

CORPORATE RISK ANALYSIS:
A RECKLESS ACT?

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Abstract

Product safety decisions should reflect appropriate risk-cost balancing. In much the same way government agencies use forms of risk assessment and benefit-cost analysis in setting regulatory standards, corporations likewise should base product safety decisions on systematic assessments of the competing concerns. This paper reports original evidence on the attitude of almost 500 jury eligible citizens who considered cases involving risk and analysis components. Systematic analyses of risk and cost tradeoffs boost the frequency of punitive damages awards. Even more striking is that as the company increases the value it places on safety, jurors use this value as an anchor and boost the punitive damages sanction. These findings are reflective of the kinds of behavior in recent punitive damages cases, including the \$4.8 billion punitive damages award against GM in 1999.

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1. Introduction

In 1999 a Los Angeles jury imposed a \$4.8 billion punitive damages award on General Motors for a case involving severe burns to passengers in a 1979 Chevrolet Malibu.¹ This award, which is the largest punitive award ever in a personal injury case,² arose in part because the company had undertaken an explicit analysis of the types of fire risks and design change costs associated with burn injuries.³ Even though a judge subsequently reduced the punitive damages award to \$1.2 billion and the total award to \$1.3 billion, the financial stakes remained at a level that was wildly disproportionate to the extent of the harm.⁴ The main issue raised by this award is whether in fact a corporation is being irresponsible if it undertakes a risk analysis and chooses not to make an unbounded cost commitment to safety.

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¹ Andrew Pollack, *\$4.9 Billion Jury Verdict In G.M. Fuel Tank Case: Penalty Highlights Cracks in Legal System*, N.Y. TIMES, July 10, 1999, at A7, and Andrew Pollack, *Paper Trail Haunts G.M. After It Loses Injury Suit: An Old Memo Hinted at the Price of Safety*, N.Y. TIMES, July 12, 1999, at A12.

² *Id.* Also see Ann W. O'Neill et al., *GM Ordered to Pay \$4.9 Billion in Crash Verdict Liability*, L.A. TIMES, July 10, 1999, at A1.

³ See Pollack, *supra* note 1.

⁴ See Frederic M. Biddle, *GM Verdict Cut \$3.8 Billion in Suit Over Explosion*, WALL ST. J., August 27, 1999, at B5. Also see *GM Vows to Appeal California Judge's Order Cutting Record Punitive Award to \$1.2 Billion*, BUREAU OF NATIONAL AFFAIRS PRODUCT SAFETY & LIABILITY REPORTER 35, Sept. 3, 1999, at 867-868.

On a personal level the approach of accepting risk tradeoffs is implicit in our daily lives. We take chances all the time. We ride in motor vehicles, fly on planes, eat potentially risky foods, and live in an environment that is not risk-free. Some tradeoffs of this kind are inevitable as we seek to strike an appropriate balance between the harm inflicted by risks and the benefits such activities offer for our lives. The task for the individual is to make those personal decisions that confer sufficient benefits to outweigh the associated risks.

When faced with options with different levels of safety, we often pay a higher price for safer products, though not without limit. Millions of consumers purchase cars with antilock brakes and protective side air bags, but few of us have such an unlimited concern for safety that we purchase a tank-like Hummer vehicle. The degree of concern for safety in turn sends signals to corporations in terms of the kinds of goods and levels of safety that we value. The risk tradeoffs that we are willing to make in effect set the price for safety in the market and provide guidance to corporations, that must supply the products and services we purchase. If corporations generate products that create more hazards than we want to bear given the product price or include unnecessary safety features that we don't value, then the product risk mix will not be successful in the marketplace. Thus, the task of corporations is to assess the risks of products and activities and determine which safety efforts are worthwhile and are in line with consumer preferences. For risks arising in a market trade with the party bearing the risk, informed consumer choices will lead to efficient risk levels. Not all risks, however, are priced in the market. Environmental hazards are an example of risks that are not. In this instance, government regulation can be used to provide appropriate incentives.

The formal mechanism for making tradeoff judgments is a risk analysis that outlines the pluses and minuses of different safety options. Risk analysis consists of a variety of different levels of analyses. First, risk analysis involves assessing the magnitude of the hazard. Is it a

serious threat or a minor background risk? Second, are the risk reducing policies selected cost-effective, i.e., do they achieve the greatest risk reduction possible for the amount of funds expended? Third, do the policies pass a benefit-cost test? Do the societal benefits of risk reduction outweigh the costs? Firms' interest in profits will lead them to choose the most cost-effective option, and risk awareness by consumers will lead firms to adopt risk reduction efforts that pass a benefit-cost test. However, in the absence of informed and rational choice, firms may not adopt all safety improvements that are efficient in terms of benefits exceeding costs -- a relationship that is tested through negligence tests in the court and benefit-cost analyses in the policy arena.⁵

Any systematic attempt to trade off costs and risk reduction benefits may appear to be a "cold blooded calculation" invented by economists.⁶ Seeking the right tradeoff between risk and cost is not an abstract economic exercise but lies at the heart of the real choices that must be made. Indeed, we want corporations to think about risks in a systematic manner and to undertake such calculations to ensure that there is appropriate risk balancing that is sufficiently protective. We all benefit when corporations have selected the right level of safety that is reflective of our own concern with safety and the costs of providing it. The merits of the analysis and the ultimate balance struck should be the main manner of concern, not whether undertaking a systematic analysis allegedly reflects a cold blooded attitude towards human life.

⁵ See A. MITCHELL POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS (2d ed. 1989); STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION (1993); RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW (5th ed. 1998); John W. Wade, *On The Nature of Strict Liability for Products*, 44 MISS. L. J. 825, 837 (1973).

⁶ See The State of Mississippi Memorandum, *The State of Mississippi Tobacco Litigation*, August 11, 1995. They variously describe my analysis for monetizing the health costs of cigarettes as "No court of equity should countenance, condone, or sanction such base, evil, and corrupt arguments... (*Id.* at 21) Seeking a credit for a purported economic benefit for early death is akin to robbing the graves of the Mississippi smokers who died from tobacco-related illness... It is an offense to human decency, an affront to justice, uncharacteristic of civilized society, and unquestionably contrary to public policy." (at 23)

Of course, the fact that companies have undertaken such balancing does not imply that they should be vindicated on economic grounds. Even armed with an extensive risk analysis, companies may fail to make sufficiently protective decisions. However, liability for corporate behavior should hinge on the risk and cost decisions, not on whether the firm undertook a risk analysis. We want to encourage corporations to do such systematic thinking about risk and cost. The fact that they have done such analyses and have perhaps erred in the process should not itself be regarded as a reckless act. Indeed, our society will only become safer if we think carefully about safety and make the right choices given our limited resources.

A major difficulty is that if companies undertake a risk analysis and yet proceed with a potentially dangerous act or a risky product, they will trigger a bias among prospective jurors against the defendant for having undertaken a risk analysis. Such biases might be especially prevalent in situations in which there is an anti-corporate bias and a general suspicion of the motives underlying corporate decisions, including risk analyses.⁷ Undertaking explicit risk-cost tradeoffs, which in effect balance lives lost and environmental damage against monetary costs, may offend juror sensibilities. The fact that a company has undertaken a risk analysis -- even a sound analysis -- may lead jurors to award punitive damages rather than compensatory damages alone. The highly charged atmosphere of many court proceedings often prompts juries into imposing large awards to send corporations a message. Such message sending in turn has the purported intent of generating incentives for safety. As the President of the California Trial

⁷ A 1998 National Law Journal-Decision Quest poll found that people often may think the worst of corporate actions: "Three out of four people said they believe executives of big companies often try to cover up the harm that they do, and more than one in five said they believe they could not be a fair juror if a tobacco company were one of the parties to a case they were considering." See Peter Aronson, David Ravella, and Bob Van Doris, *Jurors: A Biased, Independent Lot*, THE NATIONAL L. J., November 2, 1998, at A1.

Lawyers Association put it: “The purpose of punitive damages is to deter despicable acts by corporate America.”⁸

But what are these “despicable acts?” In some cases, the alleged despicable act may be the actual undertaking of a risk analysis itself rather than a failure to strike an appropriate risk-cost balance in its product safety or environmental risk choices. A prominent example is the recent case of Sergio Jimenez, who was killed in his Chrysler Minivan because of an allegedly defective rear door latch.⁹ In 1994 Sergio Jimenez, who was six years old, was riding unbuckled in the back seat of a 1985 Dodge Caravan in Charleston, South Carolina. As his mother ran a red light, her van was struck on the side by a Honda which was traveling under 15 mph. The van rolled completely over, the rear door opened, and Sergio Jimenez was thrown to the street and died. The plaintiffs claimed that the liftgate doorlock was defective and, more importantly, Chrysler had analyzed the defect and failed to repair it.

Jimenez v. Chrysler Corp. led to a \$250 million punitive damages award against the Chrysler Corporation. The company was faulted not only for the defective door latch, but also for the act of trading off the risk against cost. In Chrysler’s view, there was no significant risk posed by the defect, but the cost would have been \$100,000 or \$0.50 per vehicle for the new part.¹⁰ In such instances, jurors are unlikely to be comparing the costs and the expected benefits, given the probability of an accident, but instead may compare the \$0.50 per vehicle cost with an identifiable death, which is a stark difference. The plaintiff’s attorneys demonized Chrysler’s analysis in their post-trial memorandum: “Chrysler officials at the highest level cold bloodedly calculated that acknowledging the problem and fixing it would be more expensive, in terms of

⁸Wayne McClean, *Suit-Happy California? It’s a ‘Myth’*, S. F. CHRON., March 8, 1995, at A21; Alex Kozinski, *The Case of Punitive Damages v. Democracy*, WALL ST. J., January 19, 1995, at A18.

⁹ *Jimenez v. Chrysler Corp.*, No. 2: 96 CU1269-11 (1997).

bad publicity and lost sales, than concealing the defect and litigating the wrongful death suits that inevitably would result.”¹¹

Suppose that the company did the analysis correctly, in a manner in line with contemporary sound and responsible economic principles. Will the existence of the risk analysis itself make the jurors more likely to conclude that the corporation acted recklessly by placing excessively risky products on the market? To explore this issue, I present new empirical evidence based on an original survey that I undertook with almost 500 juror-eligible citizens. Ideally, jurors should take into account responsible risk-cost balancing. A corporate risk analysis that showed that the benefits of the safety improvement did not exceed the costs should not only eliminate the possibility of punitive damages but also eliminate negligence-based claims. Unfortunately, any such analysis seems to have adverse effects. Undertaking even a sound risk analysis in line with that used by government regulators leads jurors to impose greater sanctions for risk decisions despite the fact that these choices may have struck an appropriate risk-cost balance.

This behavior of mock jurors is not consistent with the intent of tort law. There are no existing legal provisions that indicate that firms should be punished for having undertaken a risk analysis. The type of behavior reflected by the mock jurors is also borne out in actual cases, including Jimenez v. Chrysler Corp., and many others as well. Indeed, the 1999 billion dollar punitive award against GM was also stimulated by the company’s risk analysis, as will be explored below. A detailed review of instances in which firms have undertaken risk analyses indicates that such careful risk and cost assessments tend to affect firms adversely. The well

¹⁰See Donald C. Dillworth, *Fourteen Jurors Punish Chrysler for Hiding Deadly Defect*, 34 TRIAL 14 (1998).

¹¹ *Id.*

known case involving the stigmatization of Ford following the release of the internal Ford Pinto safety documents is borne out repeatedly in more recent cases.

Adopting legal guidelines whereby defendants will not be adversely affected for having done a risk analysis may not be fully effective given jurors' penchant for hindsight bias. More sweeping legal reforms, such as proposals to take punitive damages out of the hands of jurors¹² or to abolish punitive damages altogether for corporate risk decisions¹³ are needed.

II. The Juror Judgment Survey

To explore how jurors react to the presence of corporate risk analyses of product hazards, I constructed a survey in which juror-eligible citizens considered alternative accident scenarios. Some mock jurors considered cases in which no benefit-cost analysis was performed by the company, whereas other jurors considered variants of a case in which the company did perform such an analysis. By comparing the responses of the jurors across the different case treatments, one can ascertain the incremental influence of undertaking an economic analysis.

The sample consisted of almost 500 adults, as there were 489 adult participants in the sample. The appendix presents the sample characteristics in more detail. The sample consisted of two-thirds females, with a mean age of 45 and a median education level involving some college. Subjects were recruited to participate in the study by a survey research firm in Phoenix, Arizona, which reimbursed the participants for taking part in the study. Detailed multiple regression analyses, which control for the influence of demographics, yield similar results to the overall sample comparisons.

¹² See Cass Sunstein et al, *Assessing Punitive Damages (with Notes on Cognition and Valuation in Law)*, 107 YALE L. J. 2071 (1998).

¹³ See W. Kip Viscusi, *The Social Costs of Punitive Damages Against Corporations in Environmental and Safety Torts*, 87 GEO. L. J. 285 (1998), and W. Kip Viscusi, *Why There Is No Defense of Punitive Damages*, 87 GEO. L. J. 381 (1998).

The study examined a variety of hypotheses, leading to the five different scenarios which will be discussed further below. Here I will outline the experimental structure and the principal hypotheses related to the scenarios, which are summarized in Table 1. All scenarios involved a similar auto accident context. Scenario 1 is the baseline scenario, which will serve as the initial reference point. By comparing the results in the other scenario with this control group one can ascertain the incremental effect of the risk analysis manipulations as compared to the no analysis case.

Table 2 outlines five hypotheses that can be tested using the juror results. Scenario 2 involves auto risks in which the cost per life saved for greater safety is less than in Scenario 1, but there is no corporate risk analysis in either case. Jurors should have a more favorable view of decisions in which the safety measures not undertaken by the company have a higher cost per life saved because increasing safety is more expensive. Comparing the results of Scenario 1 with Scenarios 3 through 5 indicates whether a corporate risk analysis is viewed as a responsible act or a red flag that leads jurors to punish the corporation. Similarly, comparing Scenario 3 and Scenario 4 provides a test of whether the type of corporate risk analysis matters. In particular, does it matter whether corporations use court awards as the reference point for assessing the cost of death or instead use a higher value consistent with government regulatory analyses? A higher value based on willingness to pay for safety should be regarded more favorably. However, from a cognitive standpoint a higher value may serve as an anchor that raises liability awards. Comparison of Scenarios 4 and 5 indicates whether there is any effect of company errors in the risk assessment component of the analysis. Finally, all scenarios were run using both 4 deaths and 10 deaths as the accident context to see whether higher absolute risk levels would lead jurors

to impose greater sanctions on the company. Presumably more accidents for any given level of operations should be viewed more adversely.

