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Ariel Porat

Tel Aviv University

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EX-POST RIGHT, EX-ANTE WRONG

Ariel Porat*

ABSTRACT

Should a doctor be held liable under negligence law for harmful treatment she administered to a patient, if the treatment should have been considered negligent at the time it was administered, but is now considered reasonable at the time of trial? Should a manufacturer be held liable for harm caused to a consumer from a product that is considered reasonable, and therefore non-defective, at the time of trial, but that should have been considered unreasonable, and therefore defective, at the time of its distribution? More generally put: Should the law impose liability for ex-post right but ex-ante wrong behaviors? The answer offered by this Article is yes, on both efficiency and corrective justice grounds. The Article also proposes the adoption, in certain cases, of an “alternative liability rule,” whereby an injurer bears liability if his behavior is either ex-post or ex-ante wrong.

Thus far, there are no reported cases where a plaintiff brought suit for ex-post reasonable but ex-ante unreasonable behavior or products. This is puzzling, especially given the abundance of reverse cases before the courts, where the defendant’s behavior or product is found to be ex-post unreasonable but ex-ante reasonable, and liability is not imposed. The Article’s explanation for the lack of suits for ex-post right but ex-ante wrong behavior is plaintiffs’ and their attorneys’ strong belief that when a behavior, or a product, is considered reasonable at the time of trial, it is considered reasonable by the law. The claim made in the Article is that this belief is unfounded and a plaintiff who proves ex-ante negligence should succeed at trial, regardless of whether the defendant’s behavior is considered reasonable at that time.

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INTRODUCTION

Injurers often do the wrong thing, which, in retrospect, turns out to be the right thing. Should they be held liable under current law if the ex-ante wrong but ex-post right behavior caused harm to a victim? This fundamental question, relevant to many legal fields, has never been given any clear answer, neither in the case law nor in scholarly writings. This Article offers an affirmative answer: yes, injurers should be held liable for ex-post right behavior if that behavior was ex-ante wrong. The Article also proposes and explores an innovative rule, termed the alternative liability rule, under which an injurer bears liability if his behavior is either ex-post or ex-ante wrong, showing that under certain conditions, which are often met in product liability cases, this is the optimal liability rule.

To illustrate the problem addressed in this Article, assume that a doctor must decide whether to operate on her patient. The doctor considers the reasonably available information about the patient's medical condition and negligently chooses not to operate. A few days later, the risk entailed by the doctor's decision not to operate materializes into harm. At that point, however, new information emerges that clearly indicates that given the ex-ante risks of operating versus not operating, the doctor's behavior was reasonable. Should the patient be allowed to recover, under negligence law, for the harm he suffered due to the doctor's ex-ante negligent but ex-post reasonable behavior?

A similar question may arise in any legal context where reasonableness is a criterion for liability (or defense). Consider the following example from products liability law: Suppose that a manufacturer of cellular phones is being sued by a consumer for harms caused by radiation from the phone. Assume that according to the information available at the time of the trial, the phones emit very low-risk radiation; therefore the way that the manufacturer produced its product—according to the same information—is considered reasonable and the product non-defective. Should the consumer, who suffered harm from the radiation, succeed at trial if she can show that according to the information that was reasonably available at the time of the product's distribution, the manufacturer should have suspected—*erroneously*, in retrospect—the radiation to be far riskier than what it actually is and, therefore, the product should be considered defective?

This Article claims that under the correct interpretation of the law, liability should be imposed on the injurer in both the medical malpractice and products liability cases and, more generally, in any case when the injurer was ex-ante negligent, regardless of whether his behavior is ex-post reasonable. This claim is based on efficiency as well as corrective justice grounds. In certain conditions, however, the innovative, alternative liability rule proposed in this Article should be preferable on efficiency, but *not* corrective justice, grounds. Therefore, proponents of efficiency, or, more generally, the maximization of social welfare, as the major goal of the law should advocate the adoption of the alternative liability rule, at least in certain cases.

Remarkably, I have been unable to find any case law addressing the possibility of tort liability for ex-post reasonable but ex-ante negligent behavior. Even more surprisingly, I have not found even a single case in which a plaintiff argues that despite the ex-post reasonableness of the defendant's injurious behavior—or the harm-causing product—she should be allowed to recover, because that same behavior should be considered ex-ante negligent.¹ This is puzzling, because numerous instances of the reverse case are brought to the courts, where the injurer's behavior is considered ex-post negligent, but he argues that he should not be held liable since his behavior should be considered reasonable according to the information reasonably available to him when he acted.² This parallel defensive claim of "ex-ante reasonableness" exists also in the area of products liability: manufacturers who are sued for design defects often raise the "state of the art" defense, arguing that even though the product is unreasonably dangerous, they could not have reasonably realized this when they distributed the product.³

