. Serious personal injuries are grotesque events in this world: people do not and should not spend their time guarding against the grotesque. From this point of view, the thing to be explained is the accident itself, which is conceived of as a sudden, violent rending of the social fabric. This choosing purpose leads the reactive lawyer to ask who and what tore things up. It is then natural to focus on the last decisive event over which a person who was supposed to pay attention had a choice, rather than on the full set of inus causes that an activist state could influence.⁷⁴ This last, decisive event is the manufacturer's conduct; it is he who "put a defective article into the stream of trade", thereby endangering the consumer "who was powerless to protect himself." In effect, the manufacturer performed the uncommon action of putting a bomb into

circulation. Hence, a reactive lawyer will choose the manufacturer's act of selling a defective product as the cause of an accident.

An accident thus may have at least two causes, that which an activist lawyer chooses and that which a reactive lawyer chooses. Because both points of view are admissible in legal discourse, each cause is, in an acceptable sense, "the cause." This fact accounts for the tendency of causal discussions to pass each other without making contact.⁷⁵ But the question now is whether a nonfunctional causal story exists. And for reactive judges it does; they plausibly believe that selling defective products causes accidents.

This causal interpretation also can ground ascriptions of responsibility.⁷⁶ A full theory of responsibility for the harms one causes would enable us to link the causal story to a variety of products liability rules, but we do not need that theory here. This is because any full theory would make the element of the manufacturer's choice an important feature; and this element has considerable explanatory power. Choice is relevant on the following argument: (a) To say that a person is responsible for the harms he causes is at least to say that he had a choice whether to cause the harms or not; (b) One has a choice only if one acts under conditions that insure intentionality; (c) The most important such condition for the present purpose is that the chooser was informed of the likely consequences of his acts; little or no moral weight attaches to choices made in ignorance;⁷⁷ (d) This condition is put too simply because one may choose to remain ignorant, yet persons cannot escape

responsibility if they deliberately move forward while looking down;

(e) Thus a person's choice should be regarded as uninformed, from a moral point of view, if and only if the person is ignorant in fact of the likely consequences of his actions and his ignorance is justifiable.

In the ordinary strict liability case, a manufacturer is aware of the accident causing propensities of its products. When the manufacturer does not know, its ignorance is without justification. This follows from the definition of a knowable risk. A risk is knowable when the possible harm that the firm could cause by selling the product was sufficiently great and likely as to exceed the costs of a research project that would have disclosed the possibility of this degree of harm. Not to conduct a research project in this circumstance is unjustifiable. This conclusion is implied by utilitarianism, for research coupled with a warning not only discloses the harm but permits persons to avoid it or choose to risk it; thus the research project maximizes welfare. A neokantian analysis also requires the firm to research. A firm that does not is willing to risk hurting others when to discover the danger and warn would cost less than the expected value of the harm. Given this cost comparison, many potential victims would pay to have the research done. And the firm could charge them for much of it because it bargains with potential victims and research costs affect prices; the firm, that is, has reason to believe that to do research is to advance the interests of those to whom it sells, at not excessive cost to it. To omit

research in this event is to treat others' interests as unworthy of serious concern. For similar reasons, research is required by a firm's social role. Society expects corporations to adopt those safety devices or issue those warnings for which people can be expected to pay. Presumably, persons would pay for the costs of research and disclosure when the harms they would incur by remaining ignorant would exceed these costs. Hence, firms should research in this circumstance.

A manufacturer in the ordinary strict liability case thus has caused harm and did so wrongfully. Legal liability should attach to this behavior because it is the function of civil courts to redress injuries that persons wrongfully cause, whether the causers meant harm or not. Torts are not crimes.

The causal aspect of this compensatory justice story also supports imposing remote risks on firms. Again, for a reactive lawyer the explanandum is the sudden, unexpected and tragic fact of injury. And again the decisive causal event is plausibly seen as the act of selling dangerous things. Thus, the court in Beshada v. Johns-Manville Products Corp.,⁷⁸ the leading case to impose remote risks, responded to defendants' claim that it would be unreasonable to require them "to warn of the unknowable" with:

However, a major concern of strict liability--ignored by defendants--is the conclusion that if a product was in fact defective, the distributor of the product should compensate its victims for the misfortune that it inflicted on them.⁷⁹

The sellers caused the harm.⁸⁰

The ascriptive aspect of this justice story is less easily made out for remote risks because firms sell in justifiable ignorance of them. A risk is remote when the possible harm that a product could cause is too little and too unlikely to justify a research project to learn any more about what the harm actually is. Not to do additional research in this circumstance maximizes welfare. Also, eschewing research is not disrespectful to potential victims. Were research done, the victims would have to pay, yet they would not want to pay because, ex hypothesi, the research is not worth doing. To omit research that no one wants is to further rather than retard people's concerns. Finally, a firm's social role does not require it to take safety related actions that persons would be unwilling to pay for, if the persons knew everything the firm did. Thus, firms are not responsible for the harms flowing from remote risks because they do not responsibly choose to cause those harms.

This argument may be put more graphically by considering a manufacturer's actual choices. It can choose not to make the product though the product is useful, seems safe, and therefore has customers. It can warn that the product is dangerous though no persuasive grounds to believe this exist and the warning will reduce sales by frightening consumers without apparent cause. Or the manufacturer can conduct a research program whose costs exceed its expected gains. In a world where firms are supposed to earn profits these do not seem real choices. The Beshada court, therefore, unsurprisingly went on to make

an instrumentalist analysis.

The most important inquiry, however, is whether imposition of liability for failure to warn of dangers which were undiscoverable at the time of manufacture will advance the goals and policies sought to be achieved by our products liability rules. We believe that it will.⁸¹

That the court got this inquiry wrong⁸² is less significant than that it believed the inquiry to be "The most important" one.

To summarize, a manufacturer of a product that harms people in ways or to an extent that the manufacturer cannot be expected to foresee has caused these harms but, even to reactive lawyers, is not responsible for them. Responsibility implies choice, and it is the element of choice that remoteness eradicates. For this reason, no compensatory justice case for imposing remote risks exists.