The focal point of the risk analysis cases is on whether the mock jurors would levy punitive damages and the amount of punitive damages they would choose to award. The substantive context of this decision is exemplified by the following case scenario that was used in the situation in which no analysis was performed (Scenario 2). Respondents considered an analogous scenario in which only 4 people would die, as opposed to the 10 given below:

A major auto company with annual profits of \$7 billion made a line of cars with a defective electrical system design. This failure has led to a series of fires in these vehicles that cause 10 burn deaths per year. Changing the design to prevent these deaths would cost \$10 million for the 100,000 vehicles affected per year, or \$100 each. The company thought that there might be some risk from the current design, but did not believe that it would be significant. The company notes that even with these injuries, the vehicle has one of the best safety records in its class.

The courts have awarded each of the victim's families \$800,000 in damages to compensate them for the income loss and pain and suffering that resulted. After these lawsuits, the company altered future designs to eliminate the problem.

By indicating that the product was "defective," the intent of the question was not to draw a legal conclusion but simply to indicate that the system failed to operate in a completely safe manner.¹⁴ Moreover, even if the respondents concluded that a defect existed from a legal standpoint, that would be consistent with the award of compensatory damages. As indicated in the survey text, the court already awarded compensatory damages, and the only concern is whether punitive damages are warranted.

The respondents then considered two questions. The first was whether or not punitive damages should be awarded "to punish the company for reckless behavior." Second, the

¹⁴ For example, BLACK'S LAW DICTIONARY 376 (5th ed. 1979) defines defect as "The want or absence of some legal requisite; deficiency; imperfection; insufficiency." This terminology is not substantially different from popular usage, "an imperfection that impairs worth or utility," as defined in WEBSTER'S NINTH NEW COLLEGIATE DICTIONARY 333 (9th ed. 1990).

respondents were asked for a dollar amount of punitive damages if they chose to award such damages to the survivors, where they picked from the following possibilities: \$100,000, \$1 million, \$10 million, \$100 million, and some other amount selected by the respondent.

Different groups in the sample considered the five different scenarios summarized in Table 1. In much of the discussion below, these different scenarios will be pooled into broader categories since there were no statistically significant differences among many of the major component groupings. The first broad category consists of the two scenarios in which the company performed no benefit-cost analysis of the product hazard. In Scenario 1, the company did not perform the analysis, but the cost per life saved would have been \$4 million. In Scenario 2, which is the one that was reproduced in the text above, the details of the scenario were the same except the cost per life saved was \$1 million. One would expect that jurors should be more likely to levy punitive damages if the cost per life saved is lower than if it is higher because companies are presumably more remiss if it is cheaper to provide a safe product. The expense that the company needs to incur to provide for greater product safety is less when the cost per life saved is low, making safety expenditures more attractive. Thus, there will be a broader set of circumstances under which such safety improvements are desirable from a societal benefit-cost standpoint. However, in all of the statistical tests using regression results, the level of the cost per life saved did not have any significant effect on juror decisions to levy punitive damages or the amount of the award. The fact that jurors are unresponsive to the cost per life saved is consistent with what will turn out to be the broader theme in these results, which is that the key substantive concerns that one would expect to drive the jurors' views do not in fact have a statistically significant influence.

The second set of scenarios -- Scenarios 3-5 -- consists of those in which the company performed a benefit-cost analysis of some kind. In Scenario 3 the company performed the analysis in much the same manner as did Ford and GM in cases to be discussed below by using an amount that is comparable to the compensatory damages amount for such cases. In particular, this scenario assumed that the company used an \$800,000 amount to value the lives lost. In this as well as in the two subsequent scenarios, the cost that the company would have had to incur to save a statistical life was \$4 million.

In Scenario 4 the company instead undertook the analysis in a manner that follows the approach taken by government regulatory agencies. Rather than use the compensatory damages amount, it used a value of life figure based on society's willingness to pay to prevent small risks of death. This measure consequently goes beyond the value of a person's earnings or the usual amount of a compensatory damage award. Rather, it reflects the risk-money tradeoff based on the individual's own willingness to pay for greater safety. This approach is mandated for use throughout the Federal government by the U.S. Office of Management and Budget.¹⁵ As described by the survey:

To determine whether the safety improvement was worthwhile, the company used a value of \$3 million per accidental death, which is the value used by the National Highway Traffic Safety Administration in setting auto safety standards. The company estimated that the annual safety benefits of this safer design would be \$30 million (10 expected deaths at \$3 million per death), while the cost would be \$40 million. As a result, the company believed that other safety improvements might save more lives at less cost.

By comparing the results for Scenario 4 with those in Scenario 3, we can ascertain whether undertaking the analysis in a rigorous and responsible economic fashion has any beneficial influence on how the jurors view a benefit-cost analysis of product safety designs.

¹⁵ See U.S. OFFICE OF MANAGEMENT AND BUDGET, REGULATORY PROGRAM OF THE UNITED STATES GOVERNMENT, APRIL 1, 1992 – MARCH 31, 1993 (1993).

Alternatively, comparing Scenario 4 with Scenario 1 makes it possible to ascertain whether performing an analysis helps or hurts the company's position in the eyes of the jury, holding constant the cost per life saved value.

The final survey variant in Scenario 5 is that in which the company makes a mistake in assessing the risk component in the analysis by underestimating the number of deaths by a factor of two. Under this analysis, the company estimates that the cost per life saved would be \$4 million, whereas in fact it turns out to be \$2 million. Since the reference value of life used by the National Highway Traffic Safety Administration (NHTSA) is \$3 million per life, this error represents the difference between the analysis passing a benefit-cost test and failing such a test. The company believed that it passed, but because of the error it did not. Comparison of the results in Scenario 5 with Scenario 4 enable us to determine whether such errors in a benefit-cost analysis affect juror attitudes toward corporate risk analysis.

The bottom rows in Tables 1 and 2 indicate the different waves of the survey. One set of respondents considered the set of five scenarios in which the total lives lost was 10. A second set of respondents considered the identical scenarios, except that the total lives lost was four. The scale of the risk in terms of the number of lives lost did not have any statistically significant influence on the responses. Thus, within the ranges examined, neither the cost per life saved nor the absolute level of the risk had any statistically significant influence on jurors' propensity to award punitive damages.

Table 3 reports the overall mean values of the jurors' reactions to the five different scenarios both in terms of their propensity to award punitive damages as well as the dollar value of such awards. The different versions of the survey are listed in the first column of Table 3, where in addition to presenting each of the different scenarios, I also summarize the results for

the combined group of two scenarios in which no benefit-cost analysis was performed, the three scenarios in which there was such a benefit-cost analysis, and all five scenarios.

Consider first the frequency with which punitive damages were awarded. In Scenario 1, which is the reference scenario in which the cost to save a life was \$4 million but no analysis was performed, 85 percent of these subjects were willing to award punitive damages. This figure rises to 92 percent for Scenario 2 in which no analysis is performed, but the cost to save a life drops to \$1 million.¹⁶ Overall, the two versions of the survey in which there is no analysis performed had 88 percent of the subjects awarding punitive damages. Because of this high base level, the incremental effect of the corporate analysis scenarios will largely be manifested in damage levels.

Presumably, one would expect jurors to be more lenient if the company could justify its actions based on a benefit-cost analysis. The opposite turns out to be the case. In the three scenarios in which the company did perform a benefit-cost analysis using either compensatory damages amounts or the willingness to pay for safety measure for the value of life, then the probability of awarding punitive damages ranges from 0.93 to 0.95, where these differences are not statistically significant across the different cases.¹⁷ Thus, the character of the analysis that the company performs does not have a statistically significant effect. There is, however, a statistically significant difference between Scenarios 3-5 in which a company does an analysis and Scenarios 1 and 2 in which it does not. Overall, the scenarios in which a company performs an analysis lead to a punitive damages award 94 percent of the time, which is 6 percent higher than the two cases for which no analysis was performed and 9 percent higher than when no

¹⁶ These values are not, however, statistically different from each other, as is indicated by the associated t value of 1.58.

¹⁷ In particular, the highest t-statistic is 0.545.

analysis was performed and the cost per life saved is \$4 million per life (Scenario 1). The extent of the overall variation in the award frequency is not great because of the high propensity of jurors to award punitive damages for all these scenarios. However, the direction of the effect is disturbing since jurors are doing the opposite of what juries should be doing if corporations are to be encouraged to think systematically about risk and cost tradeoffs.

Considerably more variation is displayed with respect to the magnitude of the awards. The last two columns in Table 3 present the geometric mean of the award value and the median award amount. I present these statistics rather than the simple average award amount because this average is distorted by a few outliers who assessed extremely large punitive damages values, as high as \$8 billion per fatality. There is a remarkable difference across the no analysis and risk analysis scenarios. For the two scenarios in which the company does not undertake a benefit-cost analysis, the value of the awards is almost identical. The geometric mean value ranges from \$2.86 million to \$2.95 million, or an average across the two groups of \$2.91 million. The median value is identical for both Scenario 1 and Scenario 2, as it is \$1 million.

As is indicated by the bottom rows of Panels A and B of Table 3, the award amount is roughly 50 percent greater in situations in which the company performed a benefit-cost analysis, as compared to the no analysis scenarios. Overall, the scenarios in which an analysis was performed led to damages with a geometric mean value of \$4.59 million, as compared to \$2.91 million in punitive damages when no analysis was undertaken. A similar and more dramatic pattern is characterized by the median values, which are \$1 million when no analysis is performed and \$10 million when the company does a benefit-cost analysis.

It is interesting to compare how the company's performance changes when it performs a benefit-cost analysis correctly, as in Scenario 4, rather than simply using the value of compensatory damages as the measure for the value of life, as in Scenario 3. Based on the

economic merits, the company should fare better when it values life correctly and at a higher amount than when it simply uses the compensatory damages value. Moreover, respondents also are told that the company's approach follows that used by the National Highway Traffic Safety Administration. However, undertaking a sound risk analysis does not prove to be beneficial to the company's prospects. The propensity of the respondents to award punitive damages is almost identical – 0.93 – in each case. However, the level of punitive damages awarded turns out to be greater when the company performs the analysis correctly than when it simply uses the compensatory damages value. The geometric mean award value increases from \$4.0 million to \$5.3 million in Scenario 4 as compared to Scenario 3, and the median award value is \$10 million for Scenario 4, which is more than twice as great as the \$3.5 million median value for Scenario 3.¹⁸

Performing the analysis correctly and valuing life at a higher amount leads juries to impose greater sanctions than when the company does the analysis but places a lower value on improvements in safety. How might such an effect that is opposite of any reasonable pattern of behavior arise? The mock jurors seem to make little distinction with respect to whether there should be an award of punitive damages. However, the higher value of life amount used by the company in Scenario 4 as compared to Scenario 3 provides a dollar anchor for the jury in thinking about the appropriate punitive damages award. Somewhat perversely, use of a higher value of life estimate for the company's internal analysis of what it is worth to save a life may raise the target award level in the mind of the jury as they seek to impose a damages amount that will provide more of an incentive for safety than the company exhibited in its own internal analysis. Companies are consequently in the bizarre position of increasing the potential damages

¹⁸ Using the geometric mean, this difference is not, however, statistically significant. The median award level does differ significantly. Using a median regression yields a t-value of 3.36.

award that the jury may levy the greater the weight they place on consumer safety, as was reflected in their internal value of life estimate.

Anchoring effects for punitive damages are not unique to this particular context. Requests by the plaintiff's attorney for larger damages amounts tend to increase the dollar value of the award.¹⁹ Such requests are not entirely arbitrary as they are often accompanied by irrelevant but superficially plausible mathematical formulas, such as an arbitrary percentage of the firm's profits or sales, based on the purported need to send the company a message. Indeed, recent evidence indicates that jurors in fact may have very little idea as to how to map their concerns for the corporation's behavior into a dollar amount.²⁰ My results are even more disturbing, as there is not only an anchoring phenomenon that is the opposite of the desired effect, but there should not even be punitive damages of any kind triggered by responsible risk analyses.

Finally, consider Scenario 5 in which the company undertook a flawed benefit-cost analysis. Comparison with the counterpart Scenario 4 in which there was no such error suggests that errors are not that consequential. The jury was somewhat more likely to award punitive damages in the erroneous analysis case (0.95 probability vs. 0.93), but exhibited somewhat lower proclivities to penalize the firm (\$4.5 million in punitive damages for Scenario 5 vs. \$5.3 million for Scenario 4). Overall, there were no statistically significant differences between these two scenarios.

¹⁹ Detailed evidence on this phenomenon is provided by Reid Hastie, David Schkade, and John W. Payne, *Juror Judgement in Civil Cases: Effects of Plaintiff's Requests and Plaintiff's Identity on Punitive Damages Awards*, 23(4) J.L. AND HUMAN BEHAVIOR 445 (1999).

²⁰ This point is developed by Sunstein et al., *supra* note 8.

More detailed statistical analyses controlling for the different features of each scenario and respondent characteristics yield similar results.²¹ Taking into account the influence of personal characteristics, undertaking a risk analysis increases the probability of a punitive damages award by 5 percent. It is somewhat noteworthy that the cost per life saved amount and the absolute risk level do not have a significant effect on the probability of a punitive damages award, as jurors seem to be unresponsive to variations in the underlying risk characteristics. Undertaking a benefit-cost analysis of risk does not help the company but instead boosts the value of punitive damages awarded by 47 percent. The cost per life saved amount and the absolute risk level do not play significant roles in affecting jury behavior.

III. The Risk Balancing Reference Point

Risk Analysis and Liability

What should be the negligence standard and the role that risk analysis should play in relation to such a standard? The current legal consensus on this issue recently articulated in a draft document by an American Law Institute group reflects a desire to balance risk and cost and, indeed, to consider risk-cost tradeoffs directly:

Under § 2, negligence is defined in terms of the failure to exercise reasonable care, and reasonable care is explained primarily in terms of the balance between the magnitude of the foreseeable risk and the burden of precautions that can eliminate the risk. If the burden is greater than the risk, the actor who declines to adopt that precaution is not negligent. But if the magnitude of the risk is somewhat greater than the burden, the actor is negligent for failing to adopt the precaution.

From this evaluation, two points follow that relate to the meaning of recklessness. The first point is a negative one: the fact that the actor, because of the burden entailed by a particular precaution, has made a deliberate choice to omit a precaution and hence to tolerate a risk by no means signifies that the person has behaved recklessly. Indeed, the fact that such a choice has been made

²¹ For a fuller report on these analyses see W. Kip Viscusi, *Jurors, Judges, and the Mistreatment of Risk by the Courts*, Working Paper, Harvard Law School (1999).

does not even show that the actor has behaved negligently. Rather, the actor is negligent only for making an unwise choice. In a sense, the very objective of negligence law is to encourage actors to acknowledge and confront such choices, and to render these choices wisely rather than unwisely.²²

Standard negligence principles call for risk balancing and, indeed, firms should be encouraged to make such judgements explicit. Ideally, they should also not be faulted additionally for undertaking an erroneous analysis. Undertaking a risk analysis itself before marketing a risky product should not be viewed as reckless corporate behavior. Such legal guidance is, however, divorced from the reality of personal injury and environmental damage cases and the thinking of jurors who bring to bear their own cognitive biases. The injury outcomes in such cases are not financial abstractions but may generate powerful emotional responses that may be influenced by the character of the corporate decision making process, as will be shown below.