If the claim made in this Article holds, many plaintiffs who have suffered harms from ex-post *reasonable* behavior or ex-post *non-defective* products could successfully sue their injurers. Why have they not yet done so? One possibility is that it is difficult for plaintiffs to prove in court that a behavior, or product, that is considered reasonable at the time of trial should be considered unreasonable at the time when the behavior took place. This cannot, however, explain the complete absence of suits of this kind. After all, plaintiffs commonly bring evidence relating to past events that occurred a long time prior to trial and succeed in convincing the court of the defendant's negligence. In my view, a better explanation for the lack of suits resting on ex-post reasonable but ex-ante negligent behavior is the strong belief of plaintiffs and their attorneys that when a behavior, or product, is considered reasonable at the time of trial—it is considered reasonable *by the law*. This Article shows that this belief is wrong.

The Article proceeds as follows. Part I makes the basic argument for liability for harms caused by ex-post reasonable but ex-ante negligent behavior. I term such cases ex-post reasonable/ex-ante negligent cases. The

1 The closest case I could find is *Mathis v. Morrissey*, 13 Cal. Rptr. 2d 819 (Cal. App. 1992). In this case a patient died following a surgery he underwent at his doctor's recommendation in order to prolong his life expectancy. The patient's heirs brought a medical malpractice suit against the doctor arguing, among other things, that the doctor's recommendation was negligent. The plaintiff's expert witness was called to testify that "at the time of trial there was data to suggest that surgical intervention can prolong life in such cases but that the data was not available at the time of decedent's surgery. Therefore, in [the expert's] view, surgery was not indicated for decedent at the time of the operation." *Id.* at 822. The court has not discussed the question, which is this Article's topic, whether the ex-post or ex-ante rule should prevail; namely, whether an ex-post reasonable but ex-ante negligent choice of procedure by a doctor should trigger liability. Instead, the court affirmed the trial court's instructions to the jury, who found that the doctor was not negligent. *Id.* at 826. I thank Graham Safty for referring me to this case.

2 See *infra* note 37–38 and accompanying text.

3 See *infra* notes 39–42 and accompanying text.

essence of the argument made is that the ex-ante perspective (“ex-ante rule”), rather than the ex-post perspective (“ex-post rule”), should be adopted in such cases and liability therefore imposed on the injurers for the harms caused to the plaintiffs. The absence of liability in these cases, the argument goes, will yield severe under-deterrence of injurers. The same argument is then applied to product cases. This is illustrated by the silicone breast implants litigation, where women who purchased and used the implants sued for harms they allegedly caused to them, based on the argument that the implants were a defective product. It is demonstrated that even though the implants are now regarded to be *non*-defective products, many plaintiffs should succeed at trial and recover for their harms if they can show that at the time that they purchased and used the implants, a reasonable manufacturer should have suspected—even if erroneously—the product to be unreasonably dangerous. Lastly, Part I generalizes the argument and sets it in a broader context.

Part II discusses three potential objections to the argument developed in Part I. The first is a causation argument inspired by notions of corrective justice. I show that corrective justice in fact supports, rather than precludes, the ex-ante rule, as do the principles of causation. A second objection is based on plaintiffs’ lack of information about defendants’ ex-ante behaviors. I show that this objection, too, is not persuasive. Finally, I discuss, and reject, the argument that the ex-post, rather than ex-ante rule should be adopted since the former allows defendants to enjoy their “good” luck and escape liability, which recalls the “moral luck” phenomenon in tort law. All three potential objections, although flawed in my view, could explain why plaintiffs and their attorneys might be strongly convinced that liability will not be imposed in ex-post reasonable but ex-ante negligent cases.

Part III compares the ex-post reasonable/ex-ante negligent cases with the reverse ex-post negligent/ex-ante reasonable cases and shows where they differ. This Part suggests that, in negligence cases, an ex-ante rule is indisputably more efficient than an ex-post rule, while in product cases, this is the case most of the time. A policy implication that arises from the analysis is that there are some clear advantages to an “alternative liability rule” for product cases, under which the manufacturer bears liability for harms whenever the product is unreasonably dangerous under *either* an ex-ante rule *or* ex-post rule. The Conclusion wraps up the discussion.