C. The Humanitarian Claim

A humanitarian claim to relieve needless suffering always exists. Victims of remote risks needlessly suffer; they too could not have discovered the danger and it harmed them. Humanitarian claims, however, are seldom vindicated in law suits. There are too many of them and they make us all defendants. In a world of scarce resources, the questions they raise are how to rank the claimants, how much each of them should receive, and how much of the obligation to give must each of us satisfy. None of these questions is justiciable. Are asbestos victims more deserving of relief than sickle cell anemia

victims or tornado victims? Should asbestos victims be given medical care only? Compensation for pain and suffering? Compensation for their dependents? If no one in particular is morally responsible for their plight but they have moral claims against us all, should courts allow victims to sue oil companies? Real estate tycoons? Union pension funds? If it would be supererogatory for each of these possible defendants to contribute their entire wealth to the relief of victims, how much should they be made to pay? No moral theories directly imply principled and relatively precise answers to these questions. Yet it is just such answers that this society wants courts to give. Hence, the humanitarian case for relieving the suffering of victims of remote risks cannot support imposing those risks on firms through the vehicle of products liability suits.

To acknowledge the existence of a humanitarian case, however, is to reintroduce efficiency concerns, for some forms of public funding conceivably could create resource misallocations that exceed those that would flow from judicial imposition of remote risks. Given the difficulty of quantifying either form of misallocation, general efficiency conclusions seem hard to draw. The assumption made in the Introduction to this paper, that society is otherwise well ordered, may be taken to imply that public funding is done in such a way as to have no efficiency costs; but this implication may put more weight on the assumption than it can bear. A more sensible way to proceed is to recognize that the difficulty just noted is unlikely to be important in practice, for the probable response of Congress in tort risk

contexts would be to adopt a workman's compensation solution, in which firms have clearly defined obligations to pay benefits to a fund (or purchase insurance), workers' damages are explicitly limited and specified and the Federal remedy is made exclusive.⁸³ Such solutions in effect internalize risk costs and make them predictable, and so should not cause serious misallocations.

Conclusion

Courts should not impose remote risks on firms. A remote risk is a risk whose full extent a cost justified research program would not reveal. To impose such risks is unfair, for it makes firms responsible for what they would not prevent. Also, firms have incentives to pursue inefficient strategies, such as liquidating when their going concern value exceeds their liquidation value, just to avoid the surprising liability that a remote risk imposition creates. The use of these strategies apparently underlies the extraordinary problems that bankruptcy and corporate law face in situations such as the asbestos disaster. These bodies of law can conveniently resolve the problems that products liability accidents create, when firms can anticipate the risk of those accidents. But corporate and bankruptcy law could never cope with the chaos that can result when firms are made to bear large liabilities for which they could not plan.

The fairness and efficiency objections to imposing remote risks on firms imply the error of such impositions unless strong instrumental or justice reasons exist to hold firms liable. But there are no such reasons. Imposing remote risks advances none of the

instrumental goals that tort law pursues, nor is it implied by any justice based tort theory. This is not to say that society owes no obligation to the victims of remote risks. Our country routinely honors the humanitarian claims of persons harmed by unexpected disasters. The private law suit, however, has traditionally been regarded as an impermissible method of meeting such obligations. That the victims of some remote risks can conveniently cast their claims in the form of private law suits is a contingent fact, not a justification for altering this practice.

Footnotes

* Maurice Jones, Jr. Professor of Law, University of Southern California Law Center; Professor of Law and Social Science, California Institute of Technology. This paper was improved by helpful comments made at a U.S.C. Law Center Faculty Workshop and a seminar concerning toxic risks held at the California Institute of Technology. The paper also benefitted substantially from conversations with Kim Border and Jennifer Reinganum and from comments on prior drafts by Robert Bone, Jules Coleman, Richard Craswell, Thomas Jackson, Will Jones, Stephen Morse, George Priest, Steven Shavell, Gary Schwartz, Matthew Spitzer and James Strnad.

1. The issue is new because under the old Bankruptcy Act one clearly could not be a tort creditor until one had been injured. The definition of a provable claim has been expanded sufficiently in the new Code so that a possibility exists that a claim for injuries not yet incurred is provable. See, e.g., Jackson, Translating Assets and Liabilities to The Bankruptcy Forum, forthcoming, J. Leg. Stud. (1984); Note, The Manville Bankruptcy: Treating Mass Tort Claims in Chapter 11 Proceedings, 96 Harv. L. Rev. 1121 (1983); Note, Mass Tort Claims and The Corporate Tortfeasor: Bankruptcy Reorganization and Legislative Compensation Versus The Common-Law Tort System, 61 Tex. L. Rev. 1297 (1983).

substances in considerable detail is Page, A Generic View of Toxic Chemicals and Similar Risks, 7 Ecology L. Q. 207 (1978). See also Symposium, Federal Regulation of the Chemical Industry, 46 L. and Cont. Problems 1-283 (C. Schroeder ed., 1983).

3. Many of Johns-Manville's activities are described in Roe, Bankruptcy and Tort: The Problem of the Mass Disaster, 84 Colum. L. Rev. 846.

4. Imposing risks that firms did not anticipate also produces strains in the civil litigation system. An industry has arisen to choose a dispute resolution system best suited to the asbestos cases. See, e.g., Rosenberg, The Causal Connection in Mass Exposure Cases: A "Public Law" Vision of the Tort System, 97 Harv. L. Rev., p. 51 (1984); McGovern, Management of Multi-Party Toxic Tort Litigation: Case Law And Trends Affecting Case Management, manuscript (1983). The civil litigation system is not my concern, but that it is being severely taxed is consistent with the view argued for here, that imposing remote risks on firms creates substantial costs for many parties and the state.

5. Professor Epstein claimed that the asbestos companies legitimately failed to foresee the changes in products liability law. Epstein, Manville: The Bankruptcy of Product Liability Law, Regulation, Sept./Oct. 1982 at 14. The retroactivity issue is examined in greater detail in G. Schwartz, New Products, Old Products, Evolving Law, Retroactive Law, 58 N.Y.U. L. Rev. 796,

813-28 (1983). See also Graetz, Legal Transitions: The Case of Retroactivity in Income Tax Revision, 126 U. Pa. L. Rev. 47 (1977).

Another way to deal with product claims that arise years after sale is with statutes of limitation. Some of the new statutes that have been adopted would bar some toxic product claims. See, e.g., S. D. Comp. Laws Ann. § 15-2-12.1 (Supp. 1982) (six year statute for all claims). Other new statutes apparently would not. For example, the new Kansas statute is for ten years but does not apply "if the harm was caused by prolonged exposure . . . or" the defect could not reasonably be discovered in ten years, or "if the harm caused within 10 years after . . . delivery did not manifest itself until after that time." Kan. Stat. Ann. § 60-3303 (Supp. 1982). The new statutes--there seem about twenty--are surveyed in D. Noel and J. Phillips, Products Liability Cases and Materials 795-96 (2d. ed. 1982). These statutes are unpopular with courts, which have held some of them unconstitutional. See Dworkin, Product Liability of the 1980s: "Repose is Not the Destiny" of Manufacturers, 61 N. C. L. Rev. 33 (1982).