Indeed, these competing concerns arise with respect to the American Law Institute's subsequent discussion of the role of the actor's knowledge, which will be an integral component of risk analysis: "Nevertheless, if the evidence does show that the actor had knowledge that its conduct was tortious, this evidence conduces to a finding that the actor's failure to adopt precautions is highly blameworthy for the purposes of § 2."²³ Companies, of course, may make risk analyses and adopt behavior that they do not regard as tortious. Juries may, however, disagree, and if the firm is found negligent, such risk analysis and cognizance of the risks to be posed by dangerous products could be a trigger for punitive damages regardless of what one might hope jurors will do.

²² RESTATEMENT OF THE LAW, TORTS (Draft No. 1, September 25, 1998) at 28-29.

²³ *Id.*, at 33

To provide the appropriate levels of safety to protect the public adequately, companies should institute those safety measures for which the expected benefits exceed the costs. Cost levels are usually directly measurable; they typically consist of monetary expenditures as well as perhaps the cost of time spent in taking particular precautions. The benefit component is more complex. Consider a safety device that reduces the mortality risks to consumers. For simplicity, assume that all of these calculations are undertaken on a per-consumer basis rather than over the entire product line, in which case one would take into account the total number of consumers whose lives are at risk and the total cost involved. The expected benefits of the safety device equal the change in the mortality probability multiplied by the value of preventing the consumer's death. The safety device is desirable from an economic efficiency standpoint if the costs are below these expected benefits.

Assessing risk levels and how a product's features may affect the risk is not always a precise science, especially before the product has become widely used. Engineers can run simulated tests, and pharmaceutical companies can engage in clinical trials that may involve substantial groups of prospective users in situations that are reflective of the likely product use. However, such pre-market tests are often not fully informative. Adverse reactions to a drug may not become apparent immediately, and mechanical defects may develop over time and may not be known to the company before the product is in wide use. Companies also cannot anticipate all situations in which the product will be used. Nevertheless, there is often substantial information that the company can use to form a risk judgment. Using the state of the information at the time of the product marketing decision the company can assess the change in the fatality probability that will result from a particular safety improvement.

Setting a Price on Safety

Supreme Court Justice Stephen Breyer often uses as an example the bounds on consumers' expenditures on improved auto safety as a reference point for demonstrating that there are limits that we would like to place on risk-money tradeoffs.²⁴ Would it, for example, be unreasonable to require a safety expenditure that costs \$10 billion per life saved? As Justice Breyer observes, such expenditures would be tantamount to being willing to pay an extra \$48,077 for a car that was 5 percent safer than those that we now drive. The fact that we do not all rush out to purchase marginally safer cars that are extremely more expensive is reflective of the limits we place on safety improvements. Indeed, the revealed tradeoffs from consumer purchases of used cars indicate that consumers are willing to pay just under \$3 million for each statistical life saved from the decreased risk of death from a prospective safer used car purchase.²⁵

What Justice Breyer's example implies is that the safety of products can always be increased, but that the price to do so may exceed what consumers want to pay. The failure to obtain risk-free products will occur regardless of whether it is the consumer or the producer who makes the safety decision.

Indeed, a desire to limit our expenditures on product safety could even stem from interest in other health-enhancing expenditures. Exorbitant expenditures on motor vehicle safety, for example, will divert resources that could have been spent on additional medical care, improved nutrition, or housing in a safer neighborhood. A substantial literature has developed in economics demonstrating that excessive safety expenditures in any particular area are in fact

²⁴See Breyer, *supra* note 1 at 13-14.

²⁵ See Mark Dreyfus and W. Kip Viscusi, *Rates of Time Preference and Consumer Valuations of Automobile Safety and Fuel Efficiency*, 38 J.L. AND ECON. 79 (1995).

counterproductive.²⁶ We in fact do harm our health by diverting inordinate resources exclusively to one safety concern instead of allocating our funds across different safety-enhancing ways based on the relative efficacy of those expenditures.

In setting a dollar value on human life, economists focus not on identified lives, but on statistical lives. What matters is not how much we would pay to prevent a certain death. Rather, the actual benefit being valued is a prospective probability of a statistical death. How much are we willing to pay to reduce this probability by a small amount? A hypothetical example illustrates how the value of life numbers are generated. Consider a village with a population of 10,000. Suppose that we learn that one person in the village will die at random. How much would the people in the village be willing to contribute to prevent this random death to their group, where we assume for purposes of this example that you cannot leave or otherwise escape the risk? If each person were willing to contribute \$500 to prevent a random death, then the total amount of money that we could raise would be \$500 multiplied by 10,000 people, or \$5 million. This same logic has been applied to deriving estimates based on a large series of studies of worker behavior, which has been the general approach taken in the economics literature. Studies focusing on tradeoffs people actually make between money and risk will consequently be more realistic than survey responses to hypothetical risks. Controlling for other aspects of the job, hazardous jobs command a higher price. For a worker facing an annual death risk of 1 chance in 10,000 from his or her job, the annual wage premium estimates range from \$300-\$700 per year, where these amounts control for other aspects of the individual and the job. Put in value of life terms, these amounts imply a value of life of \$3 million to \$7 million, or a midpoint value of \$5 million per statistical life.

²⁶ For an introduction to the risk-risk literature, see W. KIP VISCUSI, RATIONAL RISK POLICY (1998), and a paper by two economists from the U.S. Office of Management and Budget, Randall Lutter and John Morrall, *Health/Health Analysis: A New Way to Evaluate Health and Safety Regulation*, 8 J. RISK AND UNCERTAINTY 43 (1994).

These amounts do not imply that the worker would accept certain death in return for \$5 million, nor do they imply that a worker would be willing to pay \$5 million to prevent certain death. These amounts could be quite different. Rather, they only suggest that when facing very small risks, a value of \$5 million per statistical death reflects the person's rate of tradeoff between risk and money. For the purposes of the discussion below, this willingness to pay approach will be the yardstick used in assessing the value of life.

The use of this methodology to value life is not an arbitrary choice. It follows the recommended practice for all Federal agencies.²⁷ The justification for using the willingness to pay measure parallels the approach for valuing any policy's effects. The value of a policy benefit outcome is simply society's willingness to pay for that benefit.²⁸ In the risk context, it is the willingness to pay for risk reduction. Because the people whose lives are at risk have the most to lose, the usual reference point for valuing safety is the willingness to pay of the person at risk.

The value of life numbers are considerably higher than the estimates obtained using only the present value of lost earnings, which is often called the "human capital" approach. Lost earnings are generally a key component of compensatory damages amounts. Ignoring the role of discounting, consider a 35-year old male earning \$30,000 per year. That person has an expected active working life of just under 25 years, or a total value of future earnings of \$750,000.²⁹

²⁷ See the U.S. OFFICE OF MANAGEMENT AND BUDGET, *supra* note 11 at 633, 634, 637, and 638 (discussing the value of life).

²⁸ This is the standard principle for benefit valuation in any context. See, for example, the textbook by EDITH STOKEY AND RICHARD ZECKHAUSER, *A PRIMER FOR POLICY ANALYSIS* (1978).

²⁹ These worklife statistics are from Table A-1 of the U.S. Department of Labor, U.S. Bureau of Labor Statistics, *Worklife Estimates: Effects of Race and Education*, Bulletin 2254, (February 1986).

Whereas the present value of future earnings is under \$1 million, the value of life from the standpoint of the willingness to pay measure of the value of life is much higher.

When making awards in the case of wrongful death, courts justifiably focus on the present value of future earnings, net of consumption of the deceased and, depending on the jurisdiction, taxes. That amount of money is needed to replace the economic loss to the family based on the earnings of the deceased. However, court awarded compensation set in this manner does not serve the preventive function that is reflected in the value of life statistics. A deterrence value of life figure based on the willingness to pay methodology yields an appropriate measure of the penalty that creates efficient safety incentives, assuming that court awards provide the only incentives to the company. Thus, a value of life figure of \$5 million is an appropriate reference point for determining how much the company should spend per statistical life saved to prevent an expected death. A typical court award in the case of wrongful death may be below \$1 million. It should be noted, however, that court awards serve two functions, deterrence and compensation. Court awards equal to the value of life estimates will provide excessive insurance. The distinction between the value of life and court awards was incorporated in the test between Scenarios 3 and 4, with the result being that corporations were penalized for valuing life more highly -- a clearly perverse result.

Problems in Ex Post Jury Assessments of Risk Analyses

Juries may not in fact compare expected benefits and costs based on the state of information before the accident. Once the accident has occurred, the role of hindsight may taint juror perceptions. Jurors instead may simply think of the identified victim and how the product could have been changed to avoid that particular accident, such as the fire in the Chevrolet

Malibu after the rear end collision. They may fail to consider the benefits of the product's features, perhaps including how price, for all those who are not in the courtroom.

The role of hindsight was apparent in Carrol v. Otis Elevator, 896 F.2d 210 (7th Cir. 1990). In 1985 a department store escalator came to a sudden stop after an unidentified child apparently pushed the emergency button. Shirley Carrol, a department store clerk riding on the escalator, fell and injured her knee. She filed a products liability suit against the escalator manufacturer, claiming that the emergency stop button, which was red and placed low, was defective because it was attractive and accessible to children. In the defense's view, having a button that is easy to spot and to reach enhances its role in emergency situations.

As Judge Frank Easterbrook observed, corporate engineers are better suited to making sound risk tradeoffs than jurors, who are affected by hindsight bias:

The ex post perspective of litigation exerts a hydraulic force that distorts judgement. Engineers design escalators to minimize the sum of construction, operation, and injury costs. Department stores, which have nothing to gain from maiming their customers and employees, willingly pay for cost-effective precautions... Come the lawsuit, however, the passenger injured by a stop presents himself as a person, not a probability. Jurors see today's injury; persons who would be injured if buttons were harder to find and use are invisible. Although witnesses may talk about them, they are spectral figures, insubstantial compared to the injured plaintiff, who appears in the flesh.³⁰

That companies should undertake risk-cost balancing is emphasized in a decision by Judge Frank Easterbrook in a case involving scalding from hot coffee that paralleled the highly-publicized McDonald's coffee cup case. Angelina and Jack McMahon v. Bunn-O-Matic Corp., 150 F. 3d 651 (7th Cir. 1998) involved a coffee spill by the McMahons while on a long distance trip. Jack McMahon bought a cup of coffee in a Styrofoam cup at a mini-mart at a Mobil station. While pouring some of the coffee into a small cup, the original cup collapsed, spilling coffee on

³⁰ See Carrol v. Otis Elevator, 896 F.2d 210, 215 (7th Cir. 1990) (Easterbrook, F. concurring).

Angelina McMahon's lap and producing second and third degree burns. Their suit against the coffee maker manufacturer claimed that the maker was defective because the coffee was so hot.

Judge Easterbrook notes, however, that the fact that coffee is hot may be a situation in which the benefits exceed the costs:

Moreover, because it is costly to serve coffee hot (it takes electricity to keep the hot plate on), risks could be reduced for a negative outlay. How could it not be negligent to spend money for the purposes of making a product more injurious? But of course people spend money to increase their risks all the time - they pay steep prices for ski vacations; they go to baseball games where flying bats and balls abound; they buy BB guns for their children knowing that the pellets can maim. They do these things because they perceive benefits from skiing, baseball, and target practice... We must understand the benefits of hot coffee in relation to its costs. As for costs, the record is silent. We do not know if severe burns from coffee are frequent or rare. On the other side of the ledger, there are benefits for all coffee drinkers. Jack McMahon testified that he likes his coffee hot. Why did the American National Standards Institute set 170° F as the minimum temperature at which coffee should be held ready to serve? ... Without some way to compare the benefits of a design change (fewer and less severe burns) against the costs (less pleasure received from drinking coffee), it is impossible to say that designing a coffee maker to hold coffee at 170° F bespeaks negligent inattention to the risks.³¹

As a practical matter, consider the process that a company might undertake if it wished to complete a comprehensive assessment of the costs and benefits of a particular safety improvement. It would obtain a thorough understanding of the risks involved and how the safety modification would affect those risks. If it chose not to adopt a safety measure because the costs exceeded the benefits in its view, then it would be explicitly trading off lives against money, just as coffee retailers and coffeemaker manufacturers trade off burns against quality and profits. Moreover, proceeding in a way that is not risk-free can be viewed as knowingly inflicting harm on consumers even though at a probabilistic level even though such actions may be entirely in line with fundamental law and economics principles for efficient levels of safety.

³¹ Angelina and Jack McMahon v. Bunn-O-Matic Corporation, 150 F. 3d 651, 658 (7th Cir. 1998).

Unfortunately, knowingly inflicting a risk, albeit in a probabilistic sense, triggers conditions that may be highlighted for juries with respect to the award of punitive damages. Consider the following jury instructions for punitive damages pertaining to willful and wanton conduct:

In order for the conduct of the defendant to constitute willfulness or wantonness, his/her acts must be done under circumstances which show that he/she was aware from his/her knowledge of existing conditions that it is probable that injury would result from his/her acts and omissions, and nevertheless proceeded with reckless indifference as to the consequences and without care for the rights of others.

The distinction between the two terms, “willful” and “wanton,” is that the word “willful” implies an intent or purpose to cause injury, while “wanton” expresses a reckless disregard for the consequences of the act.

It is not necessary to find that the defendant deliberately intended to injure the plaintiff. It is sufficient that the plaintiff proves by the greater weight of the evidence that the defendant intentionally acted in such a way that the natural and probable consequence of his act was injury to the plaintiff.³²

How will a jury interpret such instructions? Suppose the defendant undertook a thorough risk analysis, yet nevertheless proceeded with a product that did not incorporate all feasible safety measures because they were not justified based on cost. Will a jury find that the defendant’s conduct is reckless and deliberately injured the plaintiff because the defendant intentionally chose not to adopt the safety measure? Giving responsible corporate risk analyses a negative spin is not only evidenced in these mock juror results but also appears in some actual cases examined below.