I. EX-POST REASONABLE BEHAVIOR

This Article deals with situations of ex-post reasonable/ex-ante negligent behavior. In such cases, the injurer’s behavior would not be deemed negligent according to the information available at the time of trial, but according to the information reasonably available to the injurer at the time of his behavior, his conduct was negligent. If an ex-ante perspective is taken in contending with these cases, the injurer’s behavior will be considered negligent and liability imposed. I call this the “ex-ante rule” and propose its adoption. This rule stands in complete opposition to the “ex-post rule,” which I

propose rejecting. Under the latter rule, there should be no liability for ex-post reasonable/ex-ante negligent behavior. Thus, if, according to the information available at the time of the trial, the injurer's behavior is reasonable, liability should not be imposed, regardless of the information available to him at the time of his behavior.

I could find not one court decision discussing the choice between an ex-post rule and an ex-ante rule in ex-post reasonable/ex-ante negligent cases. The rarity of such cases could be indication that the ex-post rule is simply taken for granted by litigators and their lawyers. Indeed, my guess is that plaintiffs and their attorneys implicitly assume that they cannot recover for harms caused by ex-post reasonable behavior, even if at a certain point in time, that same behavior could have been considered negligent. I propose that this assumption is unfounded.

A. *Negligence*

The following example and ensuing discussion will establish the argument for the ex-ante rule in ex-post reasonable/ex-ante negligent cases.

Example 1. Delivering a Baby in the Face of Uncertain Risks. A doctor must decide whether to deliver a baby by cesarean section or vaginal delivery. From an ultrasound scan, the doctor estimates the baby to weigh between 10 and 12 pounds, with no other way of more accurately determining the weight. Assume that given this range in estimated weight, a reasonable doctor would deliver by cesarean section. However, the doctor unreasonably chooses to perform a vaginal delivery. The baby is severely injured during the course of the procedure due to his large size, which would have been prevented had the doctor performed a cesarean section. Immediately upon delivery, the baby's weight is measured at 10 pounds. Assume that vaginal delivery is reasonable for a baby weighing 10 pounds (as opposed to a weight ranging between 10 and 12 pounds).⁴ Should the doctor be held liable for the harm caused to the baby?⁵

4 The logic of this assumption is explained and illustrated *infra* at text accompanying notes 7–8.

5 For a case presenting the opposite situation, where a doctor was released from liability because his behavior was considered reasonable according to the information available at the time of delivery, see, for example, *Saddler v. U.S.*, No. SA-02-CA-476-PM, 2003 U.S. Dist. Lexis 25237, at *21 (W.D. Tex. July 11, 2003). In this case, an ultrasound examination determined the plaintiff's fetal weight to be 3800 grams, while actual delivery weight was in fact 4530 grams. *Id.* at *10–12. The court decided that although the actual weight at birth, as it emerged, would have led a reasonable doctor to perform a cesarean section, vaginal delivery had been the reasonable course of action given the estimated weight at the time of delivery. *Id.* at *9; see also *Madison v. Stack*, 978 So. 2d 1257 (La. App. 2008), available at <http://www.la-fcca.org/opiniongrid/opinionpdf/2007%20CA%201719%20Decision%20Appeal.pdf>. In *Madison*, the defendant doctor ordered induction of labor, partially because of a large estimated fetal weight of between 4.2 to 4.3 kilograms. The defendant, despite anticipating shoulder dystocia during labor, nevertheless opted for vaginal delivery and not cesarean section. During delivery, the baby sustained a brachial plexus injury that would have been prevented had a cesarean section been performed. *Id.*

The natural immediate response seems to be no, for the doctor's choice of vaginal delivery was proven to be the reasonable action to take: his behavior was not negligent, or in other words, he did the right thing albeit for the wrong reasons. An alternative argument against imposing liability on the doctor is the lack of causation between his negligence and the harm suffered. After all, a reasonable doctor with full information about the baby's weight would also have opted for vaginal delivery, and the baby would have experienced the same misfortune.

But both these arguments are flawed. The analysis below will show why it is the ex-ante rule that would provide efficient incentives to the doctor in Example 1 as well as to injurers in other negligence cases. The causation argument will be analyzed in Part II.⁶

Assume that in Example 1, according to the ex-ante information reasonably available to the doctor at the time of delivery, there was a 50% probability that the baby's weight would be 10 pounds and a 50% probability that it would be 12 pounds. Further assume that with vaginal delivery, the expected harm to a ten-pound baby is higher by 50 than in the case of a cesarean delivery, while the expected harm to a twelve-pound baby is higher by 100 than in a cesarean delivery. Lastly, assume that the cost of a cesarean delivery is borne by the doctor (or the doctor's employer) and is higher by 70 than the cost of vaginal delivery. For our purposes, these are the only differences between the two procedures.⁷ Given these numbers, and assuming that an actor's behavior is determined as reasonable or not under a cost-benefit test, it is evident why a reasonable doctor would have performed a cesarean delivery: the expected harm of not delivering by cesarean is $50\% \times 100 + 50\% \times 50 = 75$, whereas cost of precaution, which is the cost of the procedure, amounts to 70. Since $70 < 75$, a reasonable doctor can be expected to deliver by cesarean section. Yet under an ex-post rule, the doctor in Example 1, who shoulders the precautions costs, is tempted to inefficiently choose vaginal delivery.