6. Cases that hold the manufacturer's knowledge of risk at the time of production to be irrelevant to the imposition of liability are collected in Wade, On The Effect In Product Liability of Knowledge Unavailable Prior to Marketing, 58 N.Y.U. L. Rev. 734, 737 n. 83 (1983). See also 2 Frumer and Friedman, Products

Liability §16A [4] (f)[vi] (1978). An influential early argument for this approach is Keeton, Products Liability--Inadequacy of Information, 48 Texas L. Rev. 398 (1970). See also G. Schwartz, Foreward: Understanding Products Liability, 67 Cal. L. Rev. 435, 482-88 (1979); Calabresi, Concerning Cause and The Law of Torts, 43 U. Chi. L. Rev. 69, 93 (1975).

7. E.g., Woodill v. Parke Davis and Co., 58 Ill. App. 3rd 349, 374 N.E. 2d. 683 (1978).

8. See, e.g., Beshada v. Johns-Manville Products Corp., 90 N. J. 191, 447/A. 2d 439 (1982); Note, Strict Liability and The Scientifically Unknowable Risk, 97 Marq. L. Rev. 660 (1974).

9. See cases cited in the authorities collected in note 6, supra.

10. E.g., Borel v. Fibreboard Paper Products Corporation, 493 F. 2d. 1076 (5th Cir. 1973).

11. The analysis that follows extends to the liability context Roberts and Weitzman, Funding Criteria For Research, Development and Exploration Projects, 49 Econometrica 1261 (1981). This is an unusual research and development model because it considers the strategy of a single firm. These models often are set in a game theoretic framework, in which a firm does R and D in response to R and D initiatives of its competitors, or as a way to exclude rivals from a market, and so forth. See P. Stoneman, The Economic Analysis of Technological Change 30-51 (1983). The

Roberts and Weitzman model fits well here because toxic substances, by and large, are homogeneous and cannot be altered; hence, each firm in a market has the same research goal, to learn its product's true characteristics. Thus little is lost by beginning with an analysis of a firm in isolation. Part C then extends the analysis to a market context. Also, the analysis here ignores issues of how knowledge of risk diffuses across firms, but rather assumes that when one firm discovers a risk's true extent, all firms instantaneously know of it. This assumption seems plausible because, as will appear, a firm that discovers a risk ordinarily translates this discovery into the warning it publicly gives; firms can conveniently monitor the public warnings of other firms.

In tort law, the word "remote" is often opposed to "proximate", with the former connoting an attenuated causal relationship. The word remote is not used in this way here, for a toxic substance can cause serious harm. Rather, as the analysis next shows, remote is used in this paper to describe risks whose existence or full extent a cost justified research program would not uncover.

12. A firm is liable for all damages if its warning is not appropriate to the degree of danger. See, e.g., Salmon v. Parke, Davis and Co., 520 F. 2d 1359 (4th Cir. 1975).

13. See M. J. Moroney, Facts from Figures, 62-63 (1965). The benefit

distribution is normal if its mean changes roughly continuously with new data, which will occur if small amounts of information change beliefs by a small amount. See Roberts and Weitzman, supra note 11, at 1283. The assumption of a normal distribution seems plausible for many research projects.

14. This paragraph is fairly technical. Readers uninterested in the derivation of the optimal stopping lines can move to the next paragraph without losing the sense of the argument.

15. See P. Stoneman, supra note 11, at 4.

16. This footnote is optional. A production function is homogeneous of degree k if, given any positive constant t , $F(tK, tL) = t^k F(K, L)$. Here K is capital and L is labor. The equation says only that if values were assigned to K and L in the production function $F(K, L)$, and the entire function was multiplied by the constant t^k , the product would equal the result if the function $F(tK, tL)$ had been solved--if, that is, every individual element of this function had been multiplied by the constant t . There are increasing returns to scale when k is greater than one, decreasing returns when k is less than one. With constant returns to scale $k = 1$ and so $F(tK, tL) = tF(K, L)$.

See J. Quirk, Intermediate Microeconomics, 115-16 (1976). A function that has constant returns to scale is linearly homogeneous. We have written the production function for a research project as $V(m, C)$. Hence, we can substitute m for K , C

for L and λ for t and write: $V(m,C) = \lambda V\left(\frac{m}{\lambda}, \frac{C}{\lambda}\right)$ for all $\lambda > 0$, where λ is a positive constant. Because this equation holds for all values of $\lambda > 0$, we can let $\lambda = C$. Then $V(m,C) = CV(m/C, 1)$. Define $g(m/C) = \frac{C}{m}V(m/C, 1)$. Solving this yields $mg(m/C) = CV(m/C, 1)$. But we know that $CV(m/C, 1) = V(m,C)$. Hence, $V(m,C) = mg(m/C)$, which is the equation in the text. Because $V(m,C)$ is linearly homogeneous, it describes a ray through the origin. See D. McCloskey, The Applied Theory of Price 488 (1982).

17. This footnote also is optional. Roberts and Weitzman first show that what we have called the slope parameters R and S are symmetrical about the horizontal axis with $S = -R$. As these are probability distributions, it can be shown that $1 = g(S) - g(R)$,

$$1 = E[Z|Z > S] \left[\frac{\Pr\{Z > S\}}{1 - 2\Pr\{Z > S\}} \right]$$

where $Z \sim N(\sigma, \sigma^2)$ and $\bar{\sigma} = \bar{\sigma}_C/C$. Doing comparative statics shows that S increases when $\bar{\sigma}$ increases or when C decreases. See Roberts and Weitzman, supra note 11, at 1285-86 and 1270.