Risk-Utility Analysis

The procedure by which one compares the risk consequences of design changes with the associated costs is not restricted to corporate risk analyses or benefit-cost tests undertaken by the government with respect to prospective regulations. Such procedures also are embodied with

³² RONALD W. EADES, JURY INSTRUCTIONS ON DAMAGES IN TORT ACTIONS, (3rd ed. 1993), at 111.

respect to legal tests for design defects known as risk-utility tests. Such tests involve elements of benefit-cost analysis, but not a formal benefit-cost test.³³

Risk-utility tests of various kinds play a central role in design defect cases.³⁴ Even if the focus is on consumer expectations, judgments as to whether reasonable expectations are met may hinge on risk-utility concerns.³⁵ Although risk-utility analysis does have a legitimate legal role, this status does not protect companies that have undertaken such studies. Jurors are still free to punish corporations for thinking systematically about risk and cost.

Undertaking a sound analysis of the benefits and costs of safety improvements may be a prescription for being penalized by the jury. In undertaking such analysis, the companies certainly will become “aware” of the linkage between the failure to install the safety device and the probability of injury. Moreover, by undertaking an analysis and making a conscious decision to forego safety improvements, companies will be subject to charges that they “deliberately intended to injure the plaintiff.” Moreover, plaintiffs’ attorneys will cite the basest of reasons – financial gain.

Economic analysis of potential safety improvements and environmental precautions is inherently unpleasant and may offend jurors. Tradeoffs will and must be made. The unpleasant nature of the exercise does not, however, imply that companies should not be undertaking such assessments. Indeed, we want to encourage such rational thinking about risks because that leads to safety improvements that are warranted based on their merits as opposed to ones that raise product prices while conferring negligible gains. As subsequent case studies indicate, however,

³³ See John W. Wade, *On The Nature of Strict Liability for Products*, 44 MISS. L. J. 825, 837-38, (1973) and W. KIP VISCUSI, *REFORMING PRODUCTS LIABILITY* (1991).

³⁴ See *RESTATEMENT OF THE LAW (THIRD): PRODUCTS LIABILITY* (1998) at 65.

³⁵ See *Id.* at 71.

undertaking even a sound assessment of costs and benefits often poses substantial hazards to responsible corporations.

Risk Analysis after Accidents

Risk analyses of course are of value with respect to prospective product risks so as to foster safe product designs. However, they are also valuable after accidents as companies attempt to diagnose the causes of accidents and improve their safety records. A prominent class of examples consists of airplane crashes. Indeed, the 1979 American Airlines DC-10 crash at O'Hare Airport was a legal battleground over what corporate records had to be shared with the plaintiffs.³⁶ In that case, a key issue on which American Airlines lost was whether it had to turn over to the plaintiffs the results of its crash investigation.

A principal motion by the plaintiffs in this case was to obtain American Airlines' internal reports on the May 25, 1979 crash that occurred shortly after takeoff from O'Hare Airport. Although American Airlines had created an internal investigation of the probable cause of the crash, it later destroyed it based on advice from their legal counsel, who claimed that the report was covered by attorney-client privilege. The legal department also instructed the American investigators to destroy all supporting notes and copies of the report. The plaintiffs claimed that this action increased their costs, and the court ruled in favor of their claim. In not maintaining the report, American Airlines allowed the court to conclude that the contents of the report would have been damaging: "The 'adverse inference' rule does apply to this motion, however, that rule

³⁶ See *In re Air Crash Disaster Near Chicago, Illinois on May 25, 1979*, 90 FEDERAL RULES DECISIONS, Section 613, which was decided by the U.S. District Court, Northern District of Illinois on June 23, 1981.

basically holds that upon a party's willful failure to produce evidence, there is the presumption that the evidence would have been unfavorable to that party."³⁷

From the standpoint of risk, what should be the objective of the post-crash analysis? Ideally, it should focus on the causes of the crash and potential measures that the airlines can take to reduce such risks. By their nature such analyses highlight shortcomings than can be fixed to prevent future tragedies. The intent of these assessments is not to put a positive spin on the corporation's past efforts so as to avert liability. To achieve its objective, such analysis must be frank. Hence, it could affect its potential liability for the accident that just occurred.

From the standpoint of risk analysis and record keeping objectives, companies face a Catch 22 situation.³⁸ If they undertake no post-accident risk evaluation at all, they may be found to be irresponsible for failing to address the potentially knowable risks generated by their company's efforts. Investigating the cause of a major accident should be a signal to the jury that the company was concerned for safety because learning what caused an accident is often a key ingredient to preventing its repetition. A frank post-accident report that is shared with the plaintiffs can, however, affect the company's liability for the accident if it reveals fault with company practices that led to the accident. The alternative of not writing and maintaining a report is also unattractive. If the company fails to produce such an accident report, it may be subject to litigation for not meeting its record keeping obligations. Clearly, society benefits from both an appropriate liability decision for the current accident and the existence of proper incentives for the corporation to adopt appropriate safety measures in the future.

³⁷ For fuller discussion of this case, see records management expert Donald Skupsky, *Legal Requirements for Records Prepared for Internal Investigations and Audits*, 26 RECORDS MANAGEMENT QUARTERLY, ARMA INTERNATIONAL 34-35 (1992).

³⁸ The three unattractive alternatives specified below are based on the analysis by Skupsky, *supra* note 33, at 34.

The sections below will consider a variety of concrete cases in which corporate risk analyses have played a role in court. In most of these examples companies were found liable, often for punitive damages. These examples are not disturbing because the act of carrying out a risk analysis did not shelter the firm from liability. I am not proposing that doing a risk analysis immunizes the company against all subsequent liability. However, undertaking a systematic risk analysis should not itself be a trigger for imposing liability. Moreover, if the analysis is sound and indicates that the costs of the safety measure do in fact exceed the value of the safety benefits, then the firm not only should not be subject to punitive damages, but it should also not be found negligent.

Some corporate risk analyses may not be economically sound so that some liability may be warranted. However, it is not technical shortcomings in the analysis that caused the concern in the cases discussed below. The attorneys and the jurors reacted to the company's having done an analysis that specifically confronted the risk decision, and then having chosen not to adopt the particular safety measure that might have prevented the specific accident from being litigated. Whether doing so would have been sensible given the state of information before the accident is rarely considered. The practical danger is that jurors react in hindsight, comparing the product design change cost with the identified victim, as Judge Easterbrook suggested. The result is that jurors place insufficient weight on the fact that these adverse outcomes often have very low probabilities. In foresight, the company must consider all potential risks since it obviously cannot identify the potentially injured parties and make only the safety improvements that will affect them.

IV. Benefit-Cost Analyses at Ford Motor Company

The Ford Pinto

A useful starting point for considering the role of corporate risk analysis in products liability litigation is the 1978 Ford Pinto case, Grimshaw v. Ford Motor Company.³⁹ Although this rear end accident occurred a quarter century ago, it remains perhaps the best-known example of a corporate risk analysis and the public outcry that it evoked. Moreover, this classic case embodies many key elements that appear in several other cases against Ford as well as other companies.

In 1972, Richard Grimshaw was a 13-year old passenger in a Ford Pinto that had stalled and come to a stop in the middle of a freeway. A car that slowed to possibly 30 miles per hour hit the Pinto from behind, creating a rear-end fire that killed the driver and catastrophically injured Richard Grimshaw.

The plaintiff's suit claimed that the placement of the gas tank behind the rear axle and the fuel filler pipe were defective designs that created the risk of fire. The result was that Richard Grimshaw was awarded more than \$2.5 million in compensatory damages and \$125 million in punitive damages. The punitive award was subsequently reduced to \$3.5 million.⁴⁰

The most publicized aspect of the Ford Pinto case was a systematic analysis of the benefits and costs of safety improvements. Mother Jones magazine published the analysis, which trial lawyer Stewart Speiser called "possibly the most remarkable document ever produced in an American lawsuit."⁴¹ In a press conference, accompanied by Ralph Nader, Mother Jones released the analysis. Its story documenting this benefit-cost analysis by Ford engineers received

³⁹ Grimshaw v. Ford Motor Company, 199 Cal App. 3d 757, 174 Cal Rptr. 349 (Cal. Ct. App. 1981)

⁴⁰For a description of the Ford Pinto case, see Gary T. Schwartz, *The Myth of the Ford Pinto Case*, 43 RUTGERS L. REV. 1013 (1991). The benefit-cost analysis dominated public debate but apparently was not presented at trial.

⁴¹See STEWART SPEISER, *LAWSUIT 357* (1980).

a Pulitzer Prize.⁴² While the Ford Pinto case involved a rear impact, the engineering analysis performed by Ford pertained not to rear impact crashes but to rollover risks and a government regulation proposed by the National Highway Traffic Safety Administration.⁴³ Nevertheless, this analysis is instructive regarding corporate safety studies. Moreover, we will find that this same kind of analysis has been a central issue in other Ford and General Motors accident litigations.

Table 4 highlights the components of Ford's analysis that it prepared using all cars as the vehicle reference point, not just the Ford Pinto. Panel A lists the adverse risk outcome and Ford's unit value for these outcomes where all these values are from an internal Ford memorandum prepared by Ford engineers.⁴⁴ Ford estimated potential risks as 180 burn deaths, 180 serious burn injuries, and 2,100 burned vehicles. The unit values applied to these injuries were similar to the value of court awards in product liability cases at that time⁴⁵ as well as to the values used by the National Highway Traffic Safety Administration in its regulatory analyses.⁴⁶ Each of these values was based on human capital concepts, or the present value of lost earnings.⁴⁷ Based on Ford's analysis, the total cost of not fixing the gas tank design would be \$49.6 million. In contrast, as is indicated in panel B, the cost of increased safety would be

⁴²See Schwartz, *supra* note 36, at 1017 for discussion of these events.

⁴³For superb documentation of this context of the analysis, see Schwartz, *supra* note 36.

⁴⁴For the actual text of the memorandum, see BRENT FISSE AND JOHN BRAITHWAITE, *THE IMPACT OF PUBLICITY ON CORPORATE OFFENDERS* 44 (1983). As the authors observed: "In the absence of an offense defined in terms of manufacturing an unjustifiably dangerous product, questions of acceptable risk of the kind raised by the Pinto Papers will rarely be the central subject of inquiry in the context of corporate offenses against the person. This is unsatisfactory, not only because of the danger of a serious underlying risk being concealed from society, but also because it may do more harm than good not to face up to the need for studies of the costs of improving product safety in matters such as that in which Ford was pilloried." *Id.* at 54.

⁴⁵See Viscusi, *supra* note 29.

⁴⁶See Schwartz, *supra* note 36.

⁴⁷Since that time, governmental risk analyses have shifted to an approach based on the value of a statistical life or the willingness to pay to avoid a statistical death as described above. See W. KIP VISCUSI, *FATAL TRADEOFFS: PUBLIC AND PRIVATE RESPONSIBILITIES FOR RISK* (1992) and the U.S. Office of Management and Budget, *supra* note 11.

\$137.5 million. By this tally, the expected benefits of improved safety are below the costs, so that undertaking the design change would not be worthwhile.

Based on current economic knowledge in the value of life area -- as opposed to the state of economic knowledge a quarter century ago -- one would have undertaken a different kind of analysis.⁴⁸ In terms of the mock juror analysis Ford followed the compensatory damages analysis in Scenario 3 rather than the willingness to pay approach of Scenario 4. However, as the juror study indicates, following Scenario 4 rather than Scenario 3 would in fact have affected Ford adversely to the extent that the higher willingness to pay value anchored the damages awards at a higher level.

The basic problem is that jurors do not undertake a comprehensive risk analysis approach, regardless of its character. Jurors would still have a tendency to compare the \$11 unit cost with the identified injured victim. Rather than examining the entire market and the associated benefits and costs, jurors will both be offended by a comprehensive risk analysis approach and focus their assessment more narrowly on the identified victim and the costs of preventing that injury. The fact that these costs will be incurred for thousands of consumers who would not have been injured will not loom as large, as Judge Easterbrook emphasized. Thus, there is a tendency to exhibit “hindsight bias:” jurors view the decision retrospectively rather than considering the expected benefits as understood at the time of the safety decision.

Ford Mustang

A similar kind of risk analysis issue, or what the court viewed as “safety science management,” arose with respect to the placement and design of the fuel system for the Ford

⁴⁸ If, however, one used current value of life estimates based on the willingness to pay to reduce risk, then the value of burn deaths becomes much greater. Using a value of life estimate of \$3 million per death, for example, preventing the burn deaths alone is worth \$540 million, which exceeds the total costs.

Mustang in Ford Motor Company v. Stubblefield et al.⁴⁹ The kinds of issues closely parallel those involved in the Ford Pinto. Terri Stubblefield was killed in 1977 when the Ford Mustang II in which she was riding was hit from behind when stopped in traffic. The car that hit her from the rear was traveling from 56 to 65 miles per hour, producing a collision that caused a “ball of fire” that engulfed the rear seat where Terri Stubblefield was seated.

The plaintiffs claimed that the fuel system was negligently designed and placed. The parents of Terri Stubblefield based their case on the company’s prior knowledge of the risk, which is the kind of knowledge that will inevitably arise as part of the corporate risk analysis. As a result, the jury awarded \$8 million to deter Ford Motor Company from such conduct in the future. Indeed, the award was based in large part on the fact that Ford had done a risk assessment that compared risk with cost and concluded that the safety improvements were not worthwhile:

The evidence here was sufficient to authorize the jury to find that the sum of \$8 million was the amount necessary to deter Ford from repeating its conduct; that is, its conscious decision to defer implementation of safety devices in order to protect its profits. One internal memo estimated that “the total financial effect of the Fuel System Integrity program [would] reduce capitalized company profits over the 1973-1976 cycle by (\$109) million,” and recommended that Ford “defer adoption of the [safety measures] on all affected cars until 1976 to realize a design cost savings of \$20.9 million compared to 1974.” Another Ford document referred to a \$2 million cost differential as “marginal.”⁵⁰

The design issue debate focused on the fuel system design for the Ford Mustang II. The main corporate decision that was the subject of the controversy was management’s decision to delay implementation of protective hardware for the Mustang II fuel tank from 1974 to 1976.

⁴⁹See *Ford Motor v. Stubblefield*, 171 6a. App. 331, 319 S.E. 2d 470 (6a Ca. App. 1984).

⁵⁰*Id.* at 341, 319 S.E. 2d at 481.

The design issues closely parallel those with the Ford Pinto, as rear impact crashes would jam the fuel tank into the rear axle, generating the risk of a fuel-fed fire as in the case of the Pinto.

