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**LIABILITY STANDARDS FOR MULTIPLE
VICTIM TORTS: A CALL FOR A NEW
PARADIGM**

By

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Liability Standards for Multiple-Victim Torts: A Call for a New Paradigm

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Abstract

Under the conventional approach in torts, liability for an accident is decided by comparing the injurer's costs of precautions with those of the victim, and, under the negligence rule, also with the expected magnitude of harm. In multiple-victim cases, the current paradigm holds that courts should determine liability by comparing the injurer's costs of precautions with the victims' *aggregate* costs and with their *aggregate* harm. This aggregative risk-utility test supposedly results in the imposition of liability on the least-cost avoiders of the accident, and, therefore, is assumed efficient.

However, this paradigm neglects the importance of the normal differences between tort victims. When victims are heterogeneous with regard to their expected harm or costs of precaution, basing the liability-decision on the aggregate amounts may be incorrect, causing in some cases over-deterrence, while in other, under-deterrence and dilution of liability. A new paradigm is therefore needed.

This Article demonstrates how aggregate liability may violate aggregate efficiency, and concludes that decisions based upon aggregate amounts are inappropriate when the victims are heterogeneous—as they typically are in real life. The Article then turns to an exploration of an alternative to the aggregative risk-utility test, and argues for a legal rule that would combine restitution for precaution costs, plus an added small “bonus,” with the sampling of victims' claims.

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INTRODUCTION

Multiple-victim accidents have become a common phenomenon in our time. The ongoing debate over the best way to regulate these accidents raises the question of how to set liability standards for multiple-victim accidents so as to achieve the socially desirable outcome.

To determine liability in multiple-victim accidents, the literature advocates using an aggregative risk-utility test. This test transforms the multiple-victim accident into a “single aggregate victim” situation, which lends itself to an analysis using the familiar Learned Hand formula. This paradigm holds that if the injurer’s untaken precautions cost less than the aggregate expected harm, then the injurer acted inefficiently and, therefore, unreasonably. Similarly, the victims are deemed contributorily negligent if their aggregate costs of taking precautions amount to less than the aggregate risk and to less than the injurer’s costs of care.

The use of this aggregative risk-utility test to determine liability in torts should be reassessed. Undoubtedly, a cost-benefit analysis of a specific activity must take into account every social cost and every social benefit of that activity. However, when victims are heterogeneous—as is usually the case—aggregating costs and benefits among them may result in a wrong determination of liability, thereby yielding inefficient outcomes. More specifically, when victims differ with regard to their expected harm levels, costs of precaution, or utilities from a specific activity, an aggregative cost-

benefit analysis may dictate that the injurer should be held liable when the victims are the least-cost avoiders; or, that the injurer should not be held liable when she could, in fact, have averted the harm more efficiently. Accordingly, this drawback can result in either over-deterrence or under-deterrence. However, since the two outcomes occur in substantially different situations, they do not cancel one another, but rather add up to an even greater social loss.

Over-deterrence may result from the aggregative test where the group of victims consists of (at least) two types of victims: one, with higher-than-average harm levels and lower-than-average precaution costs (henceforth “Subgroup A”), while the other, with lower-than-average harm levels and higher-than-average precaution costs (henceforth “Subgroup B”). In such case, a risk-utility test that is based on aggregate amounts may indicate that the injurer should have taken precautions, whereas the socially desirable outcome is that Subgroup A invests in precautions and Subgroup B bears the harm (or, under the strict liability rule, suffers the harm for which it is compensated by the injurer). Consequently, if courts use cumulative amounts as the basis for the determination of liability, this may drive the injurer to invest in precautions that are too costly.

Under-deterrence, on the other hand, may take one of two forms. First, applying the aggregative test may interfere with incentives with regard to levels of activity that the rule of strict liability provides. When the injurer’s additional activity poses a risk to additional victims whose precaution costs are low, aggregation may yield that the victims are contributorily negligent; hence, the injurer would be exempted from liability, and thus be driven to indulge in too high a level of activity. Second, combined with tort law’s reluctance to examine an injurer’s decision as to what activity to pursue, the aggregative test may allow an injurer to “dilute” her liability by deliberately choosing a riskier enterprise, which inflicts greater overall harm on a larger group of less vulnerable victims.

In real life, victims are for the most part heterogeneous. The level of harm to which they are exposed usually depends on numerous factors that are typically different for each victim, such as the value of the property that is at risk, the victim’s earning capacity, age, health, etc. In addition, the *ex ante* probability that the harm materializes may also vary between the victims, depending, for example, on their location. Furthermore, neither the costs of precautions nor their efficacy is typically the same for all victims: even the same precautionary measure may place different subjective burdens on different victims. It follows that, with respect to tort victims, heterogeneity is a much more realistic assumption than homogeneity.

However, neither courts nor scholars seem to devote enough attention to the question of victims’ heterogeneity, nor are they sufficiently aware of the inefficiency that is built into the cumulative approach. Thus, in determining liability courts may—and in fact do—determine liability incorrectly. Reference to victims’ heterogeneity is limited to class certification in class actions; but even then courts overlook the above

mentioned problems, and mainly take note of other types of heterogeneity—such as the difference in jurisdictions—which are irrelevant to the present discussion.

This flaw is also present in the Restatements of Torts. The Restatements emphasize that, when executing cost-benefit analyses, courts should consider (only) the overall costs and benefits. By failing to draw the courts' attention to victims' heterogeneity, the Restatements leave ample room for errors.

The literature has discussed victims' heterogeneity primarily in contexts involving *potential* heterogeneous victims, where only one victim—randomly drawn from the set of potential victims—is actually harmed. However, the problems that arise in such situations are different from the problems discussed in this Article, in that they relate mainly to differences between the actual victim and “the average potential victim.” These problems—revolving around the question of accuracy in damages and in the standard of care—do not exist in the eventualities that are the subject of this discussion, namely, cases where the entire group of heterogeneous victims suffers harm. Other than that, the overwhelming majority of the existing literature has assumed homogeneity of victims, either implicitly or explicitly, albeit without justifying this assumption other than by a quest for “simplicity.” One of the purposes of this Article, therefore, is to caution law and economics scholars against assuming homogeneity of victims, since such an assumption might do more than just simplify their model: it may change the outcome dramatically. Section Two will demonstrate how the problems discussed in this Article find their way into judicial decisions, but remain unnoticed by scholars.

Section Three undertakes the complex task of finding a simple, practical, and at the same time sufficiently general alternative: a legal rule that would provide the parties to a multiple-victim tort situation with efficient incentives. The straightforward solution, whereby each individual victim's case is decided on its merits, seems unfeasible, due to high administrative costs, to the lack of clear-cut criteria for dividing the parties into homogeneous subgroups, and to incorrect decisions that may result from this option. Another solution—at first glance obvious—that will be discussed in Section Three involves bifurcation. However, as will be shown, this solution does not seem to solve the under-deterrence problem, and is therefore imperfect. Section Three will explore three other possible solutions. The first is to aggregate, for each victim, the minimum of either the harm or the costs of precautions. It transpires, however, that this solution is fraught with both pragmatic and conceptual problems. The second solution uses sampling of the victims group to decide on the injurer's liability. As will be shown, this solution saves many of the administrative costs, but in some cases, induces an inefficient determination of liability.

The solution I will suggest combines two rules: in the pre-accident period it would allow restitution for efficient investment in precautions, with an added small “bonus.” In the post-accident period, sampling would be

used. This combination may solve the inefficiency inherent in the aggregative test, thus providing the parties with the right incentives to invest in only cost-justified precautions; at the same time, it retains the cost-saving properties of sampling, in cases where harm does eventually materialize.

Section Four will succinctly suggest two possible avenues for future research. The first of these is the issue of joint torts (with heterogeneous injurers), and the second—punitive damages. The insights of this analysis may, as will be shown, have a bearing on both of these issues, complicating to some extent the conventional models. Other issues, such as behavioral aspects and implications on other areas of law, will be briefly mentioned in the Conclusion.

I. THE AGGREGATIVE RISK-UTILITY TEST AND HETEROGENEOUS VICTIMS

Imagine that you take the course “Economic Analysis of Tort Law,” and in the exam the following question appears:

Mr. Smith inflicted a risk of harm upon both Ms. Roe and Ms. Doe, at the expected overall amount of \$110. Had Mr. Smith taken the only precautions available to him, at the cost of \$70, the risk would have been eliminated. Had Ms. Roe and Ms. Doe taken their own precautions, their marginal costs would have summed up to \$120.

Assume that everyone had a perfect knowledge of this data. From an economic efficiency point of view, should Mr. Smith be deemed liable to pay damages if harm materializes?

- a. Yes, because Mr. Smith was the least-cost avoider.
- b. No, because the victims were the least-cost avoiders.
- c. The answer depends on whether the legal regime is that of negligence or of strict liability, both with the defense of contributory negligence.
- d. The answer can be either ‘a’ or ‘b.’

How would you answer that question? The intuitive answer may be ‘a,’ but it is wrong. The correct answer, in this case, is ‘d.’

A. The Problem in General

So why is ‘d,’ and not ‘a,’ the right answer? To understand this, we must first recall some of the basic concepts of the economic approach to tort law. The objective of the normative economic approach to law is to maximize social welfare¹ by using legal rules as incentives. In the context of tort law, this

¹ Ronald H. Coase, *The Problem of Social Cost*, 3 J. L. & ECON. 1, 44 (1960); RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 24-25 (7th ed. 2007); STEVEN SHAVELL, *ECONOMIC ANALYSIS OF LAW* 62 (2004).

goal translates into designing liability rules that would minimize the social costs of accidents.² Those costs are, primarily, the expected harm to the victim on the one hand, and the costs of the precautions taken by both parties on the other. Different types of costs, such as administrative costs and costs related to spreading the harm, are considered secondary and tertiary.³

It has long been established that, given some plausible simplifying assumptions,⁴ negligence-based rules tend to impose liability on the efficient bearer of harm and thus provide both the injurer and the victim with the correct incentives to exercise the socially optimal level of care.⁵ The negligence-based rules comprise a risk-utility test that evaluates the reasonableness of a specific behavior based on its net social utility or cost: the rule considers a behavior unreasonable if the marginal risk it creates outweighs its marginal benefits (usually cutbacks in precaution costs). More specifically, an injurer's negligence is determined by comparing the injurer's marginal costs of care with the marginal expected harm; contributory negligence is economically determined, in alternative care situations, by comparing the victim's costs of care with both the injurer's costs and the expected harm.⁶

² Richard A. Posner, *A Theory of Negligence*, 1 J. LEGAL STUD. 29, 33 (1972); Steven Shavell, *Strict Liability Versus Negligence*, 9 J. LEGAL STUD. 1, 1 (1980).

³ Id. See also GUIDO CALABRESI, *THE COST OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS* (1970); John P. Brown, *Toward an Economic Theory of Liability*, 2 J. LEGAL STUD. 323, 326 (1973); ROBERT D. COOTER & THOMAS S. ULEN, *LAW AND ECONOMICS* 335-338 (5th ed. 2008); Israel Gilead, *Liability and Insurance in Cases of Damage Caused by Terrorist Attacks: Economic Analysis*, in BERNARD A. KOCH (ED.), *TERRORISM, TORT LAW AND INSURANCE: A COMPARATIVE STUDY* 238, 239 (2004).

⁴ The common assumptions are that parties are rational, have full information, and are risk-neutral, that transaction costs are large enough, that courts do not make systematic mistakes, and that damage awards equal the amount of harm. It is also generally assumed that each party can observe the actions of the other parties, and that courts fix the socially efficient level of care as the standard. Prof. Levinsohn-Zamir emphasized, in a recent paper, the implied assumption that outcomes of events are fully measured by the fiscal "bottom-line." See Daphna Levinsohn-Zamir, *Beyond the Bottom Line: The Complexity of Outcome Assessment* (2009), available at <http://ssrn.com/abstract=1479051> (conducting a psychological experiment to show that people evaluate the outcome of an event based on factors such as how it "was brought about, the voluntariness or non-voluntariness of the parties' behavior, the intentionality or non-intentionality of their acts, and the identity of the parties.")

⁵ See, e.g., STEVEN SHAVELL, *ECONOMIC ANALYSIS OF ACCIDENT LAW* 9-21 (1987); WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* 64-65 (1987), Brown, *supra* note 3, at 323. The term "negligence-based rules" refers to both negligence and strict liability with a defense of contributory negligence. However, in alternative care situations, negligence also must be accompanied by a defense of contributory negligence.

⁶ This is the well-known "Learned Hand formula," formulated in *United States v. Carroll Towing Co.*, 159 F.2d 169 (2d Cir. 1947), and later generally adopted. See, e.g., W. PAGE KEETON ET AL., *PROSSER AND KEETON ON THE LAW OF TORTS* § 31 at 171 (5th ed. 1984). See also the recent decision in *Labruyere v. TBF, Inc.*, 2009 U.S. Dist. LEXIS 115787 (S.D.Ill., 12-11-2009) at 9 ("The Seventh Circuit has consistently recognized and applied Learned Hand's negligence formula.") For the correct economic interpretation of this formula, namely the marginal sense, see POSNER, *supra* note 1, at 167-169 and LANDES & POSNER, *supra* note 5, at 102 ("Courts apply the formula in marginal rather than total terms.") But see Richard W. Wright, *Hand, Posner, and the Myth of the 'Hand Formula'*, 4 THEORETICAL INQ. L. 145 (2003) (Courts use the Hand

The purpose of the risk-utility test is to identify which of the parties, if any, behaved unreasonably, i.e., inefficiently. This criterion operates quite well in torts that involve a single injurer and a single victim. However, with the development of technology, more and more tort situations involve more and more victims. To deal with those situations, the current paradigm holds that the test should compare overall costs with overall benefits. When faced with an accident involving one injurer and multiple victims, courts should compare the injurer's costs of untaken precautions (i.e., her "marginal cost of care") with the *aggregate* amount of the victims' marginal costs of care, and, in the case of negligence, also with the aggregate amount of the victims' marginal expected harms.⁷

This cumulative approach, whereby courts aggregate victims' costs and benefits, may seem reasonable and even directly inferred by the goal of maximizing aggregate social utility. Cumulative costs, rather than individual costs, may seem a necessary criterion for determining liability since we are much less concerned with the repercussions of the injurer's action on individual victims than with its repercussions on society as a whole.

Nevertheless, the aggregation paradigm should be reassessed. Aggregations may result in unanticipated, inefficient results when the victims group is heterogeneous, namely, when the victims' marginal costs of care, or their marginal expected harms, are non-identical.⁸ When the victims are heterogeneous, each victim may require different types of incentives, whereas aggregations refer to the whole group of victims as one.