18. See Borel v. Fibreboard Paper Products Corporation, 493 F. 2d 1076 (5th Cir. 1973).

19. See Borel v. Fibreboard Paper Products Corporation, supra note 18.

20. This paper does not treat the asbestos cases exhaustively, but a

glance at the data suggests the plausibility of a belief held before, say, 1958, that asbestos was not excessively dangerous at common exposure levels. The first recommended Government standard for permissible amounts of asbestos in work environments was adopted in 1938. This standard was much lower than the current standard, yet it was unchanged for over thirty years; the static nature of the rule implies that little uncertainty existed respecting it. In 1968, this standard was lowered considerably for government contractors, to twelve fibers per cubic centimeter. In 1972, OSHA adopted a standard of five fibres per cubic centimeter, which was "intended primarily to protect employees against asbestosis"; "it was hoped that" the standard "would provide some incidental degree of protection against cancer." 78 Fed. Reg. 51087 (4 Nov. 1983). OSHA did not regulate more rigorously for cancer prevention because the relation between asbestos and cancer then was too obscure. In 1976, OSHA reduced the standard to two fibres per cubic centimeter. All of these standards were too low because "it was believed that the smaller fibres [as small as one micron] would not be retained in the lungs and therefore would not cause asbestosis. These shorter fibres are now known to cause asbestosis and cancer." Comment, Asbestos Litigation: The Dust Has Not Yet Settled, 7 Ford. Urb. L. J. 55, 66-67 (footnotes omitted) (1978). In 1975, OSHA proposed a reduction in the 1972 standard to .5 fibres per cubic centimeter; that is, the 1972

standard was in the middle 1970's considered to be too lenient by a factor of 10, and the 1968 standard was considered too lenient by a factor of 24. Both standards were very much higher than the 1938 standard. After a struggle with the Supreme Court, OSHA promulgated the .5 fibre standard as an "Emergency Temporary Standard" effective November 4, 1983. See 78 Fed. Reg. 51086 (4 Nov. 1983). The data are summarized in the Fordham note. See also Treiger, Relief For Asbestos Victims: A Legislative Analysis, 20 Harv. J. on Leg. 179, 192-96 (1983). Richard Epstein also argued that the asbestos companies did not know the full extent of the asbestos risk. See Epstein, supra note 5. For a contrary view, see Glotta and Sherman, Learning From the Lessons of the Asbestos Tragedy: A Reform Proposal, 19 Trial 68 (1983) ("Sufficient scientific information existed no later than 1941 to avoid the 'asbestos tragedy'". Id., at 70). Two cases also have affirmed jury verdicts imposing punitive damages on asbestos companies. Moran v. Johns-Manville Sales Corp., 691 F.2d 811 (6th Cir. 1982); Neal v. Carey Canadian Mines, Ltd., 548 F. Supp. 357 (E. D. Pa. 1982). These cases erroneously equate full information with knowledge that a product may be dangerous, apparently because they believe it to be unpardonable not to research fully or warn scaringly when one knows that (an unspecified amount of) harm might occur. This paper's argument is that such a belief is wrong.

21. This is the famous Selikoff study, which is described in authorities cited, supra note 20.
22. The difficulties of testing for carcinogenicity are well described in S. Breyer, Regulation and Its Reform 135-41 (1982).
23. This analysis derives from Calfee and Craswell, Some Effects of Uncertainty On Compliance With Legal Standards, 70 Virg. L. Rev. ____ (1984). A similar analysis is made in Cooter, Economic Analysis of Punitive Damages, 56 U.S.C. L. Rev. 79 (1982).
24. Professor Shavell also points out that research into risk has a public goods aspect, and concludes that when this aspect is important, the Government should do much of the research. See Shavell, Liability for Harm Versus Regulation of Safety, 13 J. Leg. Stud. 357 (1984). This view is correct; the text argues only that a "negligence" standard can ameliorate the public goods problem, not eliminate it.
- 24a. If a firm can influence the probability that a loss of given magnitude will occur without also influencing that magnitude, purchasing insurance creates a moral hazard problem; the firm is covered against all loss no matter how much care it takes, so it has an incentive to take little care. The moral hazard problem goes away if insurance companies can monitor care.
25. See Keeton and Kwerel, Externalities in Automobile Insurance and the Underinsured Driver Problem, 27 J. Law and Econ. 149 (1984).

26. The data are ambiguous because they do not account for people's risk perceptions. For example, if people underestimate the likelihood that they will injure others, they may buy too little insurance; conversely, if they overestimate this risk. Hence, it is difficult to isolate the contribution of "limited liability" to people's decision to insure. That contribution is unlikely to be zero, though.

Results similar to those that Keeton and Kwerel derive are found in Huberman, Mayers and Smith, Optimal Insurance Policy Indemnity Schedules, 14 Bell J. Econ. 415 (1983). These authors call attention to the role of bankruptcy exemptions, which allow a person to retain substantial tangible wealth--two cars and a house sometimes--though he declares bankruptcy. They then show that when the largest possible liability is high in relation to wealth, purchasing less than full insurance though risking bankruptcy may generate greater expected utility than paying large insurance premiums. Scarcely any papers consider a corporation's demand for insurance. The only paper I have seen is Mayers and Smith, On the Corporate Demand for Insurance, 52 J. Business 281 (1982). These authors attribute the demand for liability insurance to insurance company efficiencies in settling claims and, relative to creditors, in monitoring firm behavior. Respecting the last, a firm may retroactively lower its interest rate on loans by adopting projects with a high risk of danger after they borrow. Interest rates will reflect this possibility.

The existence of liability insurance, however, signals to lenders that insurance companies are monitoring to prevent such misbehavior, and so keeps interest rates down. The difficulty here is that seemingly no way exists to specify how much insurance on activities that firms have yet to perform would constitute an adequate signal. Put more simply, Mayers and Smith do not address the question the text next takes up, which is how much insurance is it optimal for firms to buy.

27. When a firm is deciding whether to do a project that will generate income in the future, it must discount that income to present value to compare it with the present costs of beginning the project. A firm's "cost of capital" is the discount rate it uses. This rate increases with the project's riskiness and the cost of money generally.

28. The firm's value in the text is computed by solving:

$$V = \frac{I}{(1+r)} + \frac{I}{(1+r)^2} - \frac{W}{(1+r)^3}, \text{ where } V = \text{firm value.}$$

The text gives only an approximate answer because, as the model in Part II.A2 next shows, this formula is not exactly right. But on the text's assumptions, that model also shows that the contemplated firm would actually have a substantial negative value were it valued precisely.