To understand why, consider the Hand formula (or negligence cost-benefit test), which many courts apply in determining negligence.⁸ Under the

at *2-6. The court decided that under accepted medical guidelines, the estimated fetal weight had not been high enough to mandate delivery by cesarean section. *Id.* at *14.

6 See *infra* Section II.A.

7 Other differences could be the costs to the mother, which could diverge between the two procedures. See Elizabeth L. Shearer, *Cesarean Section: Medical Benefits and Costs*, 37 SOC. SCI. MED. 1223, 1227-28 (1993) (discussing the risks and benefits of C-sections for mothers); see also Emmett B. Keeler & Mollyann Brodie, *Economic Incentives in the Choice between Vaginal Delivery and Cesarean Section*, 71 MILBANK Q. 365, 386-90 (1993) (describing various economic considerations that the mother weighs in the choice between cesarean and vaginal delivery).

8 The Hand formula was first articulated in *United States v. Carroll Towing Co.*, 159 F.2d 169 (2d Cir. 1947), by Judge Learned Hand and later endorsed by courts as well as the *Restatement of Torts*. See RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 3 cmt. e (2010) (suggesting that negligence can be asserted by a risk-benefit test, where the benefit is the advantage that the actor gains if she refrains from taking

formula, a defendant is considered negligent and therefore liable for the harm his negligence caused if, and only if, the cost of precautions that he failed to take were lower than the expected harm that would have been reduced had the precautions been taken. In algebraic terms, the injurer is considered negligent if, and only if, $B < P \times L$, when B stands for the burden of precaution, P for the probability of harm, and L for the loss.⁹

Returning now to Example 1, the inefficient choice under an ex-post rule is made by the doctor because he knows that if the baby's weight is 10 pounds, under the Hand formula he will bear no liability, because his cost of precaution (performing a cesarean delivery) would be considered higher than the expected harm that a C-section would have reduced ($70 > 50$); therefore, he might ignore the expected harm associated with that weight and take into account only the possibility of the baby weighing 12 pounds, for this would entail liability ($70 < 100$). Since there is a 50% probability of the latter scenario materializing, and the expected harm associated with that possibility is 100, the doctor would weigh his precautions cost of 70 against his expected liability of 50 (which is 50% of 100) and opt not to take precautions, namely, to perform a vaginal delivery. Note, that under more realistic assumptions, there is a continuous increase in the risk to the baby with the increase in weight. For example, assume that the expected harm to a ten-pound baby from vaginal delivery is higher by 50 than from cesarean delivery; a baby weighing 10.1 pounds is higher by 52.5; a baby weighing 10.2 pounds is higher by 55, etc. Under an ex-post rule, the doctor is liable only if the baby's actual weight is at the point where the expected harm from vaginal delivery is higher by more than 70 than from cesarean delivery. Assuming a linear increase in risk relative to weight, the doctor would take into account an expected harm of approximately 52,¹⁰ even though the actual expected harm still amounts to 75.

In contrast, an ex-ante rule would align the doctor's incentives with economic efficiency. Under this rule, the negligent doctor who failed to take precautions of 70 to reduce the expected harm by 75 would bear liability for any harm resulting from his choice, regardless of the baby's actual weight. Consequently, not taking precautions of 70 would cost the doctor 75 in

precautions, a balancing approach that is identical to the Hand formula). Some scholars have argued that many courts do not apply the Hand formula, at least not explicitly. See, e.g., Ronald J. Allen & Ross M. Rosenberg, *Legal Phenomena, Knowledge, and Theory: A Cautionary Tale of Hedgehogs and Foxes*, 77 CHI.-KENT L. REV. 683, 700–19 (2002) (arguing that the Hand formula is rarely cited or applied by American courts); Richard W. Wright, *Hand, Posner, and the Myth of the "Hand Formula"*, 4 THEORETICAL INQ. L. 145, 151–52 (2003) (same). But even without the formula, courts often use the idea embedded in the formula, which in the most abstract sense is conducting *some* comparison between the magnitude of the burden in taking precautions, on the one side, and the magnitude of the risk expected to be reduced if the precautions are taken, on the other side.

⁹ *Carroll Towing Co.*, 159 F.2d at 173 (developing the Hand formula); RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 167–71 (6th ed. 2003) (explaining the correct use of the negligence rule according to the Hand formula).