Ensuring that the risk is borne by its most efficient bearer(s) (the least-cost avoider[s]) best minimizes the costs of accidents. However, in multiple-victim cases the identity of those parties depends not only on aggregate amounts, but also on the cross-distribution of precaution costs and

formula much less often than scholars assume.) *See also* Ehud Guttel, *The Hidden Risk of Opportunistic Precautions*, 93 VA. L. REV., 1389 (The application of the said formula only to untaken precautions may lead to strategic investments in inefficient precautions.) For the said economic interpretation of contributory negligence *see, e.g.*, SHAVELL, *supra* note 5, at 18 ("if there were a clear case in which only one party's care is ex ante necessary, then only the least-cost avoider should be found negligent.") An application of this interpretation for contributory negligence can be found in *McCarty v. Pheasant Run, Inc.*, 826 F.2d 1554 (7th Cir. 1987), where the plaintiff, a hotel guest, was attacked in her hotel room. The court dismissed the claim based on the contributory negligence doctrine, because the plaintiff could have prevented the attack more cheaply than the hotel.

⁷ LANDES & POSNER, *supra* note 5; RESTATEMENT (SECOND) OF TORTS §293(d) (1965); RESTATEMENT (THIRD) OF TORTS §3 cmt. e (Proposed Final Draft No. 1, 2005); RESTATEMENT (THIRD) OF TORTS: PRODUCT LIABILITY §2 (1998); Wright, *supra* note 6; Ronen Perry, *Re-Torts*, 59 ALA. L. REV. 987 (2008) (a critique of the common aggregate-risk paradigm on the basis of distributive justice); William H. Rodgers, *Negligence Reconsidered: The Role of Rationality in Tort Theory*, 54 S. CAL. L. REV. 1, 10 (1981) ("The (correct) Hand calculus in a negligence action would ask whether $B < LP + L1P1 + L2P2 + \dots + LnPn$." Prof. Rodgers' aggregative interpretation of the Hand formula was specifically adopted, for example, by the Supreme Court of Louisiana in the case of *Washington v. Louisiana Power & Light Co.*, 555 So. 2d 1350, 1354 (La. 1990)).

⁸ Homogeneity of the victims group implies also that the precaution technology for each victim has the exact same efficiency level, and—in product liability cases—that the utilities that each victim gains from the product are also identical. When this is not the case, the victims group can be called heterogeneous.

levels of harm. The aggregation of costs creates a pool of victims that veils the required distribution data, thereby reflecting a distorted economic picture. As a result, courts decide on liability based upon the aggregate, or the average, victim, whereas the actual victims may differ from this average a great deal. Liability rules that provide good incentives to the parties in a “one injurer, one victim” context, indeed provide the correct incentives to the “aggregate victim,” or to the average one, but the actual victims may require the opposite incentive.

As stated in the introduction, real victims of tort situations are mostly heterogeneous. A victim’s level of harm, the probability that the harm would materialize, the costs of precautions and their efficacy—all these depend on factors that typically differ, at times substantially, from one victim to another. Such factors may be the value of the property that is under risk, the victim’s earning capacity, her age, her health condition, the victim’s location (in environmental torts), the victim’s education and skills, etc. Indeed, the realization that victims are heterogeneous lies at the heart of the tort doctrine, manifested, for example, in the rule that requires tortfeasors to take their victims as they find them. Because people differ from one another, it is more likely than not, for most tort situations, that the group of victims will be heterogeneous. The subsections that follow demonstrate how, when victims are heterogeneous, the aggregative test may lead to over-deterrence in some cases and to under-deterrence in others. Importantly, however, those two adverse outcomes occur under different conditions, and rather than canceling, they amplify each other, adding up to a greater social loss.

B. Over-deterrence

The application of the aggregative test to multiple heterogeneous victims situations may, in some cases, lead to over-deterrence. It may yield that the injurer is the least-cost avoider of the accident, when, in fact, the victims are the least-cost avoiders of the accident.

For illustration, think of the following hypothetical example: two guests slip and fall in the front yard of their host. Guest A, who suffers substantial harm, could easily have avoided falling, while Guest B, who suffers less harm, could not have done so. The host could have eliminated the risk only at great cost. Consider the following ex-ante amounts⁹:

Table 1: Over-deterrence

	GUEST A	GUEST B	AGGREGATION	HOST
EXPECTED HARM	100	10	110	
PRECAUTION COSTS	40	80	120	70

Suppose that A and B both sue their friend. Should the court find the host liable for her guests’ harms? The aggregative risk-utility test yields

⁹ Here I make the same simplifying assumptions commonly used in such examples (see *supra* note 4). I assume moreover that the taking of precautions by either side eliminates the risk, and that the injurer’s utility is high enough (higher than 70).

liability for the host. On aggregate, the host seems to be the least-cost avoider, since she could have prevented a risk of 110 had she invested only 70 in precautions. The guests, on the other hand, would have had to invest an overall of 120 (larger than 70, and larger than the risk of 110) to avoid the risk. Hence, if the courts use cumulative amounts as the criteria for reasonableness of behavior, the injurer would be liable, under both the negligence rule and the strict liability rule.

However, a decision to hold the host liable in this case is incorrect, since it will lead to an inefficient, only second-best, result. A rational host, expecting such decision, will invest 70 in precautions in order to avoid being liable to pay 110 in damages; thus, the overall societal costs will amount to 70. But consider what would happen if, under the same circumstances, the court exempts the host from liability: Guest A, who would not expect to receive any compensation, would avoid the risk of 100 at a cost of 40, while Guest B would choose to bear the expected harm of 10. The overall societal costs would thus amount to only 50 (10 + 40), instead of 70. The conclusion is that, on aggregate, the guests in this case are the least-cost avoiders, but the aggregative test fails to detect that, thereby inducing inefficient and too costly an investment in precautions. Hence, aggregate amounts are destructive to the detection of the least-cost avoiders.

Looking at the amount of damages that the court would impose on the host demonstrates the same point. Suppose that no party took any precaution and the two guests indeed fell and suffered harm. Courts that apply the aggregative test to this case will, as described above, find the host liable to pay damages—but how much? The cumulative approach yields 110 in damages paid by the host, but this is again wrong. If anything, the host should be made to pay only to Guest B, and only 10, thereby providing incentives for Guest A to invest in the efficient precautions. The cumulative approach thus leads to incorrect decisions not only on the basic issue of liability, but also on the amount of damages.

The same would hold true if the defense were comparative negligence, rather than contributory negligence, but the calculations here are slightly more complex, and therefore are given in the appendix.

The core of the problem illustrated in this example is that, from an economic perspective, the host should be exempted from liability to each of her guests *for altogether different reasons*: she should not be liable towards Guest A because of the victim's contributory negligence, and she should not be liable towards Guest B (under negligence) because the level of risk to Victim B is less than her costs of precaution.¹⁰ Aggregating these qualitatively different decisions results in the wrong decision on the aggregate level.

In general, over-deterrence may occur when the victims group consists of at least two subgroups, whose precaution costs and levels of harm

¹⁰ As explained above, under strict liability she might be liable towards Guest B, but since her costs of precautions are greater than Victim B's harm, this liability would not cause her to invest in the inefficient precautions.

differ from the average in opposite directions, namely, when one subgroup has both high levels of harm and cheap precautions, while the other has low levels of harm yet costly precautions. The former subgroup (represented by “Guest A” in the example above) may be least-cost avoiders who should exercise their precautions. The latter group (represented by “Guest B” in the above example) may be victims whose level of harm is too low to justify the injurer’s investment in precautions. Under such circumstances, the aggregative risk-utility test may indicate that the injurer’s investment in precautions is cost-justified, in spite of the existence of a much more efficient way to avert the risk. The aggregate test may thus induce over-investment in precautions, i.e., lead to over-deterrence.

C. Under-deterrence and Level of Activity

The aggregative test may lead not only to over-deterrence, but to under-deterrence as well. One way that this may occur is through distorting the injurer’s incentives, provided by the rule of strict liability, to indulge in the socially-efficient level of activity.¹¹ In cases where additional activity may harm additional victims, determining liability based on cumulative amounts may drive an injurer to indulge in too high a level of activity.

For illustration, imagine a factory in proximity to two towns, one closer than the other. This factory pollutes the river that supplies the towns’ drinking water. Suppose now that there are two levels of activity available to the factory: a low level of activity that results in a low level of pollution, thereby posing a risk only to the closer town; and a 20% increase in activity, which results in a higher level of pollution, thereby adding a risk to the distant town as well. Suppose further that either the factory or the residents can install a filtering system (either in the factory itself or in each of the towns’ pumping systems). Consider the *ex ante* costs shown in Table 2.¹²

Table 2: The Aggregative Test and Levels of Activity under Strict Liability

Low Level of Activity (100%)				High Level of Activity (120%)			
	Factory	Town A	Town B		Factory	Town A	Town B
Expected Harm		30	0	Expected Harm		30	100
Cost of Filtering	100	50	60	Cost of Filtering	120	50	60
Utility for the Factory	150			Utility for the Factory	180		

Applying the aggregative risk-utility test to these circumstances will cause the factory to prefer to set its activity at the high level, even under

¹¹ It is a well-established result that as far as the injurer’s level of activity is concerned, strict liability provides the injurer with right incentives. See Steven Shavell, *Strict Liability Versus Negligence*, 9 J. LEGAL. STUD. 1 (1980).

¹² For simplicity, I assume that only residents of the two towns are the potential victims of this pollution, and that there is no further environmental harm. This is of course a contrived assumption, but one that does not change the results in this example.

strict liability. In the low-activity-level situation the factory would have to pay damages to the residents of Town A¹³ and the factory's net utility would amount to 120 (150-30). On the other hand, if the factory operates in the high-level scenario, the entire group of victims would be deemed contributorily negligent, since their cumulative cost of filtering, 110, is less than both the factory's cost of filtering, 120, and their aggregate harm, 130. Thus, if the factory were to set its activity at the high level, it would have to pay no damages at all, and its utility would rise to 180. As a result, Town B would have to install the filtering system at a cost of 60 and Town A will suffer the harm of 30. The overall societal costs would thus be 90, and the net societal utility would amount to 90 (the factory's utility of 180 minus 60 in precaution costs and minus 30 in harm).

From a societal standpoint, however, it is preferable that the factory sets its activity at the low level. The factory's utility is then 150 and Town A's harm is 30 (for which—under the strict liability rule—the town is fully compensated), leading to the net societal gains of 120, as opposed to 90 in the high-activity-level scenario. The aggregate test thus distorts the incentives that strict liability provides, leading to a societal loss, in this case, of 30.

In general, under-deterrence with regard to level of activity may occur when the injurer's additional activity inflicts additional risk on another subgroup of victims, under the following conditions:

- (1) The aggregate victims' precaution costs are less than the injurer's precaution costs.
- (2) The level of harm in the low-activity-level scenario is lower than the victims' costs of precautions.
- (3) The aggregate level of harm in the high-activity-level scenario is higher than the victims' cumulative costs of precautions.

When these conditions obtain, the aggregative test will indicate that the victims are contributorily negligent in the high-activity-level scenario, but not in the low-activity-level scenario. The injurer will thus have incentives to indulge in the high-level activity. If the injurer's additional utility from the high-level activity is less than the additional risk—the incentive to increase the activity would be socially undesirable.

D. Under-deterrence in Unilateral Care Situations: A Dilution of Liability

The two preceding sections demonstrated that the aggregative test may lead to adverse outcomes in bilateral care situations. However, the aggregative test may also induce under-deterrence in unilateral care situations. Combined with tort law's reluctance to examine an injurer's prior decision as to which activity to pursue, or what product to manufacture, the aggregative test may lead to a "dilution of liability" effect, driving an injurer to intentionally inflict greater harm upon a larger group of victims.

¹³ The town will not be deemed contributorily negligent since its cost of filtering is higher than its expected harm, and therefore its decision not to filter the water is reasonable.

When courts conduct cost-benefit analyses, they totally ignore an injurer’s decision what activity to pursue or a producer’s decision what to manufacture. The fact that an injurer decided to manufacture product A and not a different product, B, is beyond the court’s discretion and is left out of the calculations.¹⁴ We will call this approach hereinafter “the specific product restriction,” or “SPR.”

SPR in itself may provide bad incentives for potential injurers, but this issue is beyond the scope of this Article. Of relevance to this discussion, however, is the likelihood that the aggregative test may aggravate the problems created by SPR even further. Accordingly, in abandoning the aggregative test—courts may mitigate the inefficiency caused by SPR.

A potential injurer who expects both SPR and the aggregative test to be applied may prefer to manufacture a product that inflicts greater overall risk upon a larger group of victims, rather than to produce a product that puts a smaller group under less overall risk.¹⁵ As an illustration of this outcome, imagine a factory that can produce one of two products, A or B, both of which can be sold for the same price in the market, and cost the same to produce. The only difference between the two products, from the factory’s standpoint, is the toxicity of fumes emitted from the furnace in the case of an accident. Producing A would result in the emission of moderately toxic fumes that may pose a risk to one employee only: the production engineer, who works in direct contact with the furnace. Producing B, on the other hand, would result in the emission of highly toxic fumes that would pose an additional risk to four maintenance workers, situated more distantly from the furnace.

Assume that the probability of an accident is 0.1% per day, and if such accident occurs, the skilled engineer would suffer a harm of \$10,000 and the low-skilled maintenance workers—a harm of \$5,000 each. The factory can avert the harm by supplying each worker with single-use masks that cost \$8 each. For simplicity, assume that there is no “workers compensation act” and that the legal regime for employer liability is negligence.¹⁶ Table 3 presents the relevant data (in per-day dollar amounts).

Table 3: “Dilution of Liability”

Producing A			Producing B			
	Engineer	Factory		Engineer	4 workers	Factory
Expected Harm	10		Expected Harm	10	4X5=20	
Precaution Costs		8	Precaution Costs			\$8 per employee

¹⁴ See the reporters’ note on RESTATEMENT (THIRD) OF TORTS § 3 cmt. j (Proposed Final Draft No. 1, 2005) (“the negligence doctrine does not apply to the defendant’s original choice of activities.”)

¹⁵ For a different sense of dilution of liability see Alon Harel & Assaf Jacob, *An Economic Rationale for the Legal Treatment of Omissions in Tort Law: The Principle of Salience*, 3 THEORETICAL INQ. L. 413 (2002) (Discussing the dilution of every injurer’s liability under the rule of joint and several liability.)