29. Other firms sometimes may operate without insurance. For example, in the famous case of Walkovsky v. Carlton, 223 N. E. 236 (N. Y. 1966), an entrepreneur set up separately incorporated

companies each of which had as its sole asset two taxicabs; these little companies then purchased the minimum insurance that the law allowed. This result is unsurprising. Each "firm" had a relatively small amount of wealth at risk to victims--two cabs; it could incur a liability well in excess of this value; and the income of two cabs isn't large relative to the highest damage judgments that could be rendered. In these circumstances, a firm may have an incentive to operate without insurance. As Part II.A2 later shows, in these circumstances courts also should pierce the corporate veil, to hold the owner personally liable. The New York Court did not do this, and so erred.

30. The equation the text next gives is the solution to the problem of valuing the firm as an infinite series, in each year of which it will disappear with probability p and continue for another period with probability $(1-p)$.

30a. This paper discusses products that seldom can be made safer. In a majority of jurisdictions, a firm is held liable for the damages "unavoidably unsafe" products cause only if the firm fails to warn adequately. Hence, for such products a warning and full insurance are substitutes. The possibility that a firm could warn rather than insure does not affect the text's analysis. A warning is exculpatory because it conveys full information. Since that is hard to do, firms that warn in fact face positive probabilities that courts will not enforce their

warnings. The risk that a firm that issues a warning will bear L is thus not pL but $p \cdot p'L$, where p' is the probability that a court will find the firm's warning to be inadequate. If we let $p \cdot p' = b$ and substitute b for p , the analysis above goes through unaffected. For convenience, the text implicitly supposed p' to be one -- see assumption (d) above. If this assumption is relaxed, firms then would be more likely to insure, for the likelihood of insurance varies inversely with p and $b \leq p$. When a firm can influence the safety of its products, warnings seldom are exculpatory, nor is care if strict liability obtains. In these circumstances, the test's analysis goes through as written for neither warnings nor care are substitutes for insurance; hence, the risk of incurring harm is pL .

31. A very good analysis is Halpern, Trebilcock and Turnbull, An Economic Analysis of Limited Liability In Corporation Law, 70 U. of Toronto L. J. 117 (1980). The authors' treat limited liability generally, and do not consider products liability problems. An early perception of the effect of limited liability in tort contexts is G. Calabresi, The Costs of Accidents (1970).

32. In a formal merger, the surviving entity is liable for all debts, including tort debts, of the predecessor corporations. When a company purchases another company's assets, the buyer is not ordinarily liable for the seller's debts. The successor

liability doctrine deals with when the buyer is liable for the seller's torts. The literature and cases concerning successor liability are extensively summarized in Phillips, Product Line Continuity and Successor Corporation Liability, 58 N. Y. U. L. Rev. 906 (1983). See also, Juenger and Schulman, Asset Sales and Products Liability, 22 Wayne L. Rev. 39 (1975).

33. See Henn and Alexander, Effect of Corporate Dissolution on Products Liability Claims, 56 Corn. L. Rev. 865 (1971).

34. See authorities cited supra note 32.

35. See authorities cited supra note 1. A recent opinion by Judge Posner suggests that courts may reconsider this rule. See In The Matter of UNR Industries, Inc., 725 F.2d. 1111 (7th Cir., 1984).

36. See Kraakman, Corporate Liability Strategies and the Costs of Legal Controls, 93 Yale L. J. 857, 868-76 (1984).

37. See Stone, The Place of Enterprise Liability in the Control of Corporate Conduct, 90 Yale L. J. 1, 69-79 (1980).

38. For an effort in this vein see Phillips, supra note 32.

39. Professor Roe recently argued that contingent tort claims should be assertable in bankruptcy to prevent firms from engaging in certain forms of inefficient behavior. See Roe, supra note 3. This proposal is not objectionable as regards knowable risks if these contingent claims are not dischargeable in full -- if, that

is, the firm is made to satisfy them to the full extent of its assets; Roe also advocates this. But Roe's proposal is unlikely to achieve its goals in practice, whether it applies to risks that are knowable or remote. See text at notes 47-51, infra.

40. The knowable delayed risk problem may be less serious than the text supposes because its emergence in a full equilibrium framework seems improbable. The analytical focus in such a framework is the market rather than the single firm. The text supposed a single firm that would operate for several periods, earn income and then vanish. If the firm were not a monopolist, however, its rivals also would operate for several periods and vanish. The market for the relevant product then seemingly would have a set of firms enter, operate, disappear and be replaced by a new set of firms. Alternatively, entry could take place at different times; then firms would continuously be entering to earn profits in the accident free years and exiting when those years were up. Markets like this apparently have not been observed, and the latter form of behavior may not be an equilibrium in any event since the frequent exits of harm-causing firms might alert workers and consumers to the product's actual riskiness. Thus, looking at markets rather than individual firms suggests that corporate structure may not be manipulated to externalize knowable delayed risks at all. This conclusion must be very tentatively held, however, because equilibrium results are risky to derive without doing the formal work. Hence, the

text argues that the law faces problems that are relatively easy to resolve even if firms would attempt to externalize knowable delayed risks.

41. A more extensive treatment of the incentive of shareholders to monitor other shareholders is found in Halpern, Trebilcock and Turnbull, supra note 31.

42. Judge Posner argued that abolishing limited liability would dampen investment incentives generally. See Posner, The Rights of Creditors of Affiliated Corporations, 43 U. Chi. L. Rev. 499 (1976). The text argues that this dampening incentive will be exacerbated if courts impose remote risks on shareholders.

43. The existence of a bankruptcy option itself is an incentive for insolvent firms to pursue inefficient strategies such as those the text next describes. The behavior of such firms is modeled in White, Public Policy Toward Bankruptcy: Me-First and Other Priority Rules, 11 Bell J. Econ. 550 (1980); Bulow and Shoven, The Bankruptcy Decision, 9 Bell J. Econ. 437 (1978). Imposing remote risks is objectionable because it increases the set of insolvent firms and strengthens their incentive to act inefficiently. This latter effect occurs because firms need not deal with future tort claimants while the firms that White, Bulow and Shoven model had to deal with all claimants on their wealth. Thus, everyone in their models who had an incentive to prevent or reduce inefficient behavior actually bargained with the firm.

Respecting data about the relationship between imposing remote risks on firms and insolvency, the text suggested above that the asbestos companies may not have foreseen the full extent of the asbestos risk. Professor MacAvoy recently stated that the asbestos companies and their insurers would go bankrupt if they had to pay future claims at the rate the courts were making them pay current claims. See P The Economic Consequences of Asbestos Related Disease, 85-86 (Jan. 1982) (Series C--Research Program in Government Business Relations, Yale School of Organization and Management, Working Paper #27).