¹⁰ $\sim 5\% (72.5 + 75 \dots + 100) = 51.75$.

expected liability, and he would therefore decide on cesarean delivery, as mandated by efficiency. In sum, whereas an ex-ante rule would create efficient incentives for the doctor in our example by forcing him to consider all risks involved before taking any action, an ex-post rule leads to severe underdeterrence because it allows the doctor to ignore some of those risks.¹¹

Example 1 illustrates cases in which uncertainty exists with respect to the risks. Let us consider a variation of this example where there is uncertainty regarding the cost of precaution. Assume that it is clear at all times that the expected harm will be 75 if certain precautions are not taken by the doctor. Further assume that according to the information reasonably available to the doctor when he must make his decision, there is a 50% probability that precautions will cost 60 and a 50% probability that they will amount to 80, yielding an expected cost of 70 (for example, if the precaution is performing a cesarean delivery, it could be unclear whether the procedure will be accompanied by complications, and therefore more costly, than a simple, less costly procedure). Suppose now that the doctor failed to take precautions, and at the time of the trial, it emerges that their cost would have been 80. Should the doctor be held liable for the resulting harm?

Under an ex-ante rule, the answer is yes, since $70 < 75$. But under an ex-post rule, the answer is no, since $80 > 75$. For the same reason that an ex-ante rule would provide efficient incentives in Example 1, it would also create efficient incentives in this case. In particular, under an ex-ante rule, the doctor would take precautions, as efficiency requires, since he would know that the failure to take these measures, whose expected cost is 70, would result in expected liability of 75. Conversely, under an ex-post rule, the doctor knows that not taking precautions will be regarded as negligence only in half of the instances (i.e., only if the precautions cost is 60); thus, failing to take precautions will cost him 37.5 in expected liability ($50\% \times 75$). Since his expected cost of precaution is higher than his expected liability ($70 > 37.5$), he will not take precautions.

The tension between the ex-ante and ex-post rules is by no means limited to medical malpractice cases. Suppose a driver hits a pedestrian while driving at 50 mph. Had he driven at 40 mph or less, he could have braked in time and avoided the accident. Given the information regarding the traffic

11 Indeed, an ex-post rule could provide, in theory, efficient incentives to the injurer if it is backed up by punitive damages. Thus, in Example 1, if when the baby's weight is 12 pounds, liability would be imposed for 150% of the actual harm and, when the baby's weight is 10 pounds, liability would not be imposed, the doctor who fails to take precautions would face a liability risk of $50\% \times 150 = 75$, which is exactly the expected harm. This indirect way of restoring efficient incentives for the injurer is difficult to implement and inconsistent with the holding in *Philip Morris v. Williams*, 549 U.S. 346, 349 (2007), of the unconstitutionality of using punitive damages to punish a defendant directly for harms to victims who were not parties in the trial. Rather the purpose of punitive damages is to punish the defendant for the reprehensibility of his behavior. *But see* Catherine M. Sharkey, *Punitive Damages as Societal Damages*, 113 YALE L.J. 347, 352 (2003) (arguing that punitive damages can and should be distributed to third parties who suffered harms and that punitive damages should be used to redress societal harms).

density reasonably available to the driver at the time of the accident, the reasonable speed to have driven was 40 mph. Suppose, however, that after the accident, it emerges that the traffic density had in fact been considerably lower (say, because the police had blocked off some roads, which reduced the traffic flow in the vicinity of the accident) and, given the lower density, driving at 50 mph would have been reasonable. Should the driver be held liable towards the pedestrian? The answer is yes: since efficiency mandates that drivers take all risks into account, even when their existence is uncertain, the ex-ante rule should be applied. If an ex-post rule is applied instead, drivers in the same position as the driver in our example will take into account fully the risks of high-density traffic but disregard partially¹² the risks of low-density traffic and drive too fast.

B. *Product Liability*

A similar analysis will show that manufacturers should be held liable for harms caused by products that are presently regarded as reasonably safe but, at the time of the product's distribution, the manufacturer should have *erroneously* suspected it to be unreasonably dangerous. Parallel to the negligence cases, I classify such defective product cases as ex-post non-defective/ex-ante defective products and argue for the application of the ex-ante, rather than ex-post, rule. The next example, based on the silicone breast implants litigation, and the discussion that follows make the argument for liability for (ex-post) non-defective products.