¹⁶ I also assume that the per-day social utility of products is high enough (greater than \$30).

From society's perspective, it is better that the factory produce A rather than B, since the only difference between the products, from society's standpoint, is that A inflicts less risk of harm than B. However, the combination of SPR and the aggregate test leads a rational factory owner to produce B rather than A. This is so, because producing A puts the factory under a risk of liability for the engineer's harm.¹⁷ The factory will therefore be required to supply the engineer with the mask, thereby adding \$8 per day to its production costs. Producing B, on the other hand, would not put the factory under any risk of being deemed negligent¹⁸ and would thus save the additional costs of \$8 per day. Hence, the factory is able to dilute its liability by inflicting a *larger* risk of harm on its workers; a rational factory is indeed likely to act this way.

This effect can be mitigated, however, if courts do not apply the aggregate test. Deciding on each victim's case on its own merits¹⁹ would make the factory liable solely towards the engineer, regardless of what product the factory produces. Accordingly, the factory would be indifferent between the two production options. Indeed, the factory will not be driven to strictly prefer A over B, but at least it will not be provided with incentives to strictly prefer B over A.

The above example demonstrates several important yet unintuitive results. First, it shows that in unilateral-care and bilateral-care situations alike, heterogeneity of victims makes the aggregate test inefficient. The fact that the aggregative test is problematic in unilateral-care situations has a bearing on the solution to the problem.²⁰ Second, it illustrates a case where some potential victims would actually prefer a no-liability world to a world where the legal regime is negligence. Under negligence, if the aggregate test is applied, the four maintenance workers would definitely²¹ be at risk of being harmed without compensation, while in a world without liability the factory would be indifferent between its two production options and may very well opt for manufacturing A rather than B. The expected utility of the four maintenance workers is thus higher in the no-liability world. This example also suggests that strict liability may be socially more desirable than negligence, contrary to suggestions in the literature that in multiple-victim accidents, the negligence rule is preferable.²² Under strict liability the factory will be liable for every worker's harm; producing B will therefore cost the

¹⁷ Applying the Learned Hand rule, a court will find that $PL > B$ ($0.1\% \times \$10,000 = \$10 > \$8$).

¹⁸ This is because if L denotes the aggregate harm, and B the aggregate precaution costs, then $PL < B$ ($0.1\% \times (\$10,000 + 4 \times \$5,000) = \$30 < \$40 = 5 \times \$8$).

¹⁹ For now, deciding on each victim's case can suffice. In Section Two, however, we will reason that this practice is not perfect, and suggest better solutions.

²⁰ This means, for example, that it will not be sufficient to decouple liability determination and compensation. For a comprehensive discussion on the issue of solutions *see infra* Section Three. For the decoupling solution *See generally* Kenneth S. Reinker & David Rosenberg, *Unlimited Subrogation: Improving Medical Malpractice Liability by Allowing Insurers to Take Charge*, 36 J. LEGAL STUD. 261 (2007).

²¹ Provided, of course, that the factory is fully rational.

²² LANDES & POSNER, *supra* note 5, at 259 ("Paradoxically, then, a negligence standard may give the injurer a greater incentive to use due care than strict liability would do.")

factory at least \$20 more than producing A, driving it to produce A rather than B, and to equip the engineer with the single-use mask.

Importantly, my claim here is not that SPR is wrong per se.²³ I only assert that the aggregative test aggravates SPR's adverse effects. The paradigm shift I offer in this article may alleviate, in some cases, the bad incentives created by SPR.

In general, the "dilution of liability" effect happens under the following conditions:

- (1) courts are unable or unwilling to examine an injurer original decision which course of action to take;
- (2) the injurer's precaution technology is such that its costs depend on the number of potential victims;
- (3) one of the injurer's optional courses of action inflicts grater overall risk upon more victims, but, on average, inflict less risk per victim; and
- (4) in the "greater harm" course of action, the overall precaution costs are higher than the average harm per victim, but in the "smaller harm" scenario the overall precaution costs are less than the average harm.

These conditions, when met, would drive an injurer to choose the course of action that inflicts a greater risk of harm on the larger group of less-vulnerable victims.

E. A Summary and Some Distinctions

To summarize the previous subsections, applying the aggregative risk-utility test to multiple-victim accidents may result in three major adverse effects:

- a) it may yield that the injurer is the least-cost avoider, and therefore should be held liable for the harm, in cases where the victims are the efficient bearers of harm. This result induces potential injurers to invest in too costly precautions;
- b) it may induce a potential injurer to indulge in too high a level of activity, by distorting the incentives created by the strict liability regime, if the additional risk caused by the high-level activity is imposed upon victims who have lower-than-average costs of precautions; or
- c) it may aggravate the already inefficient incentives that SPR creates, by providing incentives for the injurer to strategically dilute her liability by imposing too big a risk of harm on a larger group of victims.

Careful examination of the conditions and characteristics under which these adverse effects may occur—conditions that were described at the end of each of the previous subsections—can delimit the range of cases where each of these adverse effects is more likely to happen. The first factor, which is common to all problematic situations, is the heterogeneity of victims. And, as was stated earlier²⁴, in the majority of tort situations, victims are indeed heterogeneous. Moreover, the larger the group of victims, the

²³ This point is beyond the scope of this Article, but SPR may be justified from both practical and conceptual perspectives.

²⁴ See *infra*, p. 8.

more likely it is to be heterogeneous.²⁵ The problems addressed here are therefore likely to become more relevant as the number of victims increases.

However, as should be clear from the conditions stated above, heterogeneity of victims in itself is not sufficient for the problem to arise. Their heterogeneity must come in the specific forms described above. For example, if the injurer's precaution technology were independent of the number of potential victims, it would be sufficient that the injurer should be liable towards one victim to justify deeming the injurer liable towards all the victims²⁶. Applying the aggregative test in such a case would pose no problems, regardless of the variance of the victims' precaution costs or levels of harm.

Furthermore, the aggregative test may be desirable when there is a strong interdependence among the parties' utility functions, such as in cases of close communities.²⁷ In other words, when the fact that some victims exercise care, or are harmed, affects not only their own utility but other victims' utility as well, it may sometimes be more efficient to determine liability on the aggregate level. For example, suppose, in the first example above, that if Guest A exercises her precaution, Guest B would suffer an additional harm of 50²⁸. If this were the case, then only an aggregate approach would yield the efficient result.

Unfortunately, as can be deduced from the above, the inefficiency of the aggregate approach is case-based. It is sometimes efficient, yet at other times not. We can make some general observations, for example that the "dilution of liability" effect is more likely to occur in product liability cases, but these observations cannot be definitive. The "illusory" character of this inefficiency suggests that the best solution to the problem might be in the form of a general rule, applicable to all situations—which would spare a specific examination of the conditions in each specific case. This option will be explored in the third section of this Article.

The adverse effects caused by the aggregative test result from aggregating cases that require opposite incentives. In more economic terms, the aggregative test imposes a pseudo-"pooling equilibrium"²⁹ on the

²⁵ See Gideon Parchamovsky & Peter Siegelman, *Selling Mayberry: Communities and Individuals in Law and Economics*, 92 CAL. L. REV. 75, 95 (2004).

²⁶ Otherwise, worse scenarios than the second-best equilibrium might occur, where both the injurer and some victims invest in precautions.

²⁷ Parchamovsky & Siegelman, *supra* note 25, reviewed the case of the 2002 buyout of the town of Cheshire, Ohio by American Electric Power that had a nearby polluting factory. The authors reached to the conclusion that under an individualistic rational model this buyout would not have been possible, and suggested that community as a whole contributes to every individual's utility function a synergic contribution that should be taken into account when calculating the costs of a public nuisance.

²⁸ For example, if the precautions of Guest A are in the form of walking extremely slowly, thereby causing Guest B to be late for the party and miss the opportunity to meet with an important client. This eventuality may seem too farfetched, but in the case of close communities it is more likely than not that each victim's precautions would affect other victims as well.

²⁹ In economic theory, the term "pooling equilibrium" refers to signaling games with asymmetric information yet here we discuss a different context, hence the prefix

situation, in that it induces the parties to adopt their pooling strategies. Yet, as economic theory teaches us, pooling equilibria are inefficient, precisely because they embody equal treatment to substantially different agents. Moreover, applying the Learned Hand test to the “aggregate victim”—even if the aggregation is of marginal costs and benefits—contradicts the fundamental insight that the Hand formula should only be applied in its incremental form; the true value of an incremental evaluation of aggregate marginal costs lies in simply applying a separate risk-utility test for each victim.³⁰ However, while courts and scholars alike insist on using the Hand formula in its marginal form when one victim is involved, they totally neglect this insight in cases of multiple victims. The next section demonstrates that these problems do exist in reality, but that courts and scholars alike have disregarded them.

II. THE DISREGARD OF THE PROBLEM IN COURTS AND IN THE LITERATURE

A. *The Courts*

In the previous section we have learned that focusing on aggregate amounts, when performing cost-benefit analysis, is prone to inefficiency. However, as will be demonstrated here, determining liability based on aggregate amounts is exactly what courts do. Moreover, courts generally do not refer to the victims’ heterogeneity as a difficulty when doing such analyses, but only when they need to decide on certifying a class in class actions. Yet, even then, the reasoning does not address the heart of the problems described earlier, and leave ample room for mistakes.

One case where the aggregate harm approach led to an under-deterrence effect is *Johnstone v. American Oil Co.*³¹ The plaintiff, a seaman who suffered (and later died from) mesothelioma as a result of exposure to asbestos, filed a suit against, *inter alia*, the asbestos manufacturer, to whose products he had been exposed. The jury found that the defendant’s asbestos had, indeed, caused Mr. Johnstone’s illness. However, since the overall societal risks of using asbestos insulation in ships, including warships during World War II, did not outweigh the overall societal benefits, asbestos insulation was reasonably safe. Nevertheless, the district court judge granted the plaintiffs’ motion for a JNOV³² and ruled against the defendant, asserting that the risk to which Mr. Johnstone had been subjected outweighed the utility of the product. The manufacturer appealed, and the 5th Circuit reversed the JNOV and approved the jury’s finding. The 5th Circuit held that,

“pseudo.” I have added it to indicate that the aggregative test adopted by the law forces an equal-treatment equilibrium on the situation.

³⁰ Formally, if we denote by $U_i(X_i)$ the utility of victim i , as a function of her level of care, X_i , and denote by A the aggregate social utility ($A = \sum_i U_i + U_{injuror}$), and assuming

that the injurer’s utility is independent of the victim’s costs of care, then $\frac{\partial A}{\partial X_i} = \frac{\partial U_i}{\partial X_i}$.

³¹ 7 F.3d 1217 (5th Cir. 1993).

³² That is, judgment notwithstanding the verdict.

although asbestos insulation was unreasonably dangerous in the specific use that caused the plaintiff's illness and death, its cumulative risks did not outweigh its aggregate utility, and therefore asbestos insulation was reasonably safe:

In setting aside the jury's verdict, *the magistrate judge seems to have focused on the risks to Mr. Johnstone, as opposed to the risks to society as a whole.* A product's risk 'concerns ... the ratio of instances of harm compared to the total use or consumption of the product.' ...

In concluding that (the) products were not unreasonably dangerous per se, the jury did not confine its assessment of the risks of (the) products to the risk actually realized by (the individual victim), but instead *correctly considered the risks of the products to society as a whole.* ... *The jury was entitled to find that, even though (the) products were a substantial contributing cause of (the victim's) mesothelioma, the overall utility of (the) products nevertheless outweighed the risks of those products to society as a whole*³³ (emphasis added).

Even the dissenting judge in this case expressly agreed with the majority that it is "undoubtedly true" that:

the danger in fact of the product to *society as a whole* (should) be weighed against the utility of the product to *society as a whole* (original emphasis).³⁴

The 5th Circuit's decision suffers from the very same flaws we have described earlier. In a nutshell, the court examined the injurer's liability by aggregating different risks posed to heterogeneous victims. Consequently, the injurer was exempted from liability for the unreasonable risk it had inflicted upon Mr. Johnstone, only because its products were also used for other, more effective, purposes that posed relatively fewer risks to less vulnerable victims. This aggregate approach to harm levels induces underdeterrence, by providing an injurer with incentives to refrain from investing in *cost-effective* precautions in the "high risk" events. Consequently, a producer of a product that has high societal utility and relatively small risks is given a "license to harm": this manufacturer would be exempted from liability for distributing the product further, to places and for uses that are more risky and less socially desirable. Furthermore, when the chronological order is reversed, the manufacturer of a product that creates great risk and has little, if any, social utility, can dilute liability by distributing the same product to places and for uses that inflict less relative risk or have great

³³ Id., at 1223.

³⁴ Id., at 1226. The disagreement between the majority and the minority opinions was only over whether "society as a whole" should mean "society at the time of injury" or "society throughout the ages."

social utility. Accordingly, the aggregate approach to risks manifested in *Johnstone* allows a manufacturer to save the costs of efficient precautions for “high risk” victims, knowing that the “low risk” (or the “higher utility”) victims would outbalance the “high risk” use.

The *Johnstone* case is not alone, of course, in adopting the aggregate approach in a way that may lead to under-deterrence. Other courts either followed this decision³⁵ or independently used the same wrong approach.³⁶

As far as over-deterrence is concerned, the picture of what courts are actually doing is less apparent. As has already been noted by courts³⁷ and scholars³⁸, courts very rarely use the Learned Hand formula in numerical terms. Consequently, even though courts may very well make the mistake, it is almost impossible to point at specific cases where such mistake definitely led to a wrong decision on the bottom line. Furthermore, most jurisdictions apply the comparative negligence standard, rather than the contributory negligence defense, but the specific calculations of each party’s share of liability are absent from the courts’ decisions. However, when courts describe what they do, and when appellate courts supply guidelines to lower courts, these guidelines and descriptions do in fact refer to aggregate amounts, and thus are prone to the mistake of creating over-deterrence.

One case where the cumulative approach may have lead to over-deterrence is *Brooks v. Henson Fashion Floors, Inc.*³⁹ The plaintiff slipped and fell outside her office, in a hallway that the defendant had widened. The defendant had removed a wall, “leaving the regular carpeted three-foot wide path and a bare concrete floor which was to be carpeted,”⁴⁰ and later spread glue on the exposed concrete floor. The plaintiff later “stepped onto the concrete portion and slipped and fell in the freshly laid glue, injuring her left shoulder, elbow and knee.”⁴¹ The trial court had exempted the defendant

³⁵ The *Johnstone* ruling was followed by *Coates v. A C & S Inc.*, 844 F. Supp. 1126 (E.D. La. 1994), which specifically used the cumulative approach in *Johnstone* to deny the plaintiffs’ motion to declare asbestos products as unreasonable per se as a matter of law.