44. Respecting the text's two illustrations, for the first: Net present value = $\frac{-200}{(1.1)} + \frac{200}{(1.1)^2} - \frac{500}{(1.1)^3} = -\28.83 .

For the second:

Time	Value of Yield	NPV (at r = .10)
0	\$5,000	\$5,000
1	\$7,000	$\frac{\$7,000}{1.1} = \$6,363.64$
2	\$8,500	$\frac{\$8,500}{(1.1)^2} = \$7,024.79$
3	\$9,500	$\frac{\$9,500}{(1.1)^3} = \$7,142.86$
4	\$10,000	$\frac{\$10,000}{(1.1)^4} = \$6,849.32$

This illustration is too simple because it lets the firm treat future prices as certain and does not let the discount rate vary with the firm's choice of technology and extraction rate. In reality, natural resource prices vary very widely and the firm's discount rate is partly endogeneous. Adding these factors, however, will not change the basic point, which is that an insolvent firm has an incentive to accelerate the extraction rate inefficiently. See Brennan and Schwartz, Evaluating Natural

Resource Investments, U. B. C. Working Paper (1983). The firm, in theory, might sell the right to mine coal in the third year for \$7,142.86 thereby maximizing the value of the resource. Information asymmetries may impede such sales; while coal is homogeneous, the firm best knows its production function and therefore best knows the net yield. Also, outsiders may discount the price substantially because of uncertainty respecting future prices. Finally, if all firms in an industry face a similar liability, as in the asbestos cases, there may be no one to sell to.

45. See Manville Corp. Faces Increasing Opposition to Bankruptcy Filing, Wall. St. J. Jan. 31, 1984, P. 1, Col. 5.

46. Johns-Manville's behavior is described in Roe, supra note 3. The deadweight losses that occur in insolvency contexts when some claimants on a firm redistribute wealth in their favor from other claimants may be mitigated when claims can be freely purchased and recombined, for then it would reward an economic agent to purchase all of the claims on a firm and make economically efficient decisions on its behalf. There is weak evidence that this sometimes happens. See Baldwin and Mason, The Resolution of Claims in Financial Distress: The Case of Massey Ferguson, 38 J. Fin. 505 (1983). The lack of a market for future tort claims and the obvious difficulties in creating one imply that the deadweight losses the text describes will not be mitigated by

such recontracting.

47. See Rowe, supra note 3.

48. Valuing claims on firms is always complicated by the possibility of bankruptcy; should bankruptcy occur, the value of a claim reduces to its value in bankruptcy, but this is hard to calculate ex ante because it is hard to predict what a firm's asset to debt ratio will be when it becomes insolvent. See A. Schwartz, Security Interests and Bankruptcy Priorities: A Review of Current Theories, 10 J. Leg. Stud. 1, 24 (1981). This uncertainty shrinks substantially for current claims when bankruptcy actually occurs; then debts and assets are at least roughly knowable. But uncertainty as to claim value may never shrink much for current and future claimants if future claims are provable in bankruptcy, because it is very difficult to ascertain the number and value of claims that have not arisen.

49. The contingent fee allows persons to transfer some of the litigation risk to lawyers for a fee, but the litigation risk for future claims seems too high to make it worthwhile for potential claimants to pay lawyers to take it.

50. Class actions can function to mitigate the public goods aspects of litigation, but the diversities among present asbestos claimants, for example, have so far prevented classes being certified for them. The difficulty seems a fortiori for future

claims. The plaintiffs' tort bar conceivably could have sufficiently low coalition costs and sufficiently homogeneous interests to mitigate some of the difficulties the text discusses. This seems a remote possibility, however. The issue here is not whether the state should permit future claimants to trigger bankruptcies, an issue on which the tort bar perhaps could lobby, but whether the future claimants of a particular firm will trigger its bankruptcy. Bar associations lobby but rarely litigate individual claims.

51. Roe, supra note 3, argues that both future claimants and a public agency should be authorized to trigger bankruptcies but he does not consider the difficulties raised here. In particular, he apparently believes that only future claimants whose claims have "a significant aggregate value" should be authorized to sue, but does not recognize that this requires a coalition that is unlikely to form. Also, he does not deal with the information problem that seemingly would prevent effective action by a public agency. Roe, however, recognizes other difficulties with his proposals. He argues for them not because he believes that they are perfect but because he believes that future claims must be satisfied; given this belief, he must find some way to satisfy them. The difficulties with his proposals and the extraordinary complexity of the compensation schemes he and others are driven to propose suggest rather that the question whether to pay future claims should be regarded as open. This paper begins with that

view, and Part III next argues that when the future claims arise from remote risks, they should not be imposed on firms at all. If this view is accepted, whether and how these future claims can be asserted in bankruptcy are no longer questions.

52. The view that morality is derivable from accepted social roles is Aristotelian. A modern version is A. Macintyre, After Virtue (1981). For a Humean version of the idea, see Jones, Moral Obligations and Social Expectations: A Humean Reduction, California Institute of Technology Humanities Working Paper #100 (1984).

53. For example, persons who smoke are approximately 60 times more likely than nonsmokers to become ill from asbestos exposure. Hence, nonsmoking asbestos workers, particularly if they use respirators, may be bearing acceptable risks. If so, asbestos could be viable with warnings.

54. E.G., Beshada v. Johns-Manville Corp., 90 N. J. 191, 447 A. 2d. 439 (1982).

55. Professor Henderson argued that firms will spread the losses from difficult to anticipate risks over products unrelated to those that caused injury, thereby misallocating resources. See Henderson, Coping with the Time Dimension in Products Liability, 69 Cal. L. Rev. 919, 942-44 (1981). However, the liability for such losses will not be reflected in prices at all, as it does

not affect variable or fixed costs. Professor G. Schwartz agrees that damages for unforeseen risks will not be spread, but seemingly believes this is so because firms in a competitive industry operate where price equals cost, and so have no power to raise price. See G. Schwartz, *supra* note 5, at 825, n. 180. Such firms, though, would raise prices if marginal costs rose; for remote risk impositions they will not.