Example 2. Silicone Breast Implants. A manufacturer of silicone breast implants is aware, at the time of the distribution of his product ("ex-ante information"), that there is a chance that the implants could *rupture* and cause harm to consumers. But there is some uncertainty as to the scope of the risk: while it is *certain* that the product poses a risk of harmful local effects (pain to the breast, a need for additional surgery, aesthetic harm, etc.), there is only the *possibility* of long-term, harmful systemic effects (such as cancer, neurological damage, an adverse effect on offspring, etc.). The manufacturer could reduce both the expected harm of local effects and the potential for systemic effects by taking certain precautions, which are costly but worth spending given the risks as estimated at the time of distribution. However, he fails to take these measures. After a few years, new information emerges ("ex-post information"), leading to universal consensus among scientists that the implants could lead to the local but not systemic effects. The certain risk of local effects combined with the *possibility* of risk of systemic effects would have meant that the implants should have been considered unreasonably dangerous and therefore defective. However, given the risk of only local effects, the implants should not be considered unreasonably dangerous and, therefore, regarded as non-defective. Should the manufacturer bear liability for harms that resulted from local effects *before* the new

¹² They would not *fully* ignore these risks, because if they were to drive too fast, at a certain point, they would be considered negligent under an ex-post rule as well, even in conditions of low-density traffic. In addition, if they themselves were to be injured, they would bear their own losses (assuming no one else was at fault).

information surfaced, which would have been avoided had the manufacturer taken reasonable precautions prior to the product's distribution?¹³

To understand why the answer to this question is an unequivocal yes, let us assign numbers to the facts of this example as well. Assume that according to the ex-ante information, there are two sole and mutually exclusive possibilities: The first possibility, whose likelihood is estimated at 50%, is that the implants' expected harm amounts to 100, as comprised of the local (50) and systemic (50) effects. Under the second possibility, also with an estimated likelihood of 50%, the expected harm is only 50, which is what the local effects amount to. In other words, the expected harm of the implants, *according to the ex-ante information*, is $50\% \times 100 + 50\% \times 50 = 75$. Assume further that all harmful effects can be reduced to zero by taking precautions that cost 70. Under a risk-utility, or cost-benefit, test (which is commonly applied by the courts¹⁴ and advocated by the *Restatement (Third) of Torts: Product Liability*¹⁵), the implants, *according to the ex-ante information*, are defective, because the cost of precaution was *lower* than the reduction in the expected harm ($70 < 75$). *According to the ex-post information*, however, the implants are *not* defective, because we now know that the precautions cost was in fact *greater* than the reduction in the expected harm ($70 > 50$).

Let us assume now that the ex-post rule prevails, and therefore, the manufacturer in our example will be released from any liability for harms to plaintiffs (which, by definition, are the local effects of the product). Knowing in advance that if the optimistic possibility of an expected harm of 50 materializes, he will not bear any liability, the manufacturer will simply disregard this possible outcome. Instead, he will take into account *only* the pessimistic possibility of an expected harm of 100, since he knows that its materialization will result in an expected liability of 100. Since there is a 50% probability of this latter outcome, the manufacturer will find it privately beneficial not to take precautions of 70, since it will save him only 50 in liability costs ($50\% \times 100$).

13 For more information on the risks of breast implants, see COMMITTEE ON THE SAFETY OF SILICONE BREAST IMPLANTS, *Safety of Silicone Breast Implants—Free Executive Summary* (1999), <http://www.ncbi.nlm.nih.gov/books/NBK44778/>; see also Grenier v. Med. Eng'g Corp., 99 F. Supp. 2d 759, 762–64 (W.D. La. 2000) (deciding a case where the plaintiff sued manufacturers of silicone breast implants, arguing that the implants had bled silicone and caused her harm). Originally, the plaintiff had sued for both systematic and local illnesses, but later amended her claim to include only local complications, which had resulted in physical and emotional pain and suffering. *Id.* at 761. The court, applying a risk-utility test, ruled that the product was not unreasonably unsafe, based on the lack of an alternative design at the time of its manufacture and on the damages caused to the plaintiff. *Id.* at 764.

14 See *infra* text accompanying note 41.

15 RESTATEMENT (THIRD) OF TORTS: PRODUCT LIABILITY § 2, cmt. d (stating that, in determining if a design is defective, courts should adopt a risk-utility balancing test).

Not taking precautions, however, results in under-deterrence.¹⁶ Society would be better off if manufacturers facing uncertainty as to the scope of the harmful effects of their products were to take into consideration *all possibilities*, including those with a probability much lower than 100%, when deciding whether or not to take precautions. Thus, using our example, society would be better off were the manufacturer, who faces various possible alternatives regarding his product's harmful effects, to relate to the product as though it has an expected harm of 75 and take precautions of 70, instead of ignoring some of the possibilities and not take those precautions. This is precisely the outcome that would be achieved under an ex-ante rule, since the manufacturer would then face expected liability of 75 if he were to fail to take precautions of 70. In this way, his self-interest would align with the social goal.