³⁶ See, e.g., *Wright v. Dow Chem*, 845 F. Supp. 503 (M.d. Tenn. 1993), where the court implicitly approves the plaintiffs’ claim “that the products fail the risk-utility test for defective design because the products’ aggregate risks are greater than their aggregate utilities.” See also *Shute v. Moon Lake Electric Ass’n*, 899 F.2d 999 (10 Cir. 1990), at 1004 (“It is our judgment, therefore, that although the probability of this type of accident is low, the overall risk ... outweighs the limited burden imposed by our holding. Consequently, we are not persuaded by (the defendant’s) claim that the burden of guarding against this type of accident is too great.”) Also, *Quintana-Ruiz v. Hyundai Motor Corp.*, 303 F.3d 62 (1st Cir. 2002) at 64 (“The question here is whether a jury may find for a plaintiff ... when the evidence is that the overall utility of the design exceeds the overall risk.”) See also *Pries v. Honda Motor Co.*, 31 F.3d 543, 546 (7th Cir. 1994) (Under product liability rules, in order to prove that a specific design is defective, the plaintiff is required to present “data about either the costs of additional precautions or the aggregate injuries avoidable by using them.”)

³⁷ *Torrez v. TGI Friday’s, Inc.*, 509 F.3d 808, 811 (7th Cir. 2007) (“Rarely in an actual negligence case are the factors that determine whether a precaution is cost justified actually quantified.”)

³⁸ *Wright*, *supra* note 7.

³⁹ (La.App. 2 Cir. 12/7/94), 647 So. 2D 440.

⁴⁰ *Id.*, at 441.

⁴¹ *Id.*, at 442.

from liability, but the appeal court reversed this outcome. After establishing that the defendant had failed the risk-utility test, and was therefore negligent⁴², the court turned to examine the plaintiff's comparative negligence. The court mentioned that "(a)s noted by the trial court, other mall employees who traversed the hallway that morning managed to step over the obstacles without mishap," and concluded that the plaintiff "should have proceeded with more than usual caution," and that "plaintiff's inattention to where she stepped constitutes negligence." However, because the defendant's fault "created a risk of harm to every person who traveled the hallway," the court apportioned "the percentages of fault at 40% to plaintiff and 60% to defendant."⁴³

Hence, the court reduced a portion of Brooks' fault because the defendant posed a risk to others as well. The court did not use specific calculations, but this reduction in the plaintiff's fault can be economically explained by an adoption of the cumulative approach. As was shown in the first example in Section I, the cumulative approach leads to a reduction in a plaintiff's percentages of fault each time the defendant's actions posed more people under risk of harm, as was the case in *Brooks*.

Because the court in *Brooks* did not use any numbers, there is no way of knowing if, in this case, the cumulative approach has in fact led to actual distortion of incentives. There is, however, every reason to believe that other persons who "traveled the hallway" differed from Ms. Brooks in their expected harm levels and in their subjective costs of paying more attention. Since the court's implicit adoption of the cumulative approach led to a reduction in the plaintiff's fault, it may very well have led to over-deterrence.

In one area, however, courts do give special attention to heterogeneity of victims: certifying classes of victims in mass torts. However, before we delve into this issue, one qualifying remark should be made. From a purely theoretic perspective, liability should not depend on the identity of the actual parties to the claim, but rather on the mere existence of multiple victims (or injurers) in the "world beyond the courtroom walls." In other words, a certification of the class in a class action should not affect the court's decision. After all, courts are supposed to consider social welfare, regardless of who the parties to the specific claim might be. This theoretic remark notwithstanding, in practice courts hardly ever consider costs of non-parties.⁴⁴ It follows that the actual parties before the court do in fact matter and that, at least on the practical level, the joinder of parties and the certification of a class may change the decision on liability.

Courts refer to class heterogeneity in accordance with procedural

⁴² *Id.*, at 443 ("(T)he likelihood of injury was relatively high ... (and) the injuries associated with slip and fall cases can be severe and debilitating. In contrast, the cost of precautions would have been nominal.")

⁴³ *Id.*, at 444.

⁴⁴ A closely related phenomenon is the refusal of courts to recognize purely environmental harm. See generally Alexandra B. Klass, *Punitive Damages and Valuing Harm*, 92 MINN. L. REV. 83 (2007).

rules such as Rule 23 of the Federal Rules of Civil Procedure.⁴⁵ This and similar rules require both commonality of issues among the class members and predominance of those issues over the individual issues. However, even under Rule 23, courts seem to be insufficiently aware of the problematic aspects of victims' heterogeneity. Rule 23's requirement for predominance of the common issues is interpreted in most cases as not prohibiting of the certification of a heterogeneous class with regard either to the amount of harm or to affirmative defenses, such as contributory negligence.⁴⁶ As a result, heterogeneous classes are certified on a regular basis. Indeed, a rule under which only fully homogeneous groups are certified will result in very few, if any, class actions.

An interesting example of a case, where even high level of variance between victims, with respect to both harm levels and comparative negligence issues, did not serve as a bar for class certification, is *Citgo Ref. & Mktg. v. Garza*.⁴⁷ In *Citgo*, about 2,500 residents suffered harm that was inflicted by several neighboring refineries, storage facilities, and industrial facilities. The residents filed several lawsuits that were consolidated for the sake of certifying a class action. The trial court approved the class action for the property damage, certifying two classes and thirteen subclasses.⁴⁸ Upon appeal, the defendants contended, *inter alia*, that comparative negligence clauses in relevant statutes precluded the class certification, and that the plaintiffs did not fulfill the requirements of Rule 42 of the Texas Rules of Civil Procedure governing class actions in Texas.⁴⁹ The defendants claimed that because the properties were located at different distances from the facilities, there could not be commonality of issues among the class members. The trial court rejected the claim, agreeing with other courts that:

⁴⁵ USCS Fed. Rules Civ. Proc. 23(a)(2) and 23(b)(3). States' rules usually contain the identical, or very similar, provisions.

⁴⁶ *See, e.g.,* Smilow v. Southwestern Bell Mobile Sys., 323 F.3d 32 (1st Cir. 2003), at 39 ("Courts traditionally have been reluctant to deny class action status under Rule 23(b)(3) simply because affirmative defenses may be available against individual members") and at 40 ("Where, as here, common questions predominate regarding liability, then courts generally find the predominance requirement to be satisfied even if individual damages issues remain"); Scott v. First Am. Title Ins. Co., 2007 WL 135909 (D.N.H. 2007) ("When common questions predominate as to liability, courts will ordinarily find predominance even if individual issues concerning affirmative defenses or damages exist.") *See also* Grant v. Becton Dickinson & Co., 2003 Ohio 2826 (Summarizing, at pp. 23-27, the different attitudes to this question and concluding that, in the vast majority of jurisdictions, "individual defenses (are) not fatal to certification.")

⁴⁷ *Citgo Ref. & Mktg. v. Garza*, 187 S.W.3d 45 (Tex. App.—Corpus Christi 2006).

⁴⁸ The two classes were the I-37 North Class and the I-37 South Class. The I-37 North Class consisted of six subclasses: five according to the property acquisition date (at 5 years intervals), and one with properties that overlie or have been contaminated by the subsurface plume of contaminants. The I-37 South Class also consisted of five subclasses according to the property acquisition date, and two more subclasses of members who lived on specific streets.

⁴⁹ TEX. R. CIV. P. 42 consists of the same elements as of FED. RULES CIV. P. 23, as the court mentions on p. 69. ("Rule 42 is patterned after its federal counterpart ... *compare* FED. R. CIV. P. 23 *with* TEX. R. CIV. P. 42. Consequently, federal decisions and authorities interpreting current federal class-action requirements are persuasive authority in applying rule 42.")

[I]ndividual computation of damages for each class member will not prevent class certification. ... Although the individual amount of damages may vary from class member to class member, the standard conduct of appellants is relative to all potential class members.

The trial court expressly stated that the existence of diverse comparative negligence issues does not affect the certification of a class. The appeal court agreed:

As to the effect of damages calculations on commonality and predominance, the fact that damages must be computed separately for each class member does not necessarily mean in itself that individual issues predominate over common issues of law and fact. ... Nor will the existence of affirmative defenses prevent class certification ... (including affirmative defenses of contributory negligence, superseding cause, and failure to comply with warranty).⁵⁰

Yet, some decisions with regard to certification of classes do refer to the victims' heterogeneity, albeit for the wrong reasons. In *Amchem Products Inc v. Windsor*⁵¹ the Supreme Court rejected the settlement in a mass tort claim because of differences in harm levels between individual plaintiffs. However, the Supreme Court based its decision on consideration of individual justice, rather than economic efficiency, and referred only to the damage awards and not to the liability issue.

In *Rhode-Polenc*⁵², around 300 hemophiliacs from different states, infected with AIDS following the use of the defendants' products, filed a class action. The District Court certified the class, and ordered that the case be bifurcated, so that one jury would decide the overall liability of the defendants towards the class as a whole, and afterwards different juries from different jurisdictions would decide the comparative or contributory negligence of each of the plaintiffs. The defendants appealed, and the 7th Circuit reversed the District Court's decision, ordering that the class be decertified. The majority based its decision on the difference in the contributory/comparative negligence issues among the states and among the plaintiffs. Interestingly, however, although the majority decision was written by Judge Posner, this decision does not refer to any economic consideration, but rather is based on constitutional considerations, namely, the defendants' right to one jury that would decide on the whole case, and the impossibility to assemble such a jury. The main reason was that the different jurisdictions had different legal arrangements concerning contributory or comparative negligence. Judge Posner implies, however, that if one jury could have been

⁵⁰ *Id.*, at 71.

⁵¹ 521 US 591 (1997).

⁵² *In re Rhode-Poulenc Rorer Inc.*, 51 F.3d 1293 (7th Cir. 1995), *cert. denied*, 516 U.S. 867 (1995).

assembled, then the mere existence of different circumstances between the plaintiffs would not be a reason to decertify the class.

To conclude this point, even decisions that are correct from an economic standpoint are nevertheless based on non-economic considerations, making it likely that under slightly different circumstances, the decision would still be flawed. It is interesting to note, that the disregard for victims' heterogeneity is not just an American phenomenon, and that the situation is more or less similar in other common law countries.⁵³

B. The Law and Economics Literature

In general, the literature has thus far not dealt in depth with heterogeneity of multiple actual victims, nor has it pointed out the difficulties of using the aggregative test when dealing with multiple-victim situations. The literature has actually advocated the use of the aggregate test very firmly, and some scholars have criticized any opposing test for liability. For example, Prof. Rodgers specifically asserts that, without aggregations, "the Hand formula, $B < PL$," does not capture the "full calculus of costs and benefits," and that:

single case applications of the Hand formula understate the social costs of the private investment decision by overlooking all other accidents that could be avoided by the same safety expenditures ...

Construed to accomplish a full social cost-benefit analysis, the Hand calculus in a negligence action would ask whether $B < LP + L1P1 + L2P2 + \dots + LnPn$. The expanded benefit side of the equation accounts for the costs of all other accidents, discounted by their probability, that would be avoided by defendant's investment in safety equipment or cessation activity.⁵⁴

The draft of the Restatement (Third) of Torts also endorses the aggregate approach, and therefore is prone to the same mistake. Section 3 of

⁵³ See, e.g., the Canadian case of *Wilson v. Servier Can. Inc.* (2000), **50 O.R. 3d 219**. In this case (a class action for diet pills' product liability), a class was certified albeit the affirmative defenses (in particular the contributory negligence issue) and the amount of harm for each plaintiff differed substantially between the plaintiffs. It is an interesting case precisely because the court emphasizes economic efficiency as one of the reasons for the certification of the class. Needless to say, under Canadian product liability law, the risk-utility test is applied to decide whether a product is defective (LAWRENCE G. THEALL, *PRODUCT LIABILITY: CANADIAN LAW AND PRACTICE* L2-7–L2-9 (2006)). See also the Israeli case of *AdminC (Haifa) 307/07 Eran Goren v. Israel Railways* (claim in Hebrew available at http://elyon1.court.gov.il/heb/tovanot_yezugiyot/99b.pdf). In this claim, the defendant was sued for damages for all the train passengers that were harmed by the delays in train arrivals. The claim was based on an average of 6 minutes (varying between 0-30 minutes), and an average loss of 2,000 NIS per passenger per year. The court certified the class regardless of the vast differences between the victims.

⁵⁴ William H. Rodgers, *Negligence Reconsidered: The Role of Rationality in Tort Theory*, 54 S. CAL. L. REV. 1, 10 (1981). This interpretation was specifically adopted, for example, by the Supreme Court of Louisiana in the case of *Washington v. Louisiana Power & Light Co.*, 555 So. 2d 1350, 1354 (La. 1990).

the draft asserts that negligence should be determined by comparing “the foreseeable likelihood (of) harm (and) the foreseeable severity of the harm that may ensue” with “the burden that would be borne by the person and others if the person takes precautions that eliminate or reduce the possibility of harm.” This language adopts the aggregative test, as is explained in comment e:⁵⁵

e. Balancing risks and benefits. Insofar as this section identifies primary factors for ascertaining negligence, it can be said to suggest a “risk-benefit test” for negligence, where the “risk” is *the overall level of the foreseeable risk created by the actor’s conduct* and the “benefit” is *the advantages that the actor or others gain if the actor refrains from taking precautions.* (Hence this benefit is the same as the burdens which the precautions, if adopted, would entail.) The test can also be called a “cost-benefit test,” where “cost” signifies the cost of precautions and the “benefit” is the reduction in risk those precautions would achieve.⁵⁶ (emphasis added).

The Restatement further asserts that the same aggregative approach should be used for issues of contributory negligence, as comment b explains:

The definition of negligence set forth in this section applies whether the issue is the negligence of the defendant or the contributory negligence of the plaintiff.

It seems that Flemming also champions the aggregation paradigm. The Supreme Court of Oregon described Flemming as a scholar who holds “the logical argument for limiting the extent of liability as well as the negligence standard to foreseeable consequences” to be “less than compelling,” on the grounds that “aggregate risks may make conduct negligent even though the specific risk to the particular plaintiff might in isolation be neither sufficiently unreasonable nor foreseeable.”⁵⁷

⁵⁵ RESTATEMENT (THIRD) OF TORTS § 3 cmt. e (Proposed Final Draft No. 1, 2005).