56. Professor Page recently argued that firms should bear remote risks because the law should protect "justifiable consumer expectations," and consumers can justifiably expect always to buy safe products. Page, Generic Product Risks: The Case Against Comment K and For Strict Tort Liability, 58 N. Y. U. L. Rev. 853, 889 (1983). Page begins with the standard manufacturing defect case, in which the firm knows the risk. If the firm markets a defective product without a warning, it makes "an implied representation of safety"; the effect of this representation is to "deprive the consumer of the opportunity to evaluate the risk and to decide whether to accept it." 58 N. Y. U. at 889 (footnote omitted). The argument has two aspects: (a) the consumers' expectations derive from the "implied representation"; (b) these expectations are "justifiable" because the normative goal is to induce manufacturers to make safe products or supply consumers with information so the consumers can protect themselves. Page then argues that this analysis justifies manufacturer liability when a product poses "an unknown or unknowable generic hazard";

there too, "an implied representation of safety" is made. Id. The second aspect of Page's argument falls for such products, however. Imposing liability for remote risks neither increases safety nor warnings. Hence, even if consumers in fact always do expect products to be safe, they could not "justifiably" expect firms to assume remote risks. As Page himself recognizes, to make out a traditional expectations argument, one must first show "which consumer expectations are justifiable", and only then ask what actually was expected. 58 N. Y. U. at 887. If consumer expectations run to firms rather than products, as the beginning of Part III suggested, one might claim that firms should bear remote risks because their commonly accepted social role is to make consumers whole for all losses associated with the products the firms sell. But such a claim seems false in fact. See note 58, *infra*.

57. See Coleman, Moral Theories of Torts: Their Scope and Limits: Part I, 1 Law and Philosophy 371, 374-75 (1982). Part III B (2) later argues that a firm's failure to discover a remote risk is in any event not morally culpable. See text at pp. 73-79.
58. This is what courts mean by the frequent statements that manufacturers are not insurers and that tort liability is sometimes strict but never absolute.
59. See J. Rawls, A Theory of Justice (1971).

60. Id. at 55.
61. Id. at 87-88. See also 304.
62. This argument derives from B. Barry, Fair Division and Social Justice (in manuscript).
63. Professor Epstein seems first to have argued that tort law's function is to redress injuries that others cause. See R. Epstein, A Theory of Strict Liability, 2 J. Legal Stud. 151 (1973); R. Epstein, Defenses and Subsequent Pleas in a System of Strict Liability, 3 J. Leg. Stud. 165 (1974); R. Epstein, Intentional Harms, 4 J. Leg. Stud. 391. The full argument is in R. Epstein, A Theory of Strict Liability: Toward a Reformulation of Tort Law (1980). The standard critique is Borgo, Causal Paradigms in Tort Law, 8 J. Leg. Stud. 419 (1979), which agrees with Epstein that tort law must require the existence of a causal link between injurer and victim, but argues that Epstein's causal notions are too primitive and his moral theory is insufficiently developed. The fullest current statement of the compensatory justice aspect of tort law is in a series of papers by Coleman. See J. Coleman, Moral Theories of Torts: Their Scope and Limits: Part I, 1 Law and Philosophy 371 (1982); Moral Theories of Torts: Their Scope and Limits: Part II, 2 Law and Philosophy 5 (1983); Coleman, Mental Abnormality, Personal Responsibility and Tort Liability, in Mental Illness: Law and Public Policy 107 (B. A. Brody and H. Engelhardt, Jr., eds. 1980).

64. See, e.g., Coleman, supra note 63.
65. See M. White, Foundations of Historical Knowledge 106 (1965).
66. This sentence adopts the view of cause as a counterfactual.
- We think of a cause as something that makes a difference, and the difference it makes must be a difference from what would have happened without it. Had it been absent, its effects--some of them at least, and usually all--would have been absent as well.
- D. Lewis, Causation, 70 J. Phil. 556, 557 (1973). See also J. Mackie: The Cement of the Universe: A Study of Causation 64-65 (1974).
67. This account derives from J. Mackie, supra note 66, at 61-64.
- Its clarifying force does not turn on whether it presupposes a realist view--the events and states of the world it describes are "really" there--or a Wittgensteinian view--the notions of causation it explains exist in our "life world"; rather, Mackie's account is useful seemingly independently of the ontology one adopts. See Putnam, Is Causality Physical?, forthcoming Midwest Studies In Philosophy (1984). The notion of a causal field is necessary to distinguish causal from noncausal sequences. For example, the text's formal account permits birth to be a cause of death because, had birth not occurred, there would not have been the death at issue, yet no one explaining a death would choose

life as even a necessary cause. The distinction between events that are in a causal field and those that are in a minimally sufficient condition reflects, according to Mackie, "our ordinary thinking about causal sequences." *Id.* at 36. Of course, what is background and what is a cause depends on what is regarded as a "normal" state of affairs; this allows a certain discretion to slip into a causal account because "normal" is a slippery term. This seldom leads to problems. See Putnam, *SUPRA*.

68. See J. L. Mackie, Causes and Conditions, 24 *American Philosophical Quarterly* 245 (1965).

69. See Mackie, *SUPRA* note 66, at 128-29; J. Feinberg, *Doing and Deserving: Essays In The Theory of Responsibility* 144-145 (1971).

70. In *Henningsen v. Bloomfield Motors, Inc.*, 32 N. J. 358, 161 A. 2d. 69 (1960), the most influential modern products liability case, the court said:

Accordingly, we hold that under modern marketing conditions, when a manufacturer puts a new automobile in the stream of trade and promotes its purchase by the public, an [undisclaimable] implied warranty that it is reasonably suitable for use as such accompanies it into the hands of the ultimate purchaser.

32 N. J. at ___. 161A. 2d at ___. See also *Price v. Shell Oil*, 2

Cal. 3d. 245, 258, 466 P. 2d 722, 731 (1970). The Restatement version is:

[T]he seller by marketing his product for use and consumption, has undertaken and assumed a special responsibility toward any member of the consuming public who may be injured by it. . . .

Comment ___ to Restatement of Torts, Second, Section 402A. Modern commentators tend to neglect such language because it seems conclusory and is difficult to explain, but it actually is evidence for the view that compensatory justice notions were importantly responsible for generating the strict liability in tort doctrine.

71. See White, *SUPRA* note 65, at 119. For a similar theory of cause, see Feinberg, *SUPRA* note 69, at 142-43.

72. See White, *SUPRA* note 65, at 122-23.

73. See B. Ackerman, Reconstructing American Law (1984).

74. Mackie states:

Deliberate human actions are particularly relevant as causes just because they are the focus of interest with respect to responsibility and various forms of control.

Mackie, *SUPRA* note 66, at 120.