In much the same way as the company is alleged to have traded off cost vs. risk in the Ford Pinto case, the same kinds of explicit trade-offs were the subject of the controversy involving the Ford Mustang II. When Ford engineers sought guidance, “a directive was issued implementing this decision which stated that ‘actual hardware will not be added until required by law...’ Ford finally adopted a polyethylene shield which was installed in the fall of 1976 on the 1977 model Mustang II, but no effort was made to inform owners of older models of the dangers of post-collision fire.”⁵¹

The concerns were two-fold. First, the company traded off cost versus risk and knowingly inflicted harm on potential occupants. The crash tests in this analysis “showed Ford’s knowledge of the hazard at a point in time prior to the collision in which Terri Stubblefield was fatally injured.”⁵² Second, because Ford knew about the potential risk, it would have had a duty to warn potential users of the hazard. The scope of such responsibilities is unclear, since all products that are not completely risk-free do involve some risk. Communicating very small probability risks is quite difficult, particularly given the myriad of potential hazards associated with complex products such as an automobile. It certainly would not be an effective hazard warnings policy for an automobile company to warn of every potential hazard associated with the product because doing so would cause problems of information overload given the wide variety of potential sources of failure.

⁵¹ *Id.* at 334, 319 S.E. 2d at 476.

⁵² *Id.* at 339, 319 S.E. 2d at 479.

Ford's Seatbelt Failures

Ford's analysis with respect to other aspects of products risks also is an issue in Miles v. Ford Motor Company, 922 S.W. 2d 572 (Tex. App. 1996).⁵³ In that case, a jury awarded punitive damages that were subsequently overturned after the plaintiff sued Ford because the passenger side shoulder harness on a seatbelt allegedly failed. Before the collision Willie Miles, who was riding on the right passenger side, had leaned over to pick up some trash. When doing so, the shoulder harness spooled out, creating slack of about six to eight inches. A "tension eliminator" apparently prevented appropriate rewinding of the belt even though it appeared to be snug. The collision led Willie to slide through his lap belt, which caught his head and produced spinal injuries.

The basis of the claim was that the seatbelt's tension eliminator spool was defective, leading the occupant to believe that the shoulder harness was snug when in fact it was loose. The jury found that the design was defective and that the manufacturer failed to provide adequate warnings regarding the defective restraint. Moreover, the company's risk analysis and the knowledge of the hazard incorporated in this analysis played a substantial role in the plaintiff's case:

Syson [the plaintiff's accident reconstruction expert] testified that he was familiar, during the relevant time period, with the corporate policies of Ford Motor Company as they related to potentially defective products. Syson testified that when Ford identified what it believed to be a defective product, it would first run a "cost-benefit" analysis to see that the costs would be to fix or repair the defect. Next, Ford would have assigned arbitrary values to each death or serious injury and would predict the number of occurrences which would involve either death or serious injury. Finally, Ford would determine the cost to litigate such deaths and injuries. Syson testified that if the cost to repair the defect exceeded the other costs, Ford would not correct the defect.⁵⁴

⁵³ Miles v. Ford Motor Company was overturned. The case was remanded by the Supreme Court of Texas for procedural errors. See Ford Motor Company v. Miles, 967 S.W. 2d 377 (S.C. Tex. 1998).

⁵⁴ Miles v. Ford Motor, 922 S.W. 2d 572, 588-89 (Tex. App. 1996).

Notwithstanding the fact that the company undertook such an economic analysis, the court reversed the punitive damages award. Ford was fortunate in that its analysis was based on a similar regulatory analysis undertaken by the National Highway Traffic Administration [NHTSA]. As a result, the court concluded that the evidence was “barely sufficient to find ordinary negligence” and fell “far short of supporting a finding of gross negligence,” much less malice.⁵⁵ As the court noted: “Ford relied on studies by NHTSA that consistently showed the risk-utility balance of tension eliminators weighed on favor of overall safety and that the kind of tension eliminators that Ford used were not unreasonably dangerous.⁵⁶ Thus, the court stated, “[W]hile Ford’s decision to use the tension eliminators may have turned out to be a mistake [ordinary negligence], it certainly cannot be said to have been a decision in conscious indifference to the safety of its customers or in spite of a known extreme risk or harm.”⁵⁷

Being vindicated by an explicit government regulatory risk assessment is the exception rather than the norm. As in the case of Scenario 4, the jury was not swayed by a risk analysis that followed the guidelines used by the responsible Federal regulatory agency, but instead penalized the firm with punitive damages. It was the court appeal that led a judge to overturn an irrational jury act. This appeal was aided by the fact that in this instance it was the NHTSA studies themselves that in effect constituted the risk analysis. Had Ford instead relied on studies it did on its own using the NHTSA methodology, as in Scenario 4, matters may have been quite different.

⁵⁵ *Id.* at 589.

⁵⁶ *Id.*

⁵⁷ *Id.* at 590.

V. Product-Risk Analyses at General Motors

General Motors faced a fuel tank issue analogous to that in the Ford Pinto case in two cases. The first was a 1998 Georgia case, Moseley v. General Motors Corp.⁵⁸ This case involved the side saddle fuel tank design that had been the target of numerous lawsuits both on the state and the federal level.⁵⁹ In this particular case, Moseley was driving a GM pickup truck, and was hit broadside by a drunk driver of another pickup truck. Even though Moseley survived the crash and had suffered no internal injuries, the gas tank ruptured and the truck caught fire, and Shannon Moseley was burned alive after impact. The jury concluded that the product defect pertained not simply to the placement of the fuel tanks but also included the unfinished straps which bound the tank to the car and could potentially puncture the tank.

In terms of the overall risk posed by this particular truck design, GM trucks did not fare much worse than did Ford trucks; the GM trucks had 1.51 deaths per 10,000 crashes, as compared to 1.45 deaths per 10,000 crashes for Ford.⁶⁰ GM had done extensive testing of the fuel tank system that was the object of the litigation, and was undertaking further testing with regard to compliance with the National Highway Traffic Safety Administration (NHTSA) standards. The truck exceeded NHTSA standards by a substantial degree, so that from a regulatory standpoint the truck design was not inadequate. However, a key witness in the case presented the detailed GM analysis of fuel-fed fires and the costs of eliminating them, making “they knew” the “constant refrain among the jurors interviewed.”⁶¹ The result was that the jury awarded the plaintiffs \$4 million in compensatory damages, \$1 in pain and suffering, and \$101

⁵⁸ This case was overturned by Webster v. Boyett, 269 Ga. 191, 496 S.E. 2d 459 (S.C. Ga. 1998), which held that there should not have been a trifurcated proceeding in Mosley.

⁵⁹ Moseley v. General Motors, 213 Ga. App. 875, 447, S.E. 302 (Ga. Ct. App. 1994).

⁶⁰ See Terrence Moran, *GM Burns Itself*, THE AMERICAN LAWYER, April 1993, at 68.

⁶¹ *Id.*

million in punitive damages. To calculate the punitive damages amount, jurors also engaged in an arbitrary mathematical exercise, as it equaled \$20 for each of the 500,000 GM trucks on the road, where the jury added a bonus of a \$1 million “exclamation point.”⁶²

The tank placement did have a constructive purpose within the overall context of the vehicle design. GM wanted the truck to have a large fuel capacity so that drivers would not need to refuel the trucks frequently. Achieving this objective required the use of two tanks located outside of the truck’s frame rails, rather than using the single tank design in which that tank would be embraced inside the rails.

In a 1973 analysis, GM engineer Edward Ivey prepared a benefit-cost analysis of the fuel fed fire fatality issue.⁶³ It is instructive to review this analysis in detail. Consider first his calculation of the health costs associated with fuel fed fires. Based on Ivey’s “value analysis,” there would be a maximum of “500 fatalities per year in accidents with fuel fed fires where the bodies were burnt.”⁶⁴ He assigned each fatality a value of \$200,000, thus following the same approach taken in the Ford Pinto analysis. Multiplying 500 fatalities by the value of \$200,000 each, and dividing by the 41 million GM automobiles currently on the highways, yields his estimated fatality cost of \$2.40 per automobile. He then amended this calculation to focus on new models sold during the current model year, for which he estimated 55 fatalities for the 5 million new models, leading to an estimated accident cost of \$2.20 per new model auto.

His conclusion was that: “This analysis that for GM it would be worth approximately \$2.20 per new model auto to prevent a fuel fed fire in all accidents... This analysis must be tempered with two thoughts. First, it is really impossible to put a value on human life. This

⁶² *Id.*

⁶³ E.C. Ivey, *Value Analysis of Auto Fuel Fed Fire Related Fatalities*, GM Memorandum (June 29, 1973).

analysis tried to do so in an objective manner, even if a fatality is really beyond value, subjectively. Second, it is impossible to design an automobile where fuel fed fires can be prevented in all accidents unless the automobile has a non-flammable fuel.”⁶⁵

It is noteworthy that this analysis pertains to fuel fed fires more generally, and not to those in the specific target population of vehicles that was the object of the litigation. It is likely that the risks will be quite different for trucks with side saddle fuel tanks rather than the entire fleet of motor vehicles sold by GM. Consequently, the Ivey memo is not directly pertinent to the specific aspects of the Moseley case, except insofar as it indicated the character of corporate thinking. As in the case of the Ford Pinto analysis, the \$200,000 value per fatality uses a compensatory damages measure of the value of life, which was the approach used by NHTSA at that time. This amount is smaller than the willingness to pay measure of the value of life developed later in the economics literature.⁶⁶

The GM approach was consistent with the state of the art research on value of life estimates at that point in time. Just as companies should be judged with respect to the state of technological information regarding product characteristics, they should also not be subject to advances in the economic literature that occurred after the corporate decisions were made. In the 1970s the dominant approach to the value of life was the human capital method, which focused on the present value of the lost earnings of the deceased. This was, for example, the basis for the government’s approach taken with respect to traffic safety.⁶⁷ Indeed, the first estimates of the

⁶⁴ *Id.*

⁶⁵ *Id.* at 2.

⁶⁶ For instance, using data from the early 1970’s, the estimated willingness to pay measure of the value of life is \$3 million. See W. KIP VISCUSI, *EMPLOYMENT HAZARDS: AN INVESTIGATION OF MARKET PERFORMANCE*, (1979).

⁶⁷ See Schwartz, *supra* note 36, for discussion. Articulation of this approach in the literature appears in Dorothy Rice and Barbara Cooper, *The Economic Value of Life*, 57 AM. J. OF PUBLIC HEALTH 1954 (1967).

value of life from a prevention standpoint using the appropriate concept of the value of a statistical life did not occur until later in the 1970s.⁶⁸ Federal agencies did not use this concept until 1982 in which there was a debate between the Occupational Safety and Health Administration and the U.S. Office of Management and Budget over the merits of the proposed hazardous communication regulation, which was appealed to then Vice President Bush. Based on OSHA's analysis using human capital assessments, which it termed the "costs of death," the costs of the regulations exceeded the benefits. However, using the willingness to pay measure of the value of life led to the benefits being in excess of the costs.⁶⁹ For all contemporary benefit-cost analyses, one would expect the value of life measure to reflect the willingness to pay value, as in Scenario 4. This change, which should be favorable to companies, was found to be detrimental as it anchored damages awards amounts at a higher level.

The memo by GM engineer Edward Ivey played a pivotal role in the July 9, 1999 Los Angeles jury verdict against GM. This case involved a rear-end crash into a 1979 Chevrolet Malibu.⁷⁰ The record setting verdict consisted of \$107.8 million in compensatory damages for the six burn victims as well as \$4.8 billion in punitive damages. Many observers speculated that the 1997 and 1998 landmark cigarette settlements of the state attorneys general lawsuits provided an anchor that led the jury to think in terms of billions of dollars rather than millions.⁷¹

⁶⁸ See, e.g., Robert S. Smith, *The Feasibility of an 'Injury Tax' Approach to Occupational Safety*, 38 LAW AND CONTEMP. PROBS. 730 (1974); Richard Thaler and Shrewin Rosen, *The Value of Saving a Life: Evidence from the Labor Market*, HOUSEHOLD PRODUCTION AND CONSUMPTION 265-298 (N. Terleckyz ed., 1976); and Viscusi, *supra* note 62, which is the published version of his 1976 Ph.D. dissertation of the same title.

⁶⁹ See Viscusi, *supra* note 43, at 262 for a general discussion. The analysis that led to the adoption of the value of life principles in the federal government is in W. Kip Viscusi, *Analysis of OMB and OSHA Evaluations of the Hazardous Communication Proposal*, report prepared for Secretary of Labor Raymond Donovan, (March 15, 1982), cited in *id.*

⁷⁰ See Pollack, *supra* note 1.

⁷¹ See O'Neill, *supra* note 2, and Frank Swoboda and Caroline Maya, *A \$4.9 Billion Message; Jury Hits GM With Historic Crash Verdict*, WASHINGTON POST, July 10, 1999, at A1.

The basic facts of the case are similar to many other burn injury cases, such as those involving the Ford Pinto. On Christmas Eve in 1993, Patricia Anderson was driving home from church with her four children and a friend of the family. After slowing to stop for a red light, her Chevrolet Malibu was hit from the rear by a drunken driver believed to be going 50 miles per hour by the plaintiffs and 70 miles per hour by the defense lawyers. The ensuing fire in the rear ended Malibu caused severe burn injuries to the passengers, including some disfigurement.

Once again the Ivey memo played a prominent role in the courtroom battle even though GM maintained that the memo did not contribute to the vehicle's design.⁷² The cost of a safer design that could have prevented the injury by moving the gas tank 20 inches away from the rear bumper rather than 11 inches was \$8.59 per vehicle according to evidence presented by the plaintiffs.⁷³ The Ivey memo loomed particularly large as the plaintiff's attorney claimed that it showed that GM was "caught red handed."⁷⁴ According to Ivey's analysis, the cost to the company of fuel tank fires was \$2.40 per fire. Linking the memo with the \$8.59 figure, which is something Ivey did not do, implies that the costs of safety to the company outweigh the benefits.

The plaintiff's lawyers demonized the GM decision as being the result of an immoral calculation. As one of the lawyers observed after the trial, "The jurors wanted to send a message to General Motors that human life is more important than profits."⁷⁵ After the trial, jurors highlighted these tradeoff issues:

⁷² See Pollack, *supra* note 1, and Jeffrey Ball and Milo Geyelin, *GM Ordered to Pay \$4.9 Billion*, WALL ST. J., July 12, 1999, at A3.

⁷³ See Pollack, *supra* note 1 at A7.

⁷⁴ *Jury Awards \$4.9 Billion to Crash Victims, Finds GM Bargained Away Passenger Safety*, BNA PRODUCT SAFETY AND LIABILITY REPORTER, July 16, 1999, at 721.

⁷⁵ Pollack, *supra* note 1, July 10, 1999, at A7.

Jurors told reporters that they felt the company had valued life too lightly. “We’re just numbers, I feel, to them,” one juror, Carl Vangelisti, told Reuters. “Statistics. That’s something that is wrong.”⁷⁶

By its very nature risk analyses convert life and death issues into statistics. Moreover, benefit-cost tests intrinsically involve cost-health tradeoffs that some may find shocking. One juror reflected that zero risk mentality rather than a sensible tradeoff in her comment: “There was no evidence that the car they put out there was as safe as what they could have put out there.”⁷⁷ However, making such tradeoffs is inevitable. The task for the courts and society is to overcome the kinds of biases shown in the experimental results and vividly evidenced in the GM case.