⁵⁶ See also the remarks on this and other sections, in Ronen Perry, *Re-Torts*, 59 ALA. L. REV. 987, 991 (2008) (“(The Restatement) provides that the cost considered is not only the cost to the specific injurer, but to ‘the actor or others’; and the reduction in risk refers not only to the specific victim but to ‘the overall level of the foreseeable risk’”; and on page 1020: “where the risk to the plaintiff was real but the social cost of its prevention, whether by taking a certain precaution or refraining from the risk-creating activity, was higher than the magnitude of the risk ... (then) if the defendant’s conduct created additional risks to other people, applying the economic definition might also lead to imposition of liability because this definition compares the cost of care with the aggregate level of foreseeable risk, not with the expected harm to a particular plaintiff.”) See also RESTATEMENT (SECOND) OF TORTS §293(d) (1965) (directing the court’s attention to “the number of persons whose interests are likely to be invaded if the risk takes effect in harm”); RESTATEMENT (THIRD) OF TORTS: PRODUCT LIABILITY §2 (1998).

⁵⁷ *Fazzolari v. Portland School District No. 1J*, 734 P.2d 1326, 1331 (Or. 1987). The court cites FLEMING, *THE LAW OF TORTS* 196 (5th ed. 1977), but I was not able to obtain a copy of Flemming’s book. See also Richard W. Wright, *Negligence in the Courts: Introduction and Commentary*, 77 CHI.-KENT. L. REV. 425, 431 (2002) (“References to ‘balancing’ tests of negligence, especially when referring to the Hand formula, are generally understood to mean a literal or ‘straight’ balancing of aggregate risks or costs

But perhaps the most prominent body of research advocating aggregation and averaging in mass tort cases owes its existence to the seminal work of Prof. David Rosenberg.⁵⁸ Prof. Rosenberg's basic claim is that with a large number of victims courts should decide the case based on the average costs and harms of the victims.

Rosenberg argues that, although this averaging comes at the expense of individual justice, it is nevertheless justified based on efficient deterrence and access to justice—the latter advantages to some extent outweighing the disadvantage of abandoning individual justice. Rosenberg further claims that not only should society prefer deterrence over individual justice, but that potential victims should, and perhaps do, prefer optimal deterrence over individual justice, since optimal deterrence benefits everyone in society.⁵⁹ Thus, Prof. Rosenberg maintains, the prospective litigant would prefer averaging.

“For clarity of analysis,”⁶⁰ Rosenberg assumes that averaging does not impact injurers' or victims' primary behavior. He asserts that the concern with averaging or aggregation is motivated solely by the individual justice issue, but that the ex-ante perspective requires that mass tort cases be decided based on averaging. I demonstrate in this Article, however, that it is unrealistic to assume that averaging does not affect the ex-ante incentives⁶¹, and that, therefore, such an assumption does not hold, even if it is made for the sake of “clarity.”

In another paper, Rosenberg does acknowledge that to achieve optimal deterrence of victims and optimal insurance the aggregated damages should be distributed between victims at the end of the process, in accordance with “contributory negligence and similar rules.” However, as to the defendant's liability he nevertheless reasserts that:

Indeed, achieving optimal deterrence in mass tort cases entails no individualizing inquiries into and evidence of a defendant's liability and damages in relation to a specific

against aggregate utilities or benefits, according to which the actor is negligent if and only if the aggregate risks or costs are greater ... than the aggregate utility or benefits.)

⁵⁸ David Rosenberg, *Class Actions for Mass Torts: Doing Individual Justice by Collective Means*, 62 IND. L. J. 561 (1987); David Rosenberg, *Individual Justice and Collectivizing Risk-Based Claims in Mass-Exposure Cases*, 71 N.Y.U. L. REV. 210 (1996); BRUCE L. HAY & DAVID ROSENBERG, THE INDIVIDUAL JUSTICE OF AVERAGING (John M. Olin Ctr. For Law, Econ., & Bus., Harvard Law Sch., Discussion Paper No. 285, 2000), available at <http://ssrn.com/abstract=11336>.

⁵⁹ David Rosenberg, *Mass Tort Class Actions: What Defendants have and Plaintiffs Don't*, 37 HARV. J. ON LEGIS 393, 408 (2000).

⁶⁰ HAY & ROSENBERG, *supra* note 58, at 3-4.

⁶¹ This assumption, as presented above, can be made only for homogeneous victims, but this renders the term “averaging” meaningless, since homogeneous victims all suffer the same harm and therefore no averaging is needed. Moreover, Kaplow has shown that damage averaging creates adverse incentives when individuals know the actual level of harm. See Louis Kaplow, *Accuracy in Adjudication*, 23 J. LEGAL STUD. 307, 314-315 (1994). Note that Kaplow's claim refers to other circumstances than those discussed here and that as far as we are concerned, accuracy in damages is not the issue. Thus, in our first example, the victims will indeed receive accurate damages (100 to the one and 30 to the other), but will still receive distorted incentives.

plaintiff or even any actual plaintiffs. Because of the statistical and unitary nature of mass production decisions, for deterrence purposes, all claims can be resolved in the aggregate, based on probabilistic projections that average out particularities.⁶²

This Article's thesis contravenes to some extent Prof. Rosenberg's claim. I have demonstrated that aggregations may lead to wrong decisions with regard to the injurer's liability. Furthermore, if aggregation or averaging can provide the parties with bad incentives, in cases involving heterogeneous victims, then the "individual injustice" induced by averaging may not be mitigated or outbalanced by deterrence, but rather the opposite. It follows that the "average deterrence" approach would become, in itself, not optimal. Thus, it is possible that, overall, in the case of heterogeneous victims, aggregation or averaging may prove to be inferior to individual adjudication.

It should be noted, however, that, under certain conditions, the two positions can be reconciled. Indeed, my claim relates only to specific circumstances; and even then, the level of inefficiency varies and in some cases may not exceed the benefits of averaging. Furthermore, my work does not address Rosenberg's "easier access to justice" claim. In cases where the benefit of easier access to courts outweighs the social price of implementing the second-best equilibrium, averaging might be preferable. Last but not least, if the law were to be changed following the suggestions made in this Article, we might be able to enjoy the best of both worlds—in fact, my final suggestion in Section Three will incorporate one of Prof. Rosenberg's suggestions, yet only as a second resort.

To conclude this point, the literature often advocates deciding on liability through aggregating among victims. In doing so, it disregards the problem inherent in this strategy, namely, that aggregating heterogeneous costs may lead to inefficient outcomes.

One possible reason why the difficulties presented in this Article have eluded scholars is that when modeling multiple-victim situations, most of the law and economics literature assumes, sometimes explicitly and sometimes implicitly, full homogeneity of victims.⁶³ The analysis of tort

⁶² David Rosenberg, *Mandatory-Litigation Class Action: The Only Option for Mass Tort Cases*, 115 HARV. L. REV. 831, 862 (2002). Prof. Rosenberg advocated the same approach in David Rosenberg, *The regulatory Advantage of Class Action*, in W. KIP VISCUSI (ED.), REGULATION THROUGH LITIGATION 244-309 (2002) (arguing for mandatory class action, as "a form of regulation that aggregate(s) all claims for collective litigation as a single claim for aggregate liability" (p. 246), while asserting specifically that "All else being equal, to achieve optimal deterrence, mass production tort liability must threaten damages equal to the total aggregate tortious harm" (p. 248).)

⁶³ The most notable example is Landes and Posner. In their seminal book, these authors develop a model of catastrophic accidents which is based on the untenable assumption that the victims group is completely homogeneous. See LANDES & POSNER, *supra* note 5, at 258-272, and especially p. 270, where they assume homogeneity without explanations or reservations. Their main innovation is in positing that, as the number of victims rises, so too does the amount of harm, and with it the probability of the injurer reaching limited solvency. Another insightful observation is that although the harm to each victim may be large, the probability for damage is low, and therefore the risk - i.e., the expected harm—

situations with multiple victims was on the whole similar to that of a single-victim tort, with the single victim replaced by the aggregate group of victims. The main difference between the results of the multiple-victim case and the single-victim case was the greater likelihood of the injurers' insolvency, since in the former case the overall harm is usually larger. However, when scholars have assumed homogeneity, they seem to have neglected the need to justify this assumption other than an attempt to simplify the model. While simplicity of models should be encouraged, it seems less valid where it is likely to dramatically change the conclusions.

Victims' heterogeneity has been analyzed only with regard to *potential* victims. Several studies⁶⁴ have used a model in which a single

may be low as well. Landes and Posner conclude that, in catastrophic accidents, the negligence regime may be more efficient than the strict liability regime—a contention that we have hitherto demonstrated to be overly general, if not altogether wrong.

See also THOMAS J. MICELI, *THE ECONOMIC APPROACH TO LAW* 97-99 (2004) (a repetition of Landes and Posner's results), and Margherita Saraceno, *Group Litigation, Access to Justice and Deterrence*, (Amsterdam Ctr. for Law and Econ. Working Paper No. 2008-04, 2008), available at <http://ssrn.com/abstract=1128058> (addressing the different implications of group litigation of mass torts on, *inter alia*, the ex-ante incentives of the injurer, but assuming homogeneity of victims).

Another example is Dari-Mattiacci and Langlais, who compare two cases: harm inflicted on one person and the same harm inflicted on multiple victims. They analyze unilateral care situations, where the precaution technology impacts the magnitude of harm rather than the probability of an accident. Crucially, implicit in their argument is the assumption that victims are homogeneous, a notion that leads them to conclude that, as the number of victims rises, the optimal level of care decreases (due to the spreading of the risk). See Giuseppe Dari-Mattiacci & Eric Langlais, *Social Wealth and Optimal Care* (Amsterdam Ctr. for Law and Econ. Working Paper No. 2008-04, 2008) available at <http://ssrn.com/abstract=1152302>.

⁶⁴ See, e.g., Louis Kaplow & Steven Shavell, *Property Rules versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 713 (1996) (The negotiation between potential victims and potential injurers may fail when there is an ex-ante heterogeneity of either the former or the latter group, and each side knows only the distribution for the other group but not the specific realization of that distribution); Winand Emons & Joel Sobel, *On the Effectiveness of Liability Rules when Agents are not Identical*, 58 THE REVIEW OF ECONOMIC STUDIES 375 (1991) and Juan Jose Ganuza & Fernando Gomez, *Caution, Children Crossing: Heterogeneity of Victim's Cost of Care and Negligence Rule*, ECONOMIC WORKING PAPER NO. 666, DEPARTMENT OF ECONOMICS AND BUSINESS, UNIVERSITAT POMPEU FABRA (both papers calculate the right damage awards when one victim and one injurer are randomly picked from heterogeneous groups); Eric Talley, *Precedential Cascade: an Appraisal*, 73 S. CAL. L. REV. 87 (2000) (using a similar model to show some adverse effects of precedents). Tim Friehe, *On the Incentive Effects of Damage Averaging in Tort Law*, 11 ECONOMICS BULLETIN 1-7 (2007) (showing, using a model with two types of potential victims and only one actual victim, that the negligence regime is efficient, but that, in order to create the right incentives for the parties, average damage awards should be used under strict liability); Tim Friehe, *Screening Accident Victims* (German Working Papers in Law and Econ. 2006(7)) available at <http://www.bepress.com/gwp/default/vol2006/iss1/art7> (exploring the right mechanism to incentivize the actual victim to tell the truth about her real harm); Tim Friehe, *Victim Interdependence in the Accident Setting* (German Working Papers in Law and Econ. 2008(2)), available at <http://www.bepress.com/gwp/default/vol2008/iss1/art2> (analyzing the situation of interdependent potential homogeneous victims and concludes that strict liability with the defense of contributory negligence induces the parties to take efficient care); Jacob Nussim, *Distributive Aspects of Legal Standards* (2008), available at <http://ssrn.com/abstract=1095282> (discussing the distributive affects of liability rules in a situation where the potential victims are heterogeneous, and concluding that the

actual victim (unknown ex-ante) is randomly drawn from a group of heterogeneous potential victims. This approach gives rise to two main problems, both of which arise from the difference between the actual victim and other potential victims: the problem of setting ex-ante efficient standard of care, and the problem of deciding on ex-ante efficient damage awards for the actual victim. It is important to emphasize, however, that both of these problems lose their importance in scenarios where the entire group is subject to risk. The crux of these problems is the need for accuracy, so that the right incentive will be provided for future parties that do not know, ex ante, which victim would be harmed. In these cases, both the courts and the parties lack the knowledge of the actual harm that would result from an accident, and that should be balanced against the costs of precautions. When the entire group of victims is harmed, this amount is known.

Some studies have briefly pointed to possible side effects in cases where the victims are heterogeneous, such as large transaction costs,⁶⁵ or, if heterogeneity is geographic, where a polluting firm might decide to locate its polluting factory.⁶⁶ Only one recent study dealt with multiple-victim situations, contending that in those situations the efficient liability rules are different than those that are efficient in single-victim situations. In his 2009 paper,⁶⁷ Prof. Jain extends his results⁶⁸ as to the necessary and sufficient conditions for a liability rule to be efficient, from the single-victim case to the multiple-victim case. Jain proves that a liability rule would be efficient in a “one injurer, multiple victims” situation, if and only if two conditions are satisfied: (1) When the injurer is negligent, and some of the victims are not negligent, then these victims’ harms must be fully compensated by the injurer; and (2) When some victims are negligent, and the injurer is not negligent, then these victims must bear their entire harm.

The idea behind these two conditions is simple and clear: the basis for the efficiency of liability rules is in that they induce full internalization of

negligence rule has a distributive effect, while the strict liability rule does not. Nussim emphasizes that his results are limited to heterogeneity of only potential victims).

⁶⁵ Mark D. West & Emily M. Morris, *The Tragedy of the Condominiums: Legal Responses to Collective Action Problems after the Kobe Earthquake*, 51 *AM. J. COMP. L.* 903 (2003). (In cases involving heterogeneous victims, transaction costs would rise, due to the variance in harm and disputes about what remedy to pursue.) This point was also mentioned by Parchamovsky & Siegelman, *supra* note 25.

Calabresi and Melamed, on the other hand, hold that it is the large number of victims, rather than their heterogeneity, that brings about the rise in the transaction costs, which poses a difficulty to the implementation of their “Rule 4” in multiple-victims cases. See Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 *HARV. L. REV.* 1089, 1119 (1972).

⁶⁶ Mark A. Cohen & V. Santhakumar, *Information Disclosure as Environmental Regulation: A Theoretical Analysis*, 37 *ENVTL. & RESOURCE ECON.* 599 (2007).