Note, however, that even if the manufacturer in Example 2 is held liable for the harms caused to the specific plaintiffs, he should be allowed to proceed with production of the implants in exactly the same manner as before, without bearing a risk of liability. In fact, he should be free of any liability for products he distributed, or could have recalled before any injury materialized, from the moment it is revealed that there is no risk of systemic effects from the implants. Once it becomes clear that the product's expected harm amounts to 50, there is no justification for imposing liability on the manufacturer for not taking precautions that cost 70. In other words, once the expected harm is revealed to be 50, the implants are not considered unreasonably dangerous products under either an ex-ante or ex-post rule, and liability is unnecessary.

The discussion thus far has focused on a manufacturer's incentives to produce a reasonably safe product. But the manufacturer's incentives could be important also *after* the product has been produced and distributed. Therefore, a full accounting of the advantages and disadvantages of an ex-ante rule and ex-post rule from an efficiency point of view should consider all incentives, both before and after distribution. This, indeed, will be tackled further on, in Part III of the Article.

C. *Generalizing the Argument*

When an injurer's behavior can be shown to be ex-ante negligent, he or she should bear liability even if that behavior is proven to be ex-post reasonable. Consequently, in all ex-post reasonable/ex-ante negligent cases, an ex-ante rule, and not an ex-post rule, should be applied. This Section now makes the arguments presented in Sections A and B in a more general context.

16 Omri Ben-Shahar has noted that an ex-post rule could lead to under-deterrence of manufacturers. His discussion, however, did not focus on the question of whether liability should be imposed for harms caused by a product that is considered in the present to be non-defective simply because the manufacturer should have erroneously considered it to be defective at the time of distribution. Omri Ben-Shahar, *Should Products Liability Be Based on Hindsight?*, 14 J.L. ECON. & ORG. 325, 333-34 (1998).

For negligence law to provide efficient incentives to injurers, the standard of care must be set according to all foreseeable risks created by the injurer's behavior; once the injurer's behavior is found to violate that standard of care, liability must be imposed (at least)¹⁷ for all foreseeable harms resulting from those risks.¹⁸ Policy considerations could justify allowing a few exceptions to this principle. For example, high administrative costs or the risk of dampening desirable activities conducted by injurers may justify releasing injurers from liability for some types of harms or toward some types of plaintiffs.¹⁹

17 When there are no court errors in setting the standard of care and no injurer errors in complying with that standard, liability for more than the actual harm would still be efficient. See ROBERT COOTER & THOMAS ULEN, *LAW & ECONOMICS* 217 (6th ed. 2011) (arguing that under the negligence rule, injurer will take efficient precaution when compensation is set too high). With risk of errors, over-deterrence would typically result. *Id.* at 220–22; see also STEVEN SHAVELL, *FOUNDATIONS OF ECONOMIC ANALYSIS OF LAW* 225–29, 240, 244 (2004) (describing the effect of court errors on injurers' incentives); John E. Calfee & Richard Craswell, *Some Effects of Uncertainty on Compliance with Legal Standards*, 70 VA. L. REV. 965, 966 (1984) (arguing that if the standard of care is uncertain for the injurer, when expected damages are high, the injurer will over-comply with the standard).

18 See Ariel Porat, *Misalignments in Tort Law*, 121 YALE L.J. 82, 90–96 (2011) (explaining the principle described in the text and calling it the alignment principle). An argument that I do not discuss here and if correct, could often support less than full liability under a negligence rule is the discontinuity argument. According to this argument, a negligence rule, in general, creates over-deterrence, because injurers who do not comply with the standard of care could be liable for harms that were not caused by their negligence. The reason is that a rule of negligence creates discontinuity or a sudden jump in liability, because the expected liability of an injurer who complies with the standard of care drops to zero, whereas any deviation from that standard results in full liability for any harm that occurred. The discontinuity argument was originally articulated in Robert D. Cooter, *Economic Analysis of Punitive Damages*, 56 S. CAL. L. REV. 79, 80–89 (1982). Cooter later explained that the discontinuity is due to incomplete information available to the courts or the probabilistic nature of the causal connection. Robert D. Cooter, *Punitive Damages for Deterrence: When and How Much?*, 40 ALA. L. REV. 1143, 1155 (1989). Marcel Kahan and Mark Grady also have shown that the discontinuity of liability as well as the risk of burdening the negligent injurer with liability for more than the harm he caused completely disappear when causation rules are properly applied; the injurer is then liable only for those harms that would not have been created had he behaved reasonably. Mark F. Grady, *A New Positive Economic Theory of Negligence*, 92 YALE L.J. 799, 812–13 (1983); Marcel Kahan, *Causation and Incentives to Take Care Under the Negligence Rule*, 18 J. LEGAL STUD. 427, 427–29 (1989). My discussion here assumes that causation rules are indeed properly applied and, therefore, there is no discontinuity in liability.