75. Compare Epstein, supra note 63, with Landes and Posner, Causation In Tort Law: An Economic Approach, 12 J. Leg. Stud. 109 (1983). See also, in an earlier incarnation, A. Schwartz, Products Liability and Judicial Wealth Redistribution, 51 Ind. L. J. 538, 576 and n. 57 at 581 (1976) (criticising cases). The text does not suggest that one cannot have preferences over viewpoints. Ackterman and I prefer the activist view, though his description of the reactive view seems overdrawn. The text's point rather is only that many, including many judges, hold a reactive view, at least sometimes, so it is worth seeing what that view implies.

The existence of a causal link between the defendant's conduct and the plaintiff's harm, it should be noted, is neither a sufficient nor a necessary condition for tort liability. It is not sufficient because a defendant must not only cause a harm; he must cause it wrongfully. That a causal link is not necessary is illustrated by the successor liability doctrine. A successor may be liable for its predecessor's torts, though it is very difficult to argue that the successor caused those torts. Cause is dispensed with if instrumental reasons exist to impose liability. Hence, a compensatory justice theory does not explain all of tort law. Rather, the theory explains and justifies many tort law outcomes. It is unnecessary here to join the dispute about the comparative value of partial and full theories of civil liability.

76. Judith Thompson recently conflated notions of cause and

responsibility, saying:

If the defendant caused the harm, then (other things being equal) it is right that he be out of pocket for the costs. Thompson, Remarks on Causation and Liability, 13 Phil. and Pub. Aff. 101, 116-17 (1984). Judges, however, distinguish between causation and responsibility (see text at notes 78-82, infra), for, in the law, one is not responsible for every harm that one causes in fact. Thompson's mistake leads her into difficulty. For example, she does not want to hold a person liable if the person caused a harm but took "all due care . . . and . . . could not have been expected to foresee [that her actions] would lead to harm." Id. at 111. Yet she concedes her inability to give a satisfactory moral account of this outcome. See id. at 114-15. Such an account is possible once one realizes that legal liability presupposes both causation and wrongful behavior.

77. Alan Donagan, for example, in The Theory of Morality (1977) states that "It is impermissible to blame anybody for an action except as falling under a description under which it is voluntary, that is, done knowingly. . . . That it [the action] falls under other descriptions is his good or bad fortune . . . an agent is not answerable for his good or bad fortune." Id. at 121, 126. Donagan derives this view from Judeo Christian morality, and it also is Kant's position. Recently, some philosophers have attempted to work out a concept of "moral

luck", in which an agent can assess the morality of his own actions in a nonutilitarian way by asking how those actions actually turned out. See B. Williams, *Moral Luck* 20-39 (1981); T. Nagel, *Mortal Questions* 24-38 (1979). These efforts seem to me to be incoherent and mistaken and, in any event, their authors apparently do not regard them as especially helpful to people who want to assess other actors rather than themselves. See Williams, *SUPRA*, at 36-37.

78. 90 N. J. 191, 447 A2d 539 (1982).

79. 90 N. J. at ____, 447 A. 2d at 547 (emphasis added).

80. This causal story is complicated in a way that is worth mentioning but, on current knowledge, not worth pursuing seriously. Let C_1 and C_2 each be sufficient causes of an event e . For example, C_1 is "X shot Y" and C_2 is "Z poisoned Y"; the event e is Y's death, which either C_1 or C_2 could produce. In the event, X shot Y three hours before Z meant to poison her. The difficulty results because the text defined cause counterfactually, but a counterfactual account is inapplicable to the illustration. The statement: "If the world had run on from just before C_1 happened and C_1 had not have happened, e would not have happened" is false. Had the world run on, e would have happened because C_2 would; that is, Z would have poisoned Y. Thus, although C_1 happened and so e did (X shot Y, who died), the statement " C_1 (counterfactually) caused e " is false. This

difficulty is referred to as "preemptive causation," and it puts a serious strain on the notion of cause as a counterfactual. See J. Elster, *Explaining Technical Change* 34 (1983). Preemptive causation is relevant here because a person who smokes is sixty times more likely to get cancer after being exposed to asbestos than one who does not. This suggests that a significant subset of "asbestos victims" might have got cancer anyway. So if C_1 is asbestos exposure, C_2 is smoking and e is lung cancer, in some cases e would have happened though C_1 had not. And it may be that other such unrelated susceptibilities to disease exist respecting many toxic substances. But then, what notion of cause permits one to say that the manufacturer's act of exposing persons to asbestos causes cancer? An unconvincing refutation of this difficulty is Lewis, *SUPRA* note 66 at 567. I do not want to pursue the problem here for two reasons. First, preemptive causation applies to relations among particular causal events and outcomes. The set of nonsmokers who got cancer after being exposed to asbestos seemingly is not empty, nor, for all we know, is the set of smokers who would not have gotten cancer had they instead worked in chocolate factories. Hence, there exist real world causal chains, perhaps many of them, to which the preemptive causation objection does not apply. A counterfactual causal account illuminates them. Second, this paper's subject is liability, not causation itself; and the text next argues that liability should not lie though causation exists. It then is

unnecessary to pursue causal difficulties such as this in detail.

81. 90 N. J. at ___, 447 A. 2d at 547.

82. The court believed that to impose unknowable risks on firms would increase safety and facilitate loss spreading.

Gary Schwartz recently argued that what the courts mean when they use the term strict liability in design defect and warning contexts is more akin to negligence in that defendants are held liable only if they fall below some legally determined standard defining the appropriate design or warning. G. Schwartz, The Vitality of Negligence and the Ethics of Strict Liability, 15 Ga.

L. Rev. 963 (1981). And Jules Coleman claims that a rule which holds a person liable because he responsibly caused harm is actually a rule that makes liability turn on fault; such liability cannot be strict. See Coleman, Moral Theories of Torts: Their Scope and Limits: Part I, 1 Law and Philosophy 371, 380 (1982). Thus the argument in Part III may actually concern a negligence system. It uses the term strict liability because the courts use it and it seems more familiar.

83. Most of the bills now before Congress to compensate asbestos victims are of this type. See, e.g., H. R. 5735, 97th Cong. 2d Sess. (1982); H. R. 5224, 97th Cong. 1st Sess. (1981). One bill makes the victim's remedy nonexclusive and has no cap on damages, but also exculpates firms if "the release [of the substance] was not the result of a failure of the defendant to exercise due care

with respect to the hazardous substance concerned in light of all relevant facts and circumstances." H. R. 7300, 97th Cong. 2d Sess. (1982), 101 (c) (2). This section invites, if it does not require, courts to impose only knowable risks on firms.