⁶⁷ Satish K. Jain, *Efficiency of Liability Rules with Multiple Victims*, 14 *PAC. ECON. REV.* 1 (2009).

⁶⁸ Satish K. Jain & Ram Singh, *Efficient Liability Rules: Complete Characterization*, 75 *J. ECON.* 105 (2002). But see the criticism on their results in Jeonghyun Kim, *A Complete Characterization of Efficient Liability Rules: Comment*, 81 *J. ECON.* 61 (2004) (criticizing the two crucial assumptions that the harm divides equally between non-negligent parties, and that the social optimum is always unique).

costs. The first condition causes a negligent injurer to internalize the results of her unreasonable behavior. The second condition ensures that negligent victims internalize the results of their own unreasonable activity. An aggregate test for liability induces the whole group of victims to internalize the results of its *aggregate* behavior; nevertheless, the same test would fail to induce each victim in that group to internalize the results of her own behavior.

However, Jain's conditions are unfeasible, for example, for unilateral-care situations, such as in the above example of dilution of liability, or in the *Johnstone* case. In these cases, the aggregative test does indeed satisfy the two conditions, but, as we have seen, may still lead to inefficient results. Jain himself does not mention the aggregative test, nor does he address the problems created by this test.

III. POSSIBLE ALTERNATIVES TO THE AGGREGATIVE TEST

My goal in this section is to explore an efficient alternative to the aggregative risk-utility test. A good alternative would be one that is cost-effective, and at the same time sufficiently general to be applied to any case. This would eliminate the need for a preliminary stage, in which the court determines which alternative to apply—a procedure that may be both costly and fraught with errors.⁶⁹

In evaluating possible alternatives, I will, to some extent, relax the assumption of full and costless information.⁷⁰ This will allow a better, more realistic, examination of the possible alternatives, and yield a more plausible solution.

A. Dividing the Group of Victims into Subgroups

A straightforward strategy in the case in point would be to divide the victims group into homogeneous (or at least *more* homogeneous) subgroups, and

⁶⁹ For example, a suggestion whereby the court would first determine if the victims group is homogeneous enough to apply the aggregative test—is not general enough. Not only is it time-consuming and expensive, but it is also fraught with systematic errors—mainly due to behavioral biases, such as the “outgroup homogeneity (OH) bias” (the tendency to perceive a group to which a person does not belong as more homogeneous than her own ingroup, and than it actually is. *See, e.g.,* Charles M. Judd, Bernadette Park, Vincent Yzerbyt, Ernestine H. Gordijn & Dominique Muller, *Attributions of Intergroup Bias and Outgroup Homogeneity to Ingroup and Outgroup Others*, 35 *EUR. J. SOC. PSYCHOL.* 677 (2005). This bias was found to be robust even in artificial, laboratory-based, groups, without prior stereotypes. It is enough for an ingroup and an outgroup to share but a few *superficial* laboratory-based traits in order for the OH bias to be robust—and as a consequence, jurors may overestimate the homogeneity of the victims' group. *See, e.g.,* Mark Rubin, Miles Hewstone & Alberto Voci, *Stretching the Boundaries: Strategic Perceptions of Intragroup Variability*, 31 *EUR. J. SOC. PSYCHOL.* 413 (2001); Alberto Voci, *Perceived Group Variability and the Salience of Personal and Social Identity*, 11 *EUR. REV. OF SOC. PSYCHOL.* 177 (2000).

⁷⁰ To be consistent, I will retain this assumption when examining whether a given alternative does indeed help solving a problem that was presented in a specific example above, but in evaluating other advantages and disadvantages this assumption will be relaxed.

then, for each group, to conduct a separate risk-utility test. We shall name this alternative “the separating solution.”

The separating solution follows a simple rationale: if the source of the problem is the pooling together of qualitatively different victims, the apparent solution would be to simply refrain from creating such a pool.⁷¹

To understand why the separating solution seems so compelling at first glance, let us go back to the example in Table 1 (on page 7). An examination by the court of the injurer’s liability towards each victim separately, would result in the efficient outcome: Guest A alone would be deemed contributorily negligent (and hence she, and only she, will take the efficient precautions at a cost of 40). Under the negligence rule, the Host would not be held liable towards Guest B, since the expected harm is less than the Host’s costs of precautions. Under the strict liability rule, the Host would prefer to pay 10 in damages to Guest B rather than avert the harm at the cost of 70. Hence, this solution induces the socially desirable outcome of bringing the social costs down to as low as 50.

The separating solution may also seem attractive given that it does not require a drastic change in current procedural rules. Indeed, in class actions, courts sometimes resort to subcategorization.⁷² However, as will presently be shown, this alternative is far from practical, and is not feasible as a general solution, since it suffers from two major shortcomings. The first is possible additional administrative costs. Subcategorization into homogeneous subgroups may be too costly, as it would require large amounts of data. The issue of administrative costs is a matter of great concern in every economic analysis, but even more so in the case of multiple-victim torts. Although often, optimal deterrence is the primary concern and administrative costs are considered of secondary importance, in multiple-victim torts these two concerns integrate. The reason is the existence of an “insolvency cap” on the amount of damages that a potential injurer internalizes. This limit is lowered substantially by the administrative costs of individualized, or separated, litigation; since the overall harm in multiple-victim torts tends to be high, tort law’s deterrent effect may be compromised by high administrative costs.⁷³ This problem is aggravated further by the fact that this solution requires a large amount of data to be presented to, and evaluated by, the court, at very preliminary stages.⁷⁴ This means that high costs are borne at the early stages of the litigation, before other cost-mitigating tools, such as summary judgments or settlement negotiations, can be effectively applied.

There is yet another factor that may further exacerbate the problem of

⁷¹ For a more formal justification for the separating solution *See supra* note 30.

⁷² In the case of *Citgo Ref. & Mktg. v. Garza*, 187 S.W.3d 45 (Tex. App.—Corpus Christi 2006), the court subcategorized the group of victims into thirteen subclasses; for a discussion of this case *see supra*, p. 20.

⁷³ *See* Ian Ayres, *Optimal Pooling in Claims Resolution Facilities*, 53 LAW & CONTEMP. PROBS. 159, 160 (1990).

⁷⁴ In class actions, the data is required before certifying the class(es), while in unitary actions—in the pretrial.

high costs. In many cases, there is no clear-cut way to subcategorize the victims group, other than into single-person groups. Particularly when the number of types of victims is large, the separation line between the groups can become too vague. The example in Table 1 above was a simple case involving two victims where such a distinctive line clearly exists, but as the number of victims rises—and with it their heterogeneity—no clear-cut line of separation may present itself. The option of separating the group before thoroughly investigating the issue of liability may thus be redundant.⁷⁵

However, even if the costs of dividing the victims into subgroups were not prohibitively high, the separating solution would still carry a major disadvantage, possibly even worse than the first, which would render this alternative not general enough. As has already been stated, not only is aggregation sometimes unproblematic, but also in certain instances it may be the only way to reach efficiency. In such cases, the separating solution will prove inferior to the aggregative test, as is evident from Table 4.

Table 4: A Situation Where Efficiency Necessitates Aggregation

	Victim A	Victim B	Victim C	Aggregation	Injurer
Precaution Costs	85	15	20	120	70
Expected Harm	50	25	40	115	

In this example, the socially desirable outcome would be for the injurer, and him alone, to invest in precautions, and the aggregative test does indeed yield the efficient result.⁷⁶ The separating solution, on the other hand,

⁷⁵ This point can be illustrated using the following example, in which there are six heterogeneous victims:

	Victim 1	V-2	V-3	V-4	V-5	V-6	Aggregate Amounts	Injurer
Costs of Precaution	35	45	25	50	40	30	225	198
Expected Harm	15	25	35	45	55	65	240	

Applying the aggregative test here yields the inefficient result whereby the injurer should be held liable (since $198 < 225 < 240$). It is inefficient because if the court exempts the injurer from liability, the social costs would amount to only 180 (victims V-3, V-5, and V-6 would take precautions, while V-1, V-2, and V-5 would suffer the harm).

However, in this scenario, if the court wishes to apply the separating solution there would be no distinctive line of separation between the victims that would yield an efficient result. Neither of the two seemingly adequate lines of subcategorization—namely, according to harm levels (victims with harm higher than 33 or lower than 33), and according to costs of precaution (victims whose precaution costs are higher than 33 and victims whose precaution costs are lower than 33)—yields optimal deterrence. Both yield that the injurer would be deemed liable towards one of the subgroups, and therefore would have to be deemed liable towards the other group as well—to prevent a worst-case equilibrium where both the injurer and some victims take precautions. Consequently, the separating solution here does not yield a better solution than the aggregative test.

⁷⁶ Since the injurer's costs (70) are less than both the aggregate harm (115) and the aggregate precaution costs available to the victims (110), the injurer would be deemed liable, and thus would be provided with incentives to take precautions.

will not—or, rather, will not necessarily—results in the efficient outcome. If each individual victim’s case had been adjudicated on its own merits, then the injurer would not have been held liable towards victims B and C and, consequently, B and C would have had to invest in their own precautions. Under negligence, the injurer would not have been liable towards Victim A either. Under strict liability, on the other hand, she would have been liable towards Victim A, but would have preferred not to take precautions. Thus, such individualized determination of liability results in the societal costs of 85⁷⁷ instead of only 70, and is, therefore, inefficient. Only a separation of the victims group that somehow lumps together Victim A and one other victim can yield the efficient result, yet such a separating line cannot be deduced from any general rule: Victims B and C, in fact, bear more resemblance to each other than to Victim A.

In conclusion, even when full and cheap information is available, separation may not be useful in all cases and, therefore, does not serve as a general solution.

B. Bifurcation

The second alternative is to bifurcate, that is, to render separate decisions on the issues of the injurer’s primary liability and the victims’ contributory negligence. The idea behind this alternative is to separate the issues rather than the group. First, the court shall decide on the injurer’s preliminary liability. Then, provided the tortfeasor is held liable, the court will decide on the victims’ contributory negligence, separately for each victim. This suggestion is expected to save some of the procedural costs that are inherent in the separating solution. It actually is sometimes used in practice, alongside some of its variants, as a means to bypass the commonality and the predominance requirements of rule 23 of the FRCP.⁷⁸

Two comments about bifurcation are in order at this point. First, it will save costs only under the negligence regime, because under the strict liability regime the tortfeasor’s liability is pre-decided by law. Second, if, in deciding on the issue of the injurer’s primary liability, courts resort to the aggregative test, the result of bifurcation might still be as inefficient as the aggregative test. This point may become clearer if we recall that the aggregative test is inefficient in some unilateral care situations as well. Thus, in the *Johnstone* case, which was discussed earlier, bifurcation would not have yielded a different outcome.

Furthermore, just like the separating solution, bifurcation will not yield efficient outcomes in cases where only the aggregation of precaution costs leads to efficiency, like the one in Table 4. Consequently, this alternative is roughly as disadvantageous as the separating solution,⁷⁹ albeit

⁷⁷ Victim A would suffer a harm of 50, and victims B and C would invest 15 and 20 in precautions, respectively.

⁷⁸ See, e.g., *In re Visa Check/MasterMoney Antitrust Litig.*, 280 F.3d 124, 141 (2d Cir. 2001).

⁷⁹ Namely, high administrative costs and inefficient outcomes in cases such as the one

on a slightly smaller scale. The smaller scale is due to the existence of negligence cases in which the victims would not be able to establish a *prima facie* case of liability, which saves the additional administrative costs of gathering information about the plaintiffs' costs of precaution.

Hence, like the solution of separation, a mandatory bifurcation of litigation does not work as a general solution. We must therefore rely on other concepts, which may require some changes in the existing law.

C. Sampling

One possible way to mitigate the disadvantages of the separating solution would be by using samples of victim cases instead of a full individual adjudication. In a yet unpublished paper⁸⁰, Prof. Rosenberg suggests sampling as a new mechanism for resolution of multiple claims against a single big defendant. According to Rosenberg's proposal, the defendant and the prospective plaintiffs will decide on the number of claims to be randomly sampled from the entire group, and then litigate only those claims. The results of these random claims would be averaged, and each plaintiff whose claim was not individually adjudicated would receive the average amount of damages, irrespective of the merits of her specific claim.

The sampling solution will indeed save enormous amounts of administrative costs, and is therefore undoubtedly preferable to the separating solution.

Prof. Rosenberg asserts, moreover, that this alternative will not preclude achieving optimal deterrence. This claim, however, might not be entirely correct. In cases where the separating solution yields a wrong result, so would sampling. For example, the case illustrated in Table 4 would not have resulted in a different outcome had sampling been used instead of the separating solution, and thus, under-deterrence would still have occurred. For example, if the plaintiffs and the defendant were to agree that only one claim would be litigated, the expected damages the injurer would have to pay would amount to only 50⁸¹. As a result, the injurer would prefer not to invest 70 in the socially desirable precautions. Victims B and C would prefer to invest in their own precautions, and Victim A would prefer to suffer the harm and then sue the defendant. The overall societal costs would thus be 85, instead of 70. If the plaintiffs and the defendant would agree to sample two claims, the result would remain the same.⁸²

illustrated in Table 4.

⁸⁰ David Rosenberg, *A New Sampling Method for Reducing the Cost of Resolving Differing Claims against a Defendant* (2008) (unpublished manuscript, available at <http://www.law.harvard.edu/faculty/workshops/open/papers0708/rosenberg.paper.pdf>).

⁸¹ If Victim A is picked, the damages would be $3 \times 5 = 150$, but if either Victim B or Victim C are picked, the claim would be rejected as they would be deemed contributorily negligent. The expected damages are therefore $0.333 \times 150 + 0.333 \times 0 + 0.333 \times 0 = 50$.

⁸² If victims A and B are picked, the injurer will have to pay 75 in damages (50 to Victim A, 0 to Victim B and 25 to Victim C). If victims A and C are picked, the injurer will again have to pay 75 in damages (50 to Victim A, 0 to Victim C and 25 to Victim B). If victims B and C are picked, the injurer will not have to pay anything. The expected damages in this case are therefore 50. ($0.333 \times 75 + 0.333 \times 75 + 0.333 \times 0 = 50$).

The sampling solution is thus much more preferable to the separating solution, in that it saves many of the administrative costs—but it still cannot be considered a sufficiently general solution.