Jurors’ reckless disregard for rationality is reflected in their justification for the \$4.8 billion punitive damages award. This figure was selected by the jurors who linked it to General Motors’ advertising expenses over that long period.⁷⁸ While advertising expenses are a dollar number, the choice is entirely arbitrary. This amount is also “two-thirds more than GM’s entire profit for 1998,”⁷⁹ which is a benchmark that shows the award magnitude but is also unrelated to safety decisions for 1979 Chevrolet Malibus. There is an endless set of numbers the jurors might have selected from the GM financial files, but there is no precedent in the law and economics literature for linking punitive damages to advertising costs. This kind of voodoo economics which the jury viewed as a sound basis for decisions contrasts with the much more reasoned balancing in the Ivey memo. As the Washington Post observed, such punitive damages awards

⁷⁶ *Id.*

⁷⁷ See Ball and Geyelin, *supra* note 71.

⁷⁸ *Jury Orders GM to Pay \$4.9 Billion*, CHI. TRIB., July 10, 1999, at 1.

⁷⁹ Swoboda and Maya, *supra* note 70.

“send a message to the public at large that the courts are more like a casino than a hall of justice.”⁸⁰

It should also be noted that undertaking at least part of a benefit-cost analysis and making some judgements regarding the desirability of safety measures is not unique to these specific cases. For example, with respect to door latch designs for Chevrolet vehicles including the Blazer, which experienced faulty door latches, GM estimated that there would be a \$216 million parts cost and a \$700 million labor cost associated with a recall, for a total amount of \$916 million.⁸¹ The timeline for the analysis that indicated GM knowledge of the safety latch problem and a cost assessment led to a \$150 million damage award, of which \$100 million was for punitive damages, in the case of a man paralyzed after his Blazer crashed.⁸² Indeed, even more fundamental efforts by the company to learn about the riskiness of the products, such as crash test results and video tapes of these crash tests, can and have been used against the company in litigation.⁸³

The basic message from these and other cases is that the courts take a very mixed view toward knowledge of safety issues. On the one hand, various forms of benefit-cost analysis, risky-utility tests, and balancing efforts incorporated in negligence standards are presumably to be encouraged. While this goal is the intent of our legal system and regulatory oversight efforts, in practice undertaking a thorough analysis of the risks, comparing the risk costs and benefits, and then nevertheless proceeding not to undertake the most vigilant safety measures feasible may

⁸⁰ Editorial, *Casino Justice*, WASHINGTON POST, July 13, 1999, at A18.

⁸¹ See J. Stratton Shartel, *Defense Timelines Plays Key Role in Trial Against GM*, 10 INSIDE LITIGATION 1 (1996).

⁸² See *Hardy v. General Motors Corp.*, No. CV-93-56, Cir. Ct., Lowndes Co. Ala., June 3, 1996, case filed 1993; verdict rendered June 30, 1996, which is discussed in detail in Shartell, *supra* note 66. (Bozenman, J.)

⁸³ See *Lynn A. Misener v. General Motors*, 165 F. R.D. 105 (D. Utah 1996). (In this case, research such as crash tests was used as evidence in showing a defect in a case involving a claim of seatbelt unlatching.)

be highly damaging to the company if jurors regards this knowledge and study as a basis for punitive damages.

This review of cases indicates that juries often regard corporate risk analyses as a red flag. Rather than indicating concern with appropriate safety levels, such risk assessments may be viewed as an indication of callous disregard for human health. The evidence in the case analyses is consequently quite consistent with the mock juror evidence. The controlled experimental case scenarios offered the additional advantage of isolating the incremental influence of particular aspects of the case, such as the type of risk analysis performed.

VI. Pharmaceuticals -- Risk Analysis with Government Supervision

The automobile industry case studies for the most part consisted of risk analyses undertaken independently by the automobile companies. Although presumably jurors might be able to find some deficiency in such independent studies, presumably if such studies have the approval of a government agency and adhere to strict guidelines then matters should be quite different. Corporations presumably should never be subject to punitive damages for products passing a governmental risk analysis. The pharmaceutical industry provides a valuable case study in this regard because these products are subject to extremely stringent regulation by the Food and Drug Administration (FDA). In particular, all new drugs must meet rigid standards for safety and efficacy and appropriate risk balancing criteria before they are approved by the agency.

Before a company can market a prescription drug, it must first obtain FDA approval. As part of this approval process, the applicant must provide substantial pre-marketing safety and safety information based on human clinical trials. The first stage of this process typically involves the submission of an investigational new drug application to conduct clinical trials for a

new drug. The legal requirements for this application require that the company provide information with respect to the chemistry, pharmacology, toxicology, and results of animal and laboratory testing.⁸⁴ These trials may then begin provided the FDA does not either request more information or modify the protocol submitted by the company for the proposed clinical trials. From a practical standpoint, the nature of the protocols are often dictated by the FDA. The clinical trial process consists of three phases. Phase I trials are designed to elicit information about “the metabolism and pharmacologic actions of the drugs in humans, [and] the side effects associated with increasing dosage.”⁸⁵ These tests are also intended to provide information pertaining to product safety. These Phase I trials typically involve tests on a small number of healthy adults -- approximately 20-80 people. If the Phase I trials are successful, the company then proceeds to undertake Phase II trials, which typically involve testing the drug on 200-300 people who have the specific disease or condition for which the product is targeted. The Phase II trials are “conducted to evaluate the effectiveness of the drug for a particular indication or indications in patients with the disease or condition under study.”⁸⁶ In addition, these trials are intended to assess whether there are adverse side effects associated with the drug. If the Phase II trials are also successful, the company proceeds to the Phase III clinical trials involving 1,000-3,000 patients who also have the specific condition or disease for which the drug is targeted.⁸⁷ As the Phase III trials reach conclusion, the company submits a new drug application (NDA) to the FDA to obtain permission to sell the pharmaceutical product. This application must include both safety and efficacy information, and it is a compendium of all the available data obtained

⁸⁴ 21 CFR §312 (1993).

⁸⁵ 21 CFR §312.21 (a) (1993).

⁸⁶ 21 CFR §312.21 (b) (1993).

⁸⁷ 21 CFR §312.21 (c) (1993).

thus far regarding the performance of the drugs with respect to these two objectives. In addition, the NDA must include information pertaining to the proposed labeling for the new drug.⁸⁸

Before approving the drug, the FDA must make the judgment that the drug is safe and that there is “substantial evidence” of the efficacy of the drug for its proposed uses.⁸⁹ Drugs are typically not risk free, and prescription drugs by their very nature are available by prescription because there are attendant risks. Before approving the drug, the FDA in effect makes a risk-benefit judgment that the drug is in society’s best health interest.⁹⁰ Indeed, this process is so stringent that some critics of the FDA have suggested that patients are being deprived of beneficial new drugs because of the onerous character of the FDA approval process.⁹¹

There have been some attempts to recognize that pharmaceuticals are quite different from other products. In their *Restatement (Second) of Torts*, the drafters indicated that strict liability was not meant to apply to “unavoidably unsafe products,” for which drugs and vaccines serve as prominent examples:

Unavoidably unsafe products. There are some products which, in the present state of human knowledge, are quite incapable of being made safe for their intended and ordinary use. These are especially common in the field of drugs. An outstanding example is the vaccine for the Pasteur treatment of rabies, which not uncommonly leads to very serious and damaging consequences when it is

⁸⁸ The requirements for a new drug application are specified in 21 CFR §314.50 (1993).

⁸⁹ See 21 USC §355 (d) (1988): ‘[S]ubstantial evidence’ means evidence consisting of adequate and well-controlled investigations, including clinical investigations, by experts qualified ... to evaluate the effectiveness of the drug involved, on the basis of which it could fairly and responsibly be concluded by such experts that the drug will have the effect it purports or is represented to have under the conditions of use prescribed, recommended, or suggested in the labeling or proposed labeling thereof.

⁹⁰ For a description of this process, see Richard A. Merrill, *Compensation for Prescription Drug Injuries*, 59 VIRGINIA LAW REVIEW 1 (1973); and Bruce N. Kuhlik and Richard F. Kingham, *The Adverse Effects of Standardless Punitive Damage Awards on Pharmaceutical Development and Availability*, 45 FOOD DRUG COSM. L. J. 693 (1990).

⁹¹ HENRY GRABOWSKI AND JOHN VERNON, *THE REGULATION OF PHARMACEUTICALS: BALANCING THE BENEFITS AND RISKS* (1983); William M. Wardell et. al., *The Rate of Development of New Drugs in the United States, 1963-1975*, 24 Clinical Pharmacology and Therapeutics 133 (1978); William M. Wardell, *Introduction of New Therapeutic Drugs in the United States and Great Britain: An International Comparison*, 14 Clinical Pharmacology and Therapeutics 773 (1973).

injected. Since the disease itself invariably leads to a dreadful death, both the marketing and the use of the vaccine are fully justified, notwithstanding the unavoidable high degree of risk which they involve. Such a product, properly prepared, and accompanied by proper directions and warnings, is not defective, nor is it *unreasonably* dangerous. The same is true of many other drugs, vaccines, and the like, many of which for this reason cannot reasonably be sold except to physicians or under the prescription of a physician.⁹²

Notwithstanding the urgings of the American Law Institute, courts have found the prescription drugs are not unavoidably unsafe. Rather, these different jurisdictions have generally applied Comment k on a case-by-case basis.⁹³ Moreover, the courts also did not recognize compliance with the requirements of the Federal Food, Drug, and Cosmetic Act as representing a complete defense to a product's liability action.⁹⁴ Recognition of compliance with FDA requirements as a regulatory compliance defense against punitive damages remains a minority position that has only been adopted by five states.⁹⁵ I believe these provisions should be adopted more generally and should be expanded to include all corporate risk analyses that are in compliance with procedures established for the assessment of Federal regulations and for which the benefits of additional safety measures are outweighed by the value of the costs. Thus, jurors would have to make the explicit determination that either the risk analysis was not in

⁹² RESTATEMENT (SECOND) OF TORTS, §402A Comment K (1964).

⁹³ See E.G., *Hill v. Searle Lab.*, 884 F.2d 1064, 1069 (8th Cir. 1989) (“The drafters of Comment k did not intend to grant all manufacturers of prescription drugs a blanket exception to strict liability.”); *Toner v. Lederle Lab.*, 732 P.2d 1097, 308 (Idaho 1987) (Stating that Comment K does not apply to all drugs, but rather applies “when the situation calls for it”); *Feldman v. Lederly Lab.*, 97 NJ 429, 441-442, 479 A.2d 374, 380 (1984) (“We do not agree that the protective shield of Comment K immunizes all prescription drugs. Moreover, we are of the opinion that generally the principle of strict liability is applicable to manufacturers of prescription drugs.”)

⁹⁴ Jeffrey N. Gibbs and Bruce F. Mackler, *Food and Drug Administration Regulations and Products Liability: Strong Sword, Weak Shield*, 22 TORT AND INS. L. J. 194 (1987) (Including that compliance with FDA regulation provides “only modest protection against the successful lawsuit”); Thomas Scarlett, *The Relationship Among Adverse Drug Reaction Reporting, Drug Labeling, Product Liability, and Federal Preemption*, 46 FOOD DRUG COSM. L. J. 31 (1991) (Compliance with government standards is merely a factor in liability determination).

⁹⁵ The five states proscribing punitive damages in situations in which the manufacturer has complied with the FDCA are: Arizona, Ariz. Rev. Stat. Ann. §12-701 (West 1992); New Jersey, NJ. Stat. Ann. §2A: 58C-5 (C) (West 1987); Ohio, Ohio Rev. Code Ann. §2307.80 (C) (Anderson 1991); Oregon, OR. Stat. §30.927 (1993); and Utah, Utah Code Ann. §78-18-2 (Mishie 1992).

compliance with the standards established by the U.S. government for regulatory evaluation or that the benefits of additional safety did in fact exceed the costs. For situations in which agencies have made an explicit judgment along these lines, as in the instance of the Ford shoulder harness assessment, there would be no need to reassess the merits of the safety improvement.

Vaccines represent a classic case of risk-benefit tradeoffs, as there is typically the risk of an adverse reaction to the vaccine, but the vaccine itself has direct health enhancing effects. The FDA litigation for the DPT vaccine in the 1980s reflects how jurors focus on the identified lives that are the object of the tort liability cases as opposed to the statistical lives that have been saved through a beneficial vaccine product.

The DPT vaccine provides protection against diphtheria, tetanus, and pertussis. Early estimates based on the medical literature in the early 1980s indicated that this vaccine was responsible for as many as 25 serious adverse reactions annually, including brain damage and some occasional deaths. It is now believed, however, that these early safety concerns were overstated.⁹⁶ There are also substantial health benefits. The Centers for Disease Control estimate that in the absence of the pertussis vaccine program there would be approximately 322,000 additional cases of whopping cough per year, with 450 annual deaths.⁹⁷

Notwithstanding the judgement by the FDA that the product passed a risk-benefit test, vaccines such as DPT created the risk for companies of multi-million dollar verdicts. The result was that

⁹⁶ See James D. Cherry, 'Pertussis Vaccine Encephalopathy': *It Is Time To Recognize It As the Myth That It Is*, 263 JAMA 1679 (1990); Vincent A. Fulginitti, *A Pertussis Vaccine Myth Dies*, 144 AM. J. DISEASES OF CHILDREN 860 (1990); Kim R. Wentz and Edgar K. Marcuse, *Diphtheria, Tetanus, Pertussis Vaccine and Serious Neurologic Illness: An Updated Review of the Epidemeologic Evidence*, 87 PEDIATRICS 287 (1991).

⁹⁷ See generally Alan R. Hinman and Jeffery P. Koplan, *Pertussis and Pertussis Vaccine: Re-Analysis of Benefits, Risks, and Costs*, 251 JAMA 3113 (1984).

manufacturers found it more attractive to abandon the vaccine market altogether rather than to incur this considerable liability hazard.⁹⁸

The practical implications of these litigation costs are that there has been an enormous exit of firms from the vaccine market, as the number of vaccine manufacturers has shrunk by over 50 percent since 1968.⁹⁹ Now there are only single product monopolies supplying many of the vaccines for major illnesses, including polio, measles, rabies, mumps, and rubella. This pattern of monopolization in the vaccine market is reflected with respect to childhood vaccines as well, as many pediatric vaccines are produced by a single supplier.¹⁰⁰ There has also been a resulting surge in vaccine prices that has resulted from the litigation, as the higher liability costs to manufacturers raised the marginal cost of supplying vaccines to consumers.¹⁰¹ Increasing costs of vaccines will make them more expensive for consumers to become vaccinated. Following the usual economic principles whereby higher prices reduce consumer demand, there has in fact been a decline in vaccination rates in the United States because of the increased costs of immunization.¹⁰²

The importance of an expanded regulatory compliance defense can be seen by examining the extent to which pharmaceuticals have been the target of litigation despite the strong

⁹⁸ See Peggy J. Naile, *Tort Liability for DPT Vaccine Injury and the Preemption Doctrine*, 22 IND. L. REV. 655 (1989) (Explaining that large damages awards “are ... likely to induce manufacturers to abandon the vaccine market altogether”).