D. The Aggregation of Minimal Amounts

The next alternative involves abandoning the distinction between precaution costs and levels of harm. Accordingly, the court should still use the aggregative test, but not aggregate separately the victims' costs of precautions and their levels of harm. Rather, the court should aggregate the minimum of these costs, and compare the injurer's costs with the victims' aggregate minimal costs. In more mathematical terms, the adjusted aggregate Hand formula should be $B < \sum_{i=1}^n \text{Min}(P_i L_i, C_i)$, where B denotes the injurer's costs of precaution, n is the number of victims, $P_i L_i$ is Victim i's expected harm, and C_i is Victim i's costs of precautions.

It is easy to see that in bilateral-care situations, this alternative will indeed lead to minimizing the costs of accidents. However, this suggestion is fraught with three major problems: the first two—conceptual and the third—pragmatic.

The first conceptual problem is that, in abandoning the distinction between costs of precautions and levels of harm, we also abandon the distinction between the two negligence-based regimes. Specifically, this solution changes the nature of the rule of 'strict liability with a defense of contributory negligence' and equates it with the 'negligence with a defense of contributory negligence' rule. This might seem unproblematic at first glance, but if we consider that in certain types of torts there are justified reasons to prefer strict liability over negligence (e.g., in cases where it is important that injurers, rather than victims, internalize their level of activity), then this solution may prove counterproductive. For example, both in unilateral care situations and in cases where every victim has a harm level that is less than her costs of precaution, this solution dictates a comparison between the injurer's costs of precautions and the victims' aggregate level of harm. This means that the *de facto* regime would be negligence, while the *de jure* rule may be strict liability. As a result, the victims will be the ones to bear the residual harm, thereby depriving the injurer of an incentive to adopt the efficient level of activity.

The second conceptual problem is that in unilateral care situations aggregating minimal amounts will not perform better than the aggregative test. As a result, in cases such as the *Johnstone* case or the "dilution of liability" example, this alternative cannot solve the problems posed by the heterogeneity of the victims group.

The third reason why resorting to the aggregation of minimal amounts is problematic is that, much like with the separating solution, in order to implement it, courts will still need large amounts of data. In addition, although under this rule, the administrative costs would probably

amount to less than under the separating solution, one can still expect them to be prohibitively high. The lower costs thereof are due to cases where, for example, it is obvious that the marginal harm levels are lower than the marginal precaution costs. In such cases, the court would not require any data on precaution costs, and could be satisfied with the data on levels of harm alone. In opposite examples, however, when victims differ from one another with respect to the levels-of-harm to costs-of-precautions ratio—and these are the truly problematic cases—the costs might actually go up, since determining which of the two is greater may require additional proceedings.

In light of all the arguments presented above, the aggregation of minimal amounts fails as a general solution.

E. Restitution and “Restitution Plus”

As a solution to the problem of strategic investment in inefficient precautions, Prof. Guttel suggested⁸³ a legal regime based on a combination of liability on the one hand and restitution for efficient investment in precautions on the other. On Guttel’s proposal, a tortfeasor should be entitled to restitution from a potential victim—or from a potential joint-tortfeasor—for cost-justified precautions. Other scholars, too, have advocated a similar approach.⁸⁴ This idea, if expanded to allow for restitution from the injurer to victims as well, may prove as a solution to some of the problems presented herein. Under this rule, both the victims and the injurer would be entitled to restitution from the other party, in exchange for an efficient investment in precautions. Once a party invests in efficient precautions, she would be able to sue the other party for full indemnification for her costs. To illustrate how this rule works, let us return to the first example above:

	GUEST A	GUEST B	AGGREGATION	HOST
EXPECTED HARM	100	10	110	
PRECAUTION COSTS	40	80	120	70

In this example, given the restitution rule, the efficient outcome (i.e., an outcome under which Guest A and no one else invests in precautions) would become a Nash equilibrium. In other words, if Guest A, and only she,

⁸³ Ehud Guttel, *The (Hidden) Risk of Opportunistic Precautions*, 97 VA. L. REV. 1389 (2007).

⁸⁴ Alon Harel and Assaf Jacob advocated restitution for precaution costs between injurers in joint-tort cases. See Harel & Jacob, *supra* note 15, at 448-449.

Susan Rose-Ackerman suggested restitution for efficient investment in precautions in deliberate negligence scenarios. See Susan Rose-Ackerman, *Dikes, Dams, and Vicious Hogs: Entitlement and Efficiency in Tort Law*, 18 J. LEGAL STUD. 25, 27-33 (1989).

Ariel Porat suggested establishing a general rule of restitution for a broader range of cases. See Ariel Porat, *Expanding Restitution Liability for Unrequested Benefits*, at 34 (Univ. of Chi. Law Sch., John M. Olin Law & Econ. Working Paper No. 388, 2008), available at <http://ssrn.com/abstract=1088796>. For a more technical economic analysis see Giuseppe Dari-Mattiacci & Nuno M. Garoupa, *Least Cost Avoidance: The Tragedy of Common Safety*, at 7 (George Mason Law & Econ. Research Paper No. 04-27, 2007), available at <http://ssrn.com/abstract=560062>. See also Giuseppe Dari Mattiacci, *Toward a Positive Economic Theory of Negative Liability* (George Mason Law & Econ. Research Paper No. 03-29, 2008) available at <http://ssrn.com/abstract=422961>.

takes precautions—no party would be able to improve their payoffs by choosing another strategy. The rule of restitution provides Guest A with a utility of 0 (she invests 40 in precautions, for which she is fully indemnified); Guest B has a utility of (-10) and can only decrease her utility if she invests in precautions⁸⁵; the Host has a utility of (-40), and can only decrease her utility to (-70) or to (-110) if she invests in precautions. The total social costs thus amount to 40, the least possible cost.

This solution does carry a number of advantages over all the previously-discussed options, despite some shared features such as individual litigation. First—as opposed to both the separating solution and sampling—this alternative does not lead to inefficiency in cases exemplified in Table 4⁸⁶, and therefore is applicable to cases where aggregation is needed as well as to those where aggregation leads to inefficiency.

Second, it is quite understandable why, in this alternative, the overall administrative costs should amount to less than under the separating solution. Not only would courts need less data under this rule than under the separating solution, but the available data is also less ambiguous: recall that under this rule, the plaintiffs sue only after investing in the precautions, and therefore facts about the precaution costs are easily available and less ambiguous⁸⁷. Third, this solution provides the parties with much more realistic options. Some potential victims, for example, would be able to receive financing for the costly yet efficient precautions if they had a right to indemnification for these precautions.

Another advantage is that each victim decides for herself whether it is in her best interest to invest in precautions, and the efficient solution is thus “privatized.” It is plausible to assume that victims have better *ex ante* knowledge than both the courts and the injurer, and thus are in a better position to decide on investing in precautions. These pluses result in more efficient actions on the part of potential victims.

Another—practical—advantage of allowing for restitution is that it is integratable with the other alternatives. Since restitution is a pre-accident solution, it does not interfere with post-accident adjudications (when an accident does occur), thus allowing the final solution to combine the advantages of this and the other alternatives, the best of which may very well be sampling. This combination of rules—restitution in the pre-accident period and sampling in the post-accident period—will carry the advantages of both these alternatives.

However, to reach first-best efficiency, restitution per se may not be enough, even when combined with post-accident sampling of claims. In the

⁸⁵ Because the investment in B’s precautions is inefficient, she would not be entitled to restitution.

⁸⁶ The injurer in that example is eligible for indemnification, since her precautions are cost-justified; inasmuch as it is the injurer who is expected by the victims to take steps to avert the harm, no victim would invest in precautions.

⁸⁷ It is true that data about the potential harm that was averted may be more ambiguous than in the case of actual harm. However, the scope of this objection is limited, as it does not apply to future harm, which is ambiguous also in the case of actual harm.

previously-illustrated problematic cases, restitution causes the efficient outcome to become a Nash equilibrium, but not a *unique* Nash equilibrium. Put differently, if courts continue to use the aggregative test in post-accident claims—in cases like Table 1 for example—then the profile of strategies in which the injurer and no other party invests in precautions likewise constitutes a Nash equilibrium. Similarly, if courts use sampling for post-accident claims, the inefficient outcome of Table 4 is also a Nash equilibrium. The source of the problem is in that, for Guest A in Table 1 and for the Injurer in Table 4, investing in the efficient precautions is only a *weakly dominant* strategy, rather than a *strictly dominant* one: their net utility would amount to 0 irrespective of whether they avert the harm and sue for indemnification for their costs or not.

One way to obtain uniqueness for the efficient Nash equilibrium is to adopt a “restitution plus” rule, under which the party who invests in the efficient precaution is fully indemnified for her investment and, in addition, receives a *small* “reward.”⁸⁸ If this rule is implemented, investment in efficient precautions would become a *strictly dominant* strategy; the efficient Nash equilibrium thus becomes unique.

The combined “restitution plus”-sampling solution can thus be an optimal adjustment for the current law, one that would help to achieve efficiency in multiple-victim cases. This solution requires some revisions to current law; moreover, it may attract some criticism on the grounds of corrective justice;⁸⁹ nevertheless, it is highly advantageous with respect to efficiency and optimal deterrence.

IV. SOME POSSIBLE EXTENSIONS AND DOCTRINAL IMPLICATIONS

While the basic insights offered in this Article may be extended in future research to other areas within the economic analysis of torts, a detailed investigation of these implications is beyond the scope of this Article. This section will briefly touch on two of these issues, in hope that future research will explore them in more depth.

A. Multiple Injurers and Joint Liability

A “mirror image” of the heterogeneous-victims case is the case of heterogeneous injurers in joint torts. When multiple heterogeneous injurers jointly inflict harm on a victim, the application of an aggregative risk-utility test may result in an inefficient determination of liability. To illustrate this, consider the following example: Two factories pollute a nearby landfill, each

⁸⁸ In the example illustrated in Table 1, Victim A would receive a certain amount, say \$41, for her investment of \$40 in precautions.

⁸⁹ As Prof. Guttel rightfully notes, allowing restitution for precaution costs has major implications on distributive justice. For example, allowing an injurer to sue potential victims for indemnification for her investment in precautions may seem unjust. However—as Prof. Guttel emphasizes—once the first-best efficient outcome is reached, the legislature is free to redistribute the wealth to regain distributive and corrective justice. See Guttel, *supra* note 84, at 1429.

emitting a different chemical, which, although not toxic by itself, can react with the other to form a toxic compound. Consider the numbers in Table 5:⁹⁰

Table 5: Joint Torts

	FACTORY A	FACTORY B	AGGREGATION	LANDOWNER
EXPECTED HARM				140
PRECAUTION COSTS	50	50	100	80
UTILITY FROM THE INJURERS' ACTIVITY	100	40	140	

A cumulative approach to the injurers' costs yields contributory negligence of the landowner. The factories would be, therefore, not liable, inducing the landowner to abate the risk of her own accord at a cost of 80. The net societal utility would thus amount to 60 (140-80). However, imposing liability on the injurers can reduce the accident's social costs to 0 while maximizing the net societal utility to 100: Factory B will refrain from activity altogether (since its costs of precautions are greater than its utility), while Factory A will not need to take any unnecessary precautions (since its emission is not harmful per se.)⁹¹

In this case, the suggested rule of "restitution plus" might not produce the first-best outcome, since the latter does not involve efficient investment in precautions—rather it impels Factory A to refrain from activity altogether⁹². The efficient solution may, therefore, have to be more complex. It may be based upon Ronen Avraham's "Modular Liability Rules,"⁹³ whereby the parties are provided with a pair of subsequent options⁹⁴. However, exploring this solution is beyond the scope of this Article, and is, therefore, left for future research.

⁹⁰ In order to simplify the example, I left other remote parties off the chart, assuming that the injurers enjoy all the social utility from their activity, and that only the landowner bears the risk. Real life examples are, of course, more complicated, but the insight presented here can be extrapolated to them as well.

⁹¹ Landes and Posner suggest that in joint tort cases, the injurers are to be deemed jointly and severally liable, but that each tortfeasor should be fully indemnified by the least-cost avoider. *See* LANDES & POSNER, *supra* note 5, at 198-201. In this case, however, this suggestion is unhelpful, since the precaution costs for both the factories are equal.

⁹² Allowing Factory B to sue for indemnification for lost earnings may be problematic, since this rule may provide incentives to strategically launch dangerous projects for the sole purpose of shutting them down and suing for lost earnings.

⁹³ Ronen Avraham, *Modular Liability Rules*, 24 INT'L. REV. L. & ECON. 269 (2004) (addressing the problem of the different valuations for legal rights subject to a nuisance case, with two-sided asymmetric information, where parties have incentives to falsely and strategically declare their valuations to their rights or duties).

⁹⁴ Instead of the single option suggested by Calabresi and Melamed, *supra* note 65, the rules that Prof. Avraham has suggested comprise *two* subsequent options. For example, both parties may be provided with a put option, so that the victim may choose between an injunctive relief and damages. In case the victim prefers damages, the injurer pays the damages and then is given a consecutive put option: to be paid to stop polluting or to continue polluting; another rule would provide both parties with a call option: the injurer decides between paying damages and stopping to pollute. If she pays damages the victim would be granted with a consecutive option: to pay the injurer to stop polluting or to bear the risk; yet another rule may provide one of the parties with a call option, and the other with a put option.

B. Punitive Damages

One longstanding common justification for punitive damages from an economic standpoint posits that when an injurer inflicts a risk of harm not only on one individual plaintiff but also on other victims who may not sue—optimal deterrence dictates that augmented damages should be awarded.

Polinski and Shavell, for example, suggest⁹⁵ that because tort victims do not always sue⁹⁶—and even when they do, the plaintiff sometimes fails to prove her case—the damage awards should be multiplied by the multiplicative inverse of the probability of a successful lawsuit. Sharkey suggests that in intentional torts, courts should award the plaintiff “societal damages,” that is, punitive damages that reflect the societal harm.⁹⁷ These and similar justifications are not restricted only to academics. Judge Calabresi’s concurrence in *Ciraolo v. City of New York*⁹⁸, for example, is chiefly based upon his notion of “socially compensatory damages”: when an injurer causes harm to multiple victims of whom only one takes legal action against this injurer, the damage award to that plaintiff should be multiplied by the number of victims that the court assesses to have been harmed by the injurer’s same activity.⁹⁹

However, if victims are heterogeneous, determining the accurate amount of punitive damages can become a complex task. Courts can no longer deem it sufficient to estimate whether the actual plaintiff is a typical or an average victim, and then multiply the compensatory damages by the number of victims. Rather, the decision must also take into account the other victims’ precaution costs, as well as their heterogeneous amounts of harm. To illustrate this point, consider the example in Table 6 below. Suppose that an injurer inflicts harm on three victims, with harm levels ranging from 20 to 60, and with costs of precautions that fluctuate between 20 and 50. Suppose further that the injurer’s precaution technology is such that her precaution costs depend on the number of victims.

⁹⁵ A. Mitchell Polinsky & Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARV. L. REV. 869, 873-874 (1998).

⁹⁶ For the claim that victims do not always sue, see also Dorsey D. Ellis, Jr., *Fairness and Efficiency in the Law of Punitive Damages*, 56 S. CAL. L. REV. 1, 25-26 (1982). See also *In re Zyprexa Products Liability Litig.*, 489 F. Supp. 2d 230, 247 (E.D.N.Y. 2007) (“Despite this effective civil prosecution network, there are usually a substantial number of potential harmed plaintiffs who never press their claims.”)

⁹⁷ Catherine M. Sharkey, *Punitive Damages as Societal Damages*, 113 YALE L. J. 347, 363-370 (2003). See also Thomas C. Galligan, Jr., *Disaggregating More-Than-Whole Damages in Personal Injury Law: Deterrence and Punishment*, 71 TENN. L. REV. 117 (2003).

⁹⁸ 216 F.3d 236 (2d Cir. 2000).

⁹⁹ *Id.*, at 243 (“In (some) cases, however, compensatory damages will not come close to equaling all the costs properly attributable to the activity. Costs may not be sufficiently reflected in compensatory damages for several reasons, most of which go to the fact that not all injured parties are in fact compensated by the responsible injurer.”) See also Prof. Sebok’s analysis of Judge Calabresi’s opinion in Anthony J. Sebok, *Deterrence or Disgorgement?: Reading Ciraolo after Campbell*, 64 MD. L. REV. 541 (2005).

Table 6: Punitive Damages

	Victim A	Victim B	Victim C	Aggregation	Injurer
Precaution Costs	20	35	50	105	30 per victim
Expected Harm	60	40	20	120	

In the first-best equilibrium, Victims A and B take precautions, while Victim C bears the harm. The societal harm would thus amount to 75. However, consider a hypothetical that none of the victims had taken precautions before the harm occurred, and only B sues the injurer (all others being precluded from doing so by circumstances beyond their control). In this case, the court will be satisfied that B is an average victim (she is in fact the average victim: her marginal precaution costs are the victims' average costs of precautions, as is her marginal level of harm). Under the current paradigm, the court will also be satisfied that the injurer fails the aggregative risk-utility test, since she could have averted the overall harm of 120 by investing only 90 in precautions. Moreover, neither B nor the entire class of victims would be found contributorily negligent (the victims' cumulative cost of precautions is $105 > 90$). Under the existing paradigm, the court is therefore supposed to multiply B's compensatory damages by three, awarding her 120 in damages.¹⁰⁰

However, contrary to current theoretical predictions, this amount cannot ensure the efficient equilibrium. If the injurer expects to pay this amount, she will definitely invest in precautions, and the total societal costs will amount to 90. Insofar as courts continue to determine liability by the aggregative test, this way of deciding on punitive damages might actually lead to a societal loss, which in this example would amount to 15 ($90 - 75$). Thus, the major economic justification for punitive damages may lose some of its grip.

CONCLUSION

Modern life presents a growing number of cases involving multiple victims, which are markedly different from the classic "one injurer – one victim" accidents. The increasing interest in the efficient regulation of multiple-victim accidents has highlighted the need to reevaluate the ways courts determine liability in these cases. An attempt at such reevaluation undertaken in this Article has shown that the current paradigm, focusing on aggregate costs and benefits to determine the injurer's liability, may be inefficient. When victims are heterogeneous, the aggregative risk-utility test sometimes fails to detect the least-cost avoiders, leading thereby to the wrong determination of liability.

¹⁰⁰ This theoretical example is directed against solutions advocated in the current literature, which may not achieve optimal deterrence. Hence, it does not encompass, e.g., the recent U.S. Supreme Court decision in *Exxon Shipping Co. v. Baker*, 128 S. Ct. 2605 (2008), capping the punitive damage awards in maritime torts at a ceiling of 100% of the compensatory damages.

Accordingly, in certain cases involving heterogeneous victims, tort law's interest in aggregate efficiency is best served by not focusing on aggregate amounts. The paradoxical nature of these situations may have caused scholars and courts to disregard some of the counter-intuitive yet realistic consequences of the aggregative risk-utility test. Thus, under some circumstances, the injurer may prefer to cause more rather than less harm, while the mere existence of liability-rules drives her to take a less socially desirable course of action than she would in a world with no liability. In other cases, an injurer who is not liable toward any of the plaintiffs individually might wrongfully be held liable toward all of them jointly.

The problems presented in this Article have a wide spectrum of real-world implications. Thus, as has been demonstrated above, they may arise in a wide range of multiple-victim accidents, from catastrophic to involving only two victims, and in both unilateral and bilateral care situations.¹⁰¹

This Article has explored the determination of liability¹⁰² in tort law. The analysis herein has therefore been adapted to tort law's distinctive characteristics. Yet, the basic insights might also have a bearing on other areas of the law, e.g., criminal law,¹⁰³ corporate law,¹⁰⁴ and constitutional law¹⁰⁵—subjects to be explored in future research.

Further research may also concentrate on the behavioral aspects of multiple-victim situations. In this connection, two main biases come to mind: Outgroup Homogeneity Bias¹⁰⁶ and Misperception of Variance.¹⁰⁷

¹⁰¹ This means, for example that the claim that victims of mass torts usually cannot control the scope of the harm has only little bearing, if at all, on the concern of this Article. For that claim see, e.g., Paul S. Bird, *Mass Tort Litigation: A Statutory Solution to the Choice of Law Impasse*, 96 YALE L. J. 1077, 1087 (n. 53) (1987); Jennifer H. Arlen, *Compensation Systems and Efficient Deterrence*, 52 MD. L. REV. 1093, 1095 (1993) (“Injuries to community residents caused by a producer’s hazardous waste or other environmental pollutant is a classic example of a unilateral risk accident between strangers.”)

¹⁰² This analysis does not address, for example, the amount of aggregate damages that a class in a class action would receive after the liability is decided. This too raises some problems. See generally Jon Koslow, *Estimating Aggregate Damages in Class Action Litigation under Rule 10b-5*, 59 FORDHAM L. REV. 811 (1991). See also *Bell v. Farmers Insurance Exchange*, 115 Cal. App. 4th 715, 746-762 (2004) (upholding the use of statistical samplings to prove damages).

¹⁰³ Robert Mikos, for example, pointed out that in criminal law, the heterogeneity of victims may sometimes justify precautions that are only meant to drive the offender to commit the crime somewhere else. See Robert A. Mikos, “Eggshell” Victims, Private Precautions, and the Societal Benefits of Shifting Crime, 105 MICH. L. REV. 307 (2006).

¹⁰⁴ Heterogeneity of shareholders should influence cost-benefit analyses in firms, and therefore should have a bearing on managers’ decisions.

¹⁰⁵ Heterogeneity of citizens’ interests may require that the economic analysis of constitutional issues look deeper than the simple aggregation of the citizens’ utility and disutility from the possible courses of actions that the government is faced with.

¹⁰⁶ The “outgroup homogeneity (OH) bias” is the tendency of people to perceive a group to which they do not belong as more homogeneous than their own ingroup, and as more homogeneous than that outgroup actually is. See, e.g., Charles M. Judd, Bernadette Park, Vincent Yzerbyt, Ernestine H. Gordijn & Dominique Muller, *Attributions of Intergroup Bias and Outgroup Homogeneity to Ingroup and Outgroup Others*, 35 EUR. J. SOC. PSYCHOL. 677 (2005). The OH bias was found to be robust even in artificial, laboratory-based groups with no prior stereotype. It is enough for the ingroup and the outgroup to

The opening of this Article asked how tort law can regulate multiple-victim accidents in a way that will lead to economic efficiency. This question can be answered in the affirmative only if we tailor modern liability rules to the modern reality. Correspondingly, this Article has suggested a paradigm shift in the way tort law tries to regulate multiple-victim cases.¹⁰⁸ Instead of determining liability based on aggregate harm, aggregate benefits or aggregate cost of precautions, I have argued for a combined regime. In the pre-accident period, this regime would allow for restitution of precaution costs with an added small bonus. In the post-accident period, liability would be determined based on sampling. The implementation of either of these solutions would require a change in legislation.

share but a few *superficial* laboratory-based traits in common in order for the OH bias to be robust. See, e.g., Mark Rubin, Miles Hewstone & Alberto Voci, *Stretching the Boundaries: Strategic Perceptions of Intragroup Variability*, 31 EUR. J. SOC. PSYCHOL. 413 (2001); Alberto Voci, *Perceived Group Variability and the Salience of Personal and Social Identity*, 11 EUR. REV. SOC. PSYCHOL. 177 (2000).

These findings may indicate the possibility that in multiple-party tortious events, OH bias may influence both the parties and the courts. The demonstration of an OH bias in ad hoc laboratory-based groups may indicate that a robust OH bias can be invoked by the mere separation into, e.g., “residents” and “businessmen,” “injurers” and “juries,” or “victims” and “judges.” OH bias should be significant especially in mass tort cases. The research suggests that when groups of victims are large, the expected OH bias would be stronger. Moreover, in cases where the group of victims is less socially powerful than the injurer (or, in a bench trial, than the judge), this group is likely to be perceived as overly homogeneous. Furthermore, the legal system’s insistence on separation between the judge or juries and the parties, although crucial to justice, may ironically induce a much stronger bias in the court. It is unlikely that the judge, the jury, or the injurer should be closely acquainted with individuals from the victims group, and in addition, it is feasible that in mass tort situations, the group of victims will share some common properties, such as location, illness, interests, occupation, etc. In such cases, a significant OH bias might therefore be observed.

¹⁰⁷ Behavioral studies suggest that people do not make the adjustments required by the nature of the samples they use, and thus generate a more homogeneous picture of the world. This is because a sample’s variance is lower than the sampled population’s variance. See Yaakov Kareev, *On the Perception of Consistency*, in BRIAN H. ROSS, (ed.), *THE PSYCHOLOGY OF LEARNING AND MOTIVATION*, VOL. 44 (2004), p. 261 (“[P]eople ... do not correct for the biased values likely to be observed in small samples. Thus, people are shown to rely on biased estimates of variability and correlations.”) Thus, an injurer or a court might perceive the group of victims as more homogeneous than it really is, if samples are used.

¹⁰⁸ In this Article, I have restricted my criticism of the aggregative risk-utility test to the economic perspective. This does not mean, however, that it is the only valid critical perspective. The aggregative test can be criticized also from the perspectives of distributive justice, corrective justice, or individual autonomy. For this criticism see generally John B. Atanasio, *The Principle of Aggregate Autonomy and the Calabresian Approach to Products Liability*, 74 VA. L. REV. 677 (1988) and Kenneth W. Simons, *Tort Negligence, Cost-Benefit Analysis, and Tradeoffs: A Closer Look at the Controversy*, 41 LOY. L.A. L. REV. 1171 (2008).

APPENDIX: INEFFICIENCY UNDER THE COMPARATIVE NEGLIGENCE DEFENSE

In order to see why a cumulative approach may result in over-deterrence under the defense of comparative negligence, and not only under the defense of contributory negligence, let us return to Table 1.

	GUEST A	GUEST B	AGGREGATION	HOST
EXPECTED HARM	100	10	110	
PRECAUTION COSTS	40	80	120	70

There are two basic formulas to compute a party's share of liability¹⁰⁹:

$$(I) \text{ Party's share of liability} = \frac{(\text{expected harm}) - (\text{party's precaution costs})}{2X(\text{expected harm}) - (\text{total precaution costs})}$$

$$(II) \text{ Party's share of liability} = \frac{(\text{total precaution costs}) - (\text{party's precaution costs})}{\text{total precaution costs}}$$

If the court were to use the first formula, the cumulative approach would result in no share of liability to the plaintiffs¹¹⁰, thus driving Guest A to refrain from taking precautions, and instead causing the Host to invest in too-costly precautions. An individual approach, on the other hand, would result in a comparative negligence of 66.6% to Guest A¹¹¹ and 0% to Guest B. Under the individual approach, Guest A will prefer to take precautions at the cost of 40, rather than to suffer the harm of 100 and later to be compensated for only 33.3. The Host would prefer not to invest 70 in the too-costly precautions. The individual approach thus results in social costs to the amount of 50, while the cumulative approach results in social costs to the amount of 70.

If the court were to use the second formula, the cumulative approach would result in the plaintiffs' share of liability of 36.84%¹¹², thus again

¹⁰⁹ See Gary T. Schwartz, *Contributory and Comparative Negligence: A Reappraisal*, 87 YALE L. J. 697, 705-706 (n. 44) (1978). See also WERNER Z. HIRSCH, LAW AND ECONOMICS: AN INTRODUCTORY ANALYSIS 157 (3rd ed., 1999). David Sobelsohn has suggested yet another formula. See David C. Sobelsohn, *Comparing Fault*, 60 IND. L. J. 413, 420 (n. 58) (1985). However, Sobelsohn's formula is unfeasible for two main reasons. First, it yields that the injurer has to pay damages even when she is not negligent. Second, in multiple-victim cases, the amount of damages that the injurer pays differs from the amount of damages that the victims receive.

¹¹⁰ There will be no liability assigned to the plaintiffs since the result of the calculation of the guests' share, $\frac{110-120}{200-190}$, is a negative number, while the calculation of the Host's share is greater than one: $\frac{110-70}{200-190} = 4$. This result is, of course, reasonable in itself, since the guests are, on aggregate, not negligent at all.

¹¹¹ $\frac{100-40}{200-110} = \frac{2}{3}$

¹¹² $\frac{190-120}{190} = \frac{7}{19} = 0.3842\dots$

driving Guest A to refrain from taking precautions. The Host likewise would then prefer not to invest in precautions, since she would expect to pay only 69.5 to the plaintiffs, i.e., less than her cost of precautions (70). Thus, the cumulative approach would yield the worst possible outcome: social costs of 110, since no party will take precautions. An individual approach, on the other hand, would result in a comparative negligence of 63.6% to Guest A¹¹³ and 90.9% to Guest B¹¹⁴. Guest A would therefore prefer to take precautions at the cost of 40, rather than to suffer the harm of 100 and later receive only 36.4 in compensation. The overall social costs of the individual approach would thus be 50, instead of 110 as under the cumulative approach.

¹¹³ $\frac{110 - 40}{110} = \frac{7}{11}$

¹¹⁴ $\frac{110 - 10}{110} = \frac{10}{11}$