⁹⁹ See generally AMA Board of Trustees, *Impact of Product Liability on the Development of New Medical Technologies*, 137 PROC. HOUSE OF DELEGATES 79 (1988).

¹⁰⁰ See generally *Vaccine Injury Compensation: Hearing on H.R. 1780, H.R. 477, and H.R. 5184 Before the Subcomm. on Health and the Environment of the Comm. on Energy and Commerce*, 99th Cong., 2d sess. 115 (1986), at 7 (Assessing the precipitous decline of the number of vaccine manufacturers in the United States).

¹⁰¹ See The AMA Board, *supra* note 84, at 7. See also Gina Kolata, *Litigation Causes Huge Price Increases in Childhood Vaccines*, 232 SCIENCE 1339 (1986), which documents the huge increase in DPT vaccine prices and the portion going towards products liability insurance.

¹⁰² Sara Rosenbaum, *Rationing Without Justice: Children in the American Health System*, 140 U. PA. L. REV. 1859 (1992).

implication of the FDA view that such products on balance are beneficial. Table 5 summarizes several examples of punitive damages cases. Oral contraceptives have long been a target of litigation, leading to substantial liability awards.¹⁰³ Indeed, the National Academy of Science has concluded that litigation for oral contraceptives was sufficiently onerous that it served as a principal deterrent for the development of new contraceptive devices in the United States.¹⁰⁴

Another prominent example of a line of litigation involving prescription drugs in Bendectin. Bendectin was an anti-nausea prescription drug that pregnant woman took from 1957-1983 in order to reduce the symptoms of morning sickness. Indeed, it is estimated that 30 million women took this drug.¹⁰⁵ The FDA approved Bendectin in 1956 as a drug for combating morning sickness, and this approval remains in effect.¹⁰⁶ Although the FDA concluded that use of Bendectin is safe for the unborn child,¹⁰⁷ the wave of Bendectin cases ultimately led to sufficient costs to the company that the product was driven from the market. The FDA never revoked its approval. Although no jury finding that Bendectin causes birth defects has ever been sustained, plaintiffs received a favorable verdict in approximately 36 percent of the cases that have gone to trial.¹⁰⁸ The risk of juror error coupled with the high litigation costs led the

¹⁰³ See *Woderson v. Ortho Pharmaceutical Corp.*, 681 P. 2d 1038 (Kan.), *cert. denied*, 469 U.S. 965 (1984).

¹⁰⁴ See THE NATIONAL RESEARCH COUNCIL AND INSTITUTE OF MEDICINE, *DEVELOPING NEW CONTRACEPTIVES* 141 (1991) (Unpredictable nature of litigation is a significant disincentive for fertility research and development).

¹⁰⁵ See *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823, 824 (D.C. Cir. 1988) (30 million pregnant women used Bendectin between 1957 and 1983), *cert. denied*, 493 U.S. 882 (1989).

¹⁰⁶ *Id.* at 824.

¹⁰⁷ This conclusion is consistent with that in the scientific community as well. See, E.G., *Turpin v. Merrell Dow Pharmaceuticals, Inc.*, 959 F.2d 1349, 1353-56 (6th Cir. 1992) (Describing 35 epidemiological studies which concluded that Bendectin did not cause birth defects); *Wilson v. Dow Pharmaceuticals, Inc.*, 893 F.2d 1149, 1154-55 (10th Cir. 1990) (Sustaining a verdict for the manufacturer-based, *inter alia* approximately 40 epidemiological studies showing the Bendectin did not cause birth defects).

¹⁰⁸ For a review of the Bendectin, see generally Joseph Sanders, *Jury Deliberation in a Complex Case: Havner v. Merrell Dow Pharmaceuticals*, 16 JUST. SYS. J. 45 (1993) (Assessing juries' performance in Bendectin case when plaintiff obtained a substantial verdict); Joseph Sanders, *The Bendectin Litigation: A Case Study in the Lifecycle of*

company to withdraw the product from the market notwithstanding the continuing assessment by the FDA and the scientific community the Bendectin provides benefits in excess of any risks.

The Bendectin cases are particularly noteworthy in that the punitive damages awards are often substantial -- as high as \$75 million in one instance. However, the Bendectin cases are also distinctive in that the punitive damages verdicts and, in some cases, the verdict itself, is overturned upon appeal. The cost to Merrell Dow Pharmaceuticals consisted in large part of the litigation costs to fend off these lawsuits with potentially catastrophic implications.

Not all the defendants were as fortunate. In the last case listed in Table 5 not only was there a compensatory damages amount of \$9 million, but also a punitive damages award of \$35 million against the pharmaceutical company. Moreover, there was an additional lawsuit involving the physician in this case who won \$500,000 in compensation and \$23.5 million in punitive damages.

There are three principal messages regarding juror mistreatment of risk issues conveyed by the cases listed in Table 5. First, compensatory damages involving pharmaceuticals are often considerable, with values in the millions. Companies must pay these damages notwithstanding the FDA drug approval process and the tests incorporated within it. Second, juries often award punitive damages that are even more daunting and are more inconsistent with the firm having met regulatory requirements. Finally, the inappropriateness of punitive damages is often recognized by the courts, as these awards are frequently overturned. However, this appeals process is not costless, and risk-averse companies may settle out of court rather than face the legal uncertainties involved with such high stakes lotteries.

Mass Torts, 43 HASTINGS L. J. 301 (1992) (Exploring the rapid decline in the rate of plaintiff success in Bendectin lawsuits).

In some of these cases listed in Table 5 the plaintiff suggested that the defendant falsified lab reports, did inadequate testing, or failed to inform the FDA of side effects of the drug. If the company did in fact withhold information from the government agency or misrepresented this information, then the FDA itself could impose regulatory sanctions if in fact it believed these offenses to be significant. From a practical standpoint, pharmaceutical firms receive information about potential adverse reactions on a continuing basis. A single patient with an unfavorable outcome could lead to such a report. However, in the absence of a large sample or a controlled experiment in which one can ascertain that the drug itself is responsible for the adverse outcome, rather than, for example, the patient's existing medical condition, then the company may in fact not have any information to report to the FDA. Once a pattern of adverse reactions becomes established, however, in hindsight it becomes clear that the earlier reports did in fact signal a potential problem, but until sufficient information becomes available it is often impossible to make reliable judgments regarding adverse effects. If in fact the company did deceive the FDA, presumably compensatory damages for the victim combined with regulatory sanctions imposed by the regulatory agency should be sufficient for any well-designed regulatory effort.

These examples are not isolated incidents but are reflective of a broader pattern of litigation against the pharmaceutical industry. By their very nature, drugs are intimately involved with our prospects for life and death. Because there are competing effects and these products may not be entirely risk free, our task is to select those drugs which on balance have net beneficial health effects, which is the intent of the FDA judgement. The difficulty is that jurors often second guess these judgments, making the pharmaceutical industry a leading target for tort liability.

Consider the performance of the pharmaceutical industry during the peak of the liability crisis from 1984-1986.¹⁰⁹ The pharmaceutical industry was subject to more liability suits in the Federal courts and a higher value of damages awards than the entire rest of the manufacturing sector in the United States. Moreover, the ratio of liability costs to sales for the pharmaceutical industry dwarfed that of the rest of the manufacturing industries in the U.S. economy. Rather than being immune from liability, pharmaceuticals became the principal target during the liability cost explosion. This pattern diminished thereafter as firms began to settle more cases out of court. Nevertheless, the threat of liability and the potential for tremendous cost impositions remains.

What the pharmaceutical experience demonstrates is that even when the risk-benefit analysis has been undertaken subject to rigid government guidelines and has been sanctioned by a careful review from the pertinent government authority, the company still remains at risk for being second guessed regarding the merits of its product. Moreover, since jurors confront identified lives harmed by a product and do not focus on the expected lives saved in the overall societal benefits of a product, there will be a tendency to impose excessive punishments on corporations in risky contexts.

The most constructive lesson of the pharmaceutical experience is that formalization of a regulatory compliance defense can potentially serve a constructive role. The rationale for expanding the regulatory compliance defense against punitive damages beyond the five states that have already adopted it is quite strong. Moreover, there is no reason why a similar kind of defense should not also be provided for other risk analyses that have been undertaken by corporations and which are consistent with Federal guidelines for evaluating regulations.

¹⁰⁹ The statistics cited in this paragraph are based on the evidence for the U.S. Federal Courts presented by W. Kip Viscusi et al., *A Statistical Profile of Pharmaceutical Industry Liability, 1976-1989*, 24 SETON HALL L. REV. 1418 (1994).

Although I will suggest other broader policy reforms in the concluding section, even a limited reform of this type would have a substantial beneficial effect in recognizing that sound corporate risk analyses should have an exculpatory function rather than serving as the trigger for imposing punitive damages.

VII. Conclusion

A major puzzle raised by the performance of the courts is that many of the most well-known products liability cases involving punitive damages are also those in which the corporation carried out a risk analysis, or in some cases, a sound benefit-cost analysis. Nevertheless, jurors chose to award punitive damages although the company's risk analysis led to the judgement that the safety improvement at issue in the litigation was not warranted. Furthermore, in most cases the product's overall safety record was comparable to similar products on the market. Such punishment of corporations by the legal system creates incentives that are the opposite of what we want to encourage: better corporate risk behavior. More rational thinking about risk and a conscientious effort to achieve risk-cost balancing in line with society's valuation of safety presumably should be a sign of corporate responsibility rather than a trigger for corporate punishment. As Judge Frank Easterbrook observed, corporations are well positioned to undertake such risk analyses and routinely do so in a manner that reflects a degree of technical knowledge and judgement that a jury is unlikely to share.

Why do jurors err by punishing corporations for risk-cost balancing? A variety of conjectures are possible. People may be averse to explicit balancing involving money and risks human lives, irrespective of the level of the tradeoff involved. Money and lives are in different units that one may view as incommensurable. Or jurors might not focus on the tradeoff available

at the time of the safety decision, which is between cost and small probabilities of an accident, not the certainty of an adverse outcome. In hindsight a small corporate expenditure would have prevented an identifiable death, whereas *ex ante* it is risks of death not identifiable lives in the balance. Such pair-wise comparisons involving identified victims and safety costs will be overwhelming, particularly for low probability – high loss events where the consequences are immense after the fact but have a low expected value once weighted by the small probability of occurrence. Once corporations have undertaken systematic thinking about risk levels, yet they nevertheless pursue product or environmental policies that do not provide for absolute levels of safety, the juror may regard the corporate decision as “cold-blooded.” This difficulty arises, in part, because of the well-documented role of hindsight bias with respect to retrospective risk judgements. What matters at the time of the corporate decision is the cost of the safety measure compared to the expected benefits. Benefits are expressed as the reduced probability of an accident multiplied by the value of the likely damage from an accident. But, as Judge Frank Easterbrook observed, hindsight bias is a “hydraulic force” compelling jurors not to compare the expected, probabilistic benefits and costs but to simply compare the loss to the victim before them against the costs to save that individual.

How does such a hindsight bias play out with respect to particular cases? For the Ford Pinto, the comparison is between an \$11 per car cost of moving the placement of the gas tank and the identified burn death from a Pinto. For the GM fuel tank placement, the comparison is between the \$2.20 cost averaged over the fleet of new cars sold as compared to an identified burn death. Once such comparisons are made, the corporation’s decision not to undertake the safety improvement appears to be ludicrous, reckless, and irresponsible. However, before the accidents occur, the appropriate comparison is between the expected value of the losses that will occur if the safety improvement is not undertaken and the total cost over the entire product line of

undertaking the safety measure, which will not be as stark a comparison and may have the opposite implications. These benefit-cost comparisons also avoid the exclusive focus on the identified life lost after the fact, which is a retrospective or hindsight mindset. Instead, it takes the jury back to the time of the corporate decision.

The original mock juror analysis done for this study made it possible to isolate which factors affected juror beliefs and how they were influential. The results were of interest both in terms of what affected juror beliefs and what did not. The most consistent result across the different scenarios was that undertaking any type of risk analysis was harmful to the corporation's prospects both with respect to the probability of punitive damages and, more important, with respect to the magnitude of the award. Using a willingness to pay value of life rather than the compensatory damages value has the perverse effect of anchoring juror award judgments at a higher level. Risk analyses and, in particular, analyses that value lives highly are harmful to the company's prospects, whereas failing to think systematically about risks and undervaluing life is a less costly corporate strategy. The resulting incentives are the opposite of what we should be creating.

The various scenarios that were addressed by the large sample of juror-eligible citizens were also of interest in terms of the factors that were not consequential in affecting their judgements with respect to the likelihood of awarding punitive damages or the amount of the punitive damages award. Ideally, the expense of providing for greater safety should be consequential, but there was no significant effect on jury attitudes. Similarly, the total number of deaths may be a concern as well, but it was not influential. This result is not bad in that the relative benefits and costs should be instrumental. Increasing the number of deaths and costs proportionally just changes the scale of the problem and does not affect whether safety measures are worthwhile. Finally, whether the corporation undertook an erroneous benefit-cost analysis or

did the analysis correctly did not have a significant effect in altering juror judgements. The fact that mock jurors did not respond in a sensible way to these various manipulations, which one might have expected to be influential, highlights the value of examining how jurors behave rather than simply hypothesizing about likely behavior.

It is noteworthy that in the instances described in the scenarios in which a benefit-cost analysis was supplied and the appropriate value of life was used that the benefits of undertaking the safety measure were exceeded by the costs. This result is not only of economic interest, but it has important implications for the extent of the appropriate liability of the firm as well. If the costs exceed the benefits, then the company is not even negligent in failing to adopt the safety measure, much less being guilty of reckless behavior that would warrant punitive damages. However, undertaking this kind of responsible risk analysis is an indicator that the company was knowledgeable of the risk and intentionally inflicted the risk on a probabilistic basis, thus triggering criteria for the award of punitive damages in the view of the mock jurors.

The solution for such transgressions of jurors against responsible corporate risk assessments is not a narrowly defined legal reform. It is not feasible to draft exemptions from punitive damages if corporations have undertaken risk analyses since the quality and pertinence of such risk analyses vary. The principal exception is if there is compliance with regulatory guidelines, as with FDA approvals. Corporate risk analyses in compliance with Federal regulatory guidelines should be given a statutory defense against punitive damages. Such a measure would begin to address to jurors' biases. Rewriting jury instructions for punitive damages would not seem to be a reasonable solution, since the difficulties arose from cognitive biases and systematic errors that people make in thinking about risk. The problem more generally is that jurors are not well suited to thinking about the subtle economic judgements that are involved in determining whether punitive damages should be awarded and how much the

award should be. Moreover, rewriting instructions for juries may not be effective if juries ignore such directives or interpret them in a manner that fits their desired objectives. The free spirit character of jurors is reflected in the result that three-fourths of all people agree with the statement “Whatever a judge said the law is, jurors should do what they believe is the right thing.”¹¹⁰

There have been a variety of legal reform efforts directed at restraining punitive damages, with those that have been adopted thus far focusing primarily on punitive damages caps. However, caps do not eliminate the fundamental irrationality that juries display with respect to their thinking about punitive damages awards. An alternative proposal is to take the responsibility for awarding punitive damages out of the hands of jurors and to give that responsibility to judges. That solution would remedy the inadequacy of the juror behavior, but would take as given the underlying rationale for some need for punitive damages in response to corporate safety and environmental risks. That approach also assumes that judges are fully rational in their handling of risk, which is not true as well.¹¹¹ Elsewhere I have proposed that punitive damages for corporate safety and environmental torts should be abolished. The underlying rationale is that compensatory damages coupled with the role of market forces and the vigorous regulatory regimes in these areas will provide adequate incentives. Moreover, there is no statistically significant evidence that abolishing punitive damages has had any effect on a wide variety of measures of safety, ranging from the rate of toxic chemical spills to product accident rates.

¹¹⁰ See the 1998 Juror Outlook Survey in Bob Van Voris, *Civil Cases: Juries Do Not Trust Civil Litigators*. *Period.* THE NATIONAL L. J., Nov. 2, 1998, at A24.

¹¹¹ See W. Kip Viscusi, *How Do Judges Think about Risk?*, 1 AM. L. AND ECON. REV. (forthcoming 1999).

The fundamental role of benefit-cost analysis and risk assessment within the context of making judgements of corporate culpability also is an additional rationale for transferring the responsibility of creating deterrence incentives from the courts to regulatory agencies. Analyses of the risk consequences of safety designs or corporate decisions often involve complex technical judgements and sophisticated economic analyses, which in many instances are beyond the competence of random jury members. Indeed, the U.S. Office of Management and Budget has issued detailed economic guidelines for how agencies should prepare such assessments.¹¹² Even within these guidelines, there are often complex economic judgments to be made that are highly technical in nature. Government agencies routinely make these judgements as part of every major new rulemaking. Indeed, they have been required by executive orders of the President to undertake such analyses for several decades. One should not be surprised that jurors without such training and background fail to make technical economic judgements in a sound manner. What is more disturbing, however, is that sound economic analyses are not simply treated in a random fashion by jurors but actually may damage the company's prospects in court.

¹¹² See, e.g., supra note 11.

APPENDIX

Sample Description

The sample of 489 adults was recruited by a survey research firm in Phoenix, Arizona. Subjects were paid an average of \$40 to participate in one-and-a-half hours of survey efforts. Subjects came to the central location where they participated in this survey. The scenario discussed in this paper was Question 1 on part of a longer written survey dealing with risk and legal issues. The average respondent took 15 minutes to complete the survey.

Table A summarizes the sample characteristics. Overall, 68 percent of the sample is female, where the mock jurors had an average age of 45. In terms of the racial background, 80 percent of the respondents were white, 5 percent were Hispanic, and the remainder were other minorities.

The educational level of the sample ranged from 4 percent of the sample that had not yet completed high school to 11 percent of the sample who had professional degrees. The largest educational group represented was that of people who had had some college education, where this group comprised 40 percent of the sample.

The smoking status variable is in line with national cigarette smoking prevalence estimates, as 23 percent of the sample were current smokers and an equal percentage were former smokers.

The other indicator of risk preferences was seatbelt use, and 80 percent of the sample indicated that they always used seatbelts while driving or riding in a car.

The sample was not nationally or regionally representative. However, it did include a diverse population mix. Moreover, using multiple regression analysis one can estimate the incremental effect of the scenario manipulations, controlling for the influence of personal

characteristics. These effects are almost identical to those reflected in the summary of the overall sample mean effects in Table 3.

Although the text described results for the mean response levels, regression analyses yielded similar results. These regressions took into account respondent gender, age, race, education, smoking status, and seatbelt use.¹¹³ Controlling for personal characteristics, the probability that a juror would award punitive damages increases by 5 percent, which is the same as when personal characteristics are not taken into account. There is a modest effect on the level of punitive damages award, however. Without controlling for personal characteristics, undertaking a benefit-cost analysis increases the punitive damages award amount by 47 percent, whereas this value is only 39 percent when personal characteristics are taken into account.

¹¹³ These results are reported in greater detail in Viscusi, *supra* note 9.

Table 1
Juror Risk Survey Variations

Scenario	Description
	<i>No Benefit-Cost Analysis</i>
1	No analysis performed, \$4 million cost per life saved
2	No analysis performed, \$1 million cost per life saved
	<i>Benefit-Cost Analysis Performed</i>
3	Analysis using \$800,000 compensatory damages amount to value life, \$4 million cost per life saved
4	Analysis using NHTSA value of life figure of \$3 million to value life, \$4 million cost per life saved
5	Erroneous analysis using NHTSA value of life figure of \$3 million to value life, estimated cost per life saved of \$4 million but actual amount was \$2 million

Survey Waves	Lives Lost
1	Total lives lost was 10
2	Total lives lost was 4

Table 2
Summary of Experimental Structure, Hypotheses, and Results

Experimental Test	Hypothesis	Finding
Scenario 1 vs. Scenario 2	Jurors will impose greater sanctions (i.e., increased frequency and magnitude of punitive damages) if safety improvements are cheaper, or a lower cost per life saved.	No significant effect ($t_{\text{PROB}}=1.58$; $t_{\text{AMT}}=0.100$)
Scenario 1 vs. Scenarios 3, 4, 5	Jurors will impose greater sanctions if firms undertake a risk analysis related to subsequent accidents.	Significant effect with large influence on award level ($t_{\text{PROB}}=2.78^{***}$; $t_{\text{AMT}}=1.85^*$)
Scenarios 1-2 vs. Scenarios 3-5	Jurors will impose greater sanctions if firms undertake a risk analysis related to subsequent accidents.	Significant effect with influence on both probability and award level ($t_{\text{PROB}}=2.11^{**}$; $t_{\text{AMT}}=2.45^{**}$)
Scenario 3 vs. Scenario 4	Jurors will not be as likely to punish corporate risk analysis using a higher value of life and in line with government regulatory practices. Alternative hypothesis: Higher value of life measures by the company serve as an anchor that boosts damages awards	Significant effect in the “wrong” direction as awards increase with value of life used ($t_{\text{PROB}}=0.08$; $t_{\text{AMT}}=1.05$)
Scenario 4 vs. Scenario 5	Juries will impose greater sanctions if corporations make errors in their risk analysis.	No significant effect ($t_{\text{PROB}}=0.50$; $t_{\text{AMT}}=0.60$)
Scenarios 1-5 (10 deaths) vs. Scenarios 1-5 (4 deaths)	Juries will impose greater sanctions if the number of lives lost is greater.	No significant effect ($t_{\text{PROB}}=0.80$; $t_{\text{AMT}}=0.43$)

Notes: t_{PROB} is the t-statistic for the difference in punitive award probability means.

t_{AMT} is the t-statistic for the difference in award level geometric means.

* - statistically significant at 10% level, two-tailed test

** - statistically significant at 5% level, two-tailed test

*** - statistically significant at 1% level, two-tailed test

Table 3
Jurors' Reactions to Automotive Negligence Case

Panel A: Scenarios with no Benefit-Cost Analysis by Company

Version of survey	Sample Size	Percent of sample favoring punitive damages	Geometric mean of awards (\$ millions)	Median Award
\$4million/life (Scenario 1)	97	.845	2.95	1.0
\$1million/life (Scenario 2)	97	.918	2.86	1.0
Combined no analysis by company	194	.881	2.91	1.0

Panel B: Scenarios with Benefit-Cost Analysis by Company

Version of survey	Sample Size	Percent of sample favoring punitive damages	Geometric mean of awards (\$ millions)	Median Award
Court costs as value (Scenario 3)	97	.928	4.02	3.5
NHTSA value of life (Scenario 4)	102	.931	5.31	10.0
NHTSA value of life, error (Scenario 5)	96	.948	4.50	10.0
Combined analysis by company	295	.936	4.59	10.0

Panel C: Full Sample Results

Version of survey	Sample Size	Percent of sample favoring punitive damages	Geometric mean of awards (\$ millions)	Median Award
Total for all five scenarios	489	.914	3.85	5.0

t-test (punitive damages frequency): $t=2.0958^{**}$

t-test (ln punitive damages amount): $t=2.4431^{**}$

Table 4
Benefit-Cost Calculations for the Ford Pinto

Panel A: Benefit calculations for increased safety in Pinto gas tank design

Outcome of faulty design	Ford's unit value	Ford's total value
180 burn deaths	\$200,000	\$36 million
180 serious burn injuries	\$67,000	\$12.1 million
2,100 burned vehicles	\$700	\$1.5 million
Total		\$49.6 million

Panel B: Cost calculations for increased safety in Pinto gas tank design

Number of units	Unit cost	Total cost^a
11 million cars	\$11	\$121 million
1.5 million light trucks	\$11	\$16.5 million
Total		\$137.5 million

^aExcluded is the minor cost component of the lost consumer's surplus of customers who do not buy Pintos because of the \$11 price increase.

Table 5
Examples of Pharmaceutical Punitive Damages Cases

Retail Name	Chemical Name	Case Name	Cite	Court, Date	Compensatory Damages	Punitive Damages	Ratio of Punitive to Compensatory	Comments
	Aminophylline	Batteast v. Wyeth Labs	137 Ill. 2d 175	Ill. 1990	\$9,000,000	\$13,000,000	1.44	
Oraflex	Benzoxaprofen	Borom v. Eli Lilly & Co.	No. 83-0038-COL.	U.S. Dist. Court, M.D. GA, 1983	--	\$6,000,000	Infinite	Alabama law prohibits compensatory damages in wrongful death
Bendectin	Doxylamine Succinate	Blum v. Merrell Dow Pharmaceuticals	705 A. 2d 1314	Pa. Super. Ct. 1997	\$4,200,000	\$15,000,000	3.57	In first trial, jury awarded 1mm compensatory and \$1 million punitive damages, but verdict set aside due to insufficient number of jurors. On retrial, jury awarded \$4.2 million/\$15 million, but appellate court reversed the verdict.
Bendectin	Doxylamine Succinate	Ealy v. Richardson-Merrell, Inc.	No. 83-3504	USDC, D.C., 1987	\$20,000,000	\$75,000,000	3.75	Trial judge denied the punitive portion of the jury award. Appeals Court reversed the remaining compensatory damages verdict.
Bendectin	Doxylamine Succinate	Brock v. Merrell Dow Pharmaceuticals, Inc.	874 F.2d 307	5th Circ., 1989	\$240,000	\$310,000	1.29	Reversed on appeal.
Bendectin	Doxylamine Succinate	Merrell Dow Pharmaceuticals v. Havner	953 S.W.2d 706	Tex., 1997	\$3,750,000	\$30,000,000	8.00	Appellate court reverses decision, but then on rehearing, reinstated compensatory damages. State supreme court reversed appellate court.
Duphaston	Dydrogesterone	Glass v. Philips Roxane	No. C0270-762	Superior Ct., Los Angeles County, CA, 1983	\$500,000	\$750,000	1.50	Defendant falsified lab reports, did inadequate testing, and failed to warn
Loxitane	Loxapine Succinate	American Cyanamid v. Frankson	732 S.W.2d 648	Tex. App. 1987	\$2,195,000	\$500,000	0.23	
Depo-Medrol	Methylprednisolone Acetate	Proctor v. Davis	291 Ill. App. 3d 265	Ill. App. Ct., 1997	\$3,200,000	\$124,500,000	38.91	Jury deliberated 3 hours before finding for plaintiff. Trial court reduced punitive damages to \$35 million, appellate court reduced to \$6.2 million, then dismissed the case. State supreme court reinstated, appellate court further reduced punitive damages to \$6 million.
Norinyl/Ortho-Novum	Norethindrone with Mestranol	Wooderson v. Ortho Pharmaceuticals Corp.	235 Kan. 387	Kan., 1984	\$2,000,000	\$2,750,000	1.38	Failure to warn medical profession of risk
Dilantin	Phenytoin Sodium	Keenan v. Parke-Davis Co.	No. 84-1667	Superior Ct, Providence County, RI, 1990	\$14,000,000	\$9,760,000	0.70	Twins born with birth defects, compensatory damages of \$2 million per child plus \$10 million interest, punitive damages of \$4.88 million per child
Coumadin	Sodium Warfarin	Chelos v. Endo Labs	No. 77 L 21775	Circuit Court, Cook County, Ill. 1986	\$13,000,000	\$26,000,000	2.00	Defendant knew about but did not inform FDA of side effects
Streptase/Varidase	Streptokinase-Streptodornase	Mulligan v Lederle Labs, a division of American Cyanamid Company	786 F.2d 859	8th Circ., 1986	\$50,000	\$100,000	2.00	Defendant did not report known side effects
	Theophylline	Bocci v Key Pharmaceuticals, Inc.	No. A9210-07050	Circuit Ct., Multnomah County, Or., 1994	\$9,000,000	\$35,000,000	3.89	Physician involved sued for damage to reputation and won \$500,000 in compensation and \$23.5 million in punitive damages

Table A
Means of Variables in Juror Study Sample

Variable	Mean	Standard deviation
Female	0.682	0.466
Age	44.7	15.3
Race:		
White	0.884	0.320
Black	0.022	0.149
Native American	0.006	0.078
Hispanic	0.047	0.211
Asian	0.004	0.064
Other race	0.016	0.126
Education:		
Some high school	0.037	0.189
High school graduate	0.186	0.389
Some college	0.401	0.491
College graduate	0.269	0.444
Professional degree	0.107	0.310
Smoking status:		
Current smoker	0.225	0.418
Former smoker	0.233	0.423
Nonsmoker	0.541	0.499
Seatbelt use:		
Always	0.804	0.398
Sometimes	0.157	0.364
Never	0.039	0.194

Sample size: 489