19 RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 7 cmt. a (“[I]n some categories of cases, reasons of principle or policy dictate that liability should not be imposed.”); DAN B. DOBBS, *THE LAW OF TORTS* § 223 (2000) (discussing policy considerations that could release injurers from liability); KEETON ET AL., *PROSSER AND KEETON ON THE LAW OF TORTS* 358 (W. Page Keeton et al. eds., 5th ed. 1984) (“‘[D]uty’ [in negligence law] is not sacrosanct in itself, but is only an expression of the sum total of those considerations of policy which lead the law to say that the plaintiff is entitled to protection.”); Ariel Porat, *The Many Faces of Negligence*, 4 THEORETICAL INQ. L. 105, 109 (2003) (describing several kinds of policy considerations that are used by courts

Prevailing negligence law occasionally is inconsistent with these principles and creates misalignments between the standard of care and compensable harms. Although generally, all foreseeable risks are indeed considered by the courts when they set the standard of care, liability is occasionally imposed for only some of the harms resulting from those risks. Misalignments create inefficiencies, and elsewhere, I have suggested eliminating them.²⁰ To understand why this inefficient outcome occurs, imagine an injurer who is creating foreseeable risks of 75 that he can eliminate at a cost of 70. Assume that even though the standard of care is set according to all the foreseeable risks, liability is imposed for only two-thirds of the harm resulting from the injurer's behavior. Under such rules, although the injurer will be defined as negligent ($70 < 75$), he will face expected liability of only $2/3 \times 75 = 50$. As a result, he will not take precautions of 70 and will instead prefer to bear expected liability of 50, which is obviously inefficient. If, in contrast, he risks bearing liability for all the harms resulting from the risks created by his negligence, he will prefer to take precautions of 70, rather than bearing expected liability of 75.

Note that the misalignment problem is not unique to negligence law and can surface in the context of any tort liability based on reasonableness. For in all such cases, setting the standard of behavior according to all foreseeable risks created by the injurer's behavior is not, in itself, sufficient for creating efficient incentives for injurers; rather it is crucial also to impose liability for all harms resulting from those risks. Products liability is no exception in this respect. A manufacturer will only have efficient incentives to take precautions if he expects to bear liability (at least)²¹ for any harms resulting from the foreseeable risks that would be avoided were the product reasonably produced.²²

The ex-post rule that this Article proposes rejecting is also a manifestation of misalignment between standard of care and compensable harms and, therefore, inefficient. In contrast, the ex-ante rule that I argue to adopt eliminates the misalignment and is, therefore, efficient.

In Example 1, the doctor's behavior was negligent at the time it took place. If the legal system seeks to ensure efficient incentives for doctors to take reasonable precautions, it must determine whether their behavior is negligent by reference to the time it occurred, as well as impose liability, when a doctor is found to be negligent, for all harms resulting from the fore-

to limit liability for negligence); Stephen D. Sugarman, *A New Approach to Tort Doctrine: Taking the Best from the Civil Law and Common Law of Canada*, 17 SUP. CT. REV. 375 (2002) (same).

20 See Porat, *supra* note 18 (exposing misalignments in tort law).

21 See *supra* note 17. With no court errors in setting the standard of care and no injurer errors in complying with that standard, liability for more than the actual harm caused would still be efficient.

22 Manufacturers can at times take precautions after the distribution of the product. Thus far, the discussion has ignored post-distribution incentives. They will be addressed *infra* in Part III.

seeable risks that could have been avoided had he behaved reasonably, again by reference to the time of the behavior. Considering the time of the occurrence of the behavior is essential, since it was at that point that the doctor could have taken precautions and reduced risks. An ex-ante rule of this sort would align the standard of care with compensable harms and provide doctors and medical care providers with efficient incentives to take care of their patients. Applying an ex-post rule instead will result in misalignment and inefficiency. Doctors and medical care providers will know when treating their patients that they can consider only some risks and not others. Instead of facing liability for all harms that their reasonable precautions would prevent, they will risk liability for only some of those harms. Their incentives to take precautions will therefore be deficient, and under-deterrence will result.²³ Accordingly, in Example 1, the doctor should bear liability for the harm that materialized from the risk to the ten-pound baby, *even if that risk, on its own, did not justify delivering the baby by cesarean section.*

An analogical analysis can be applied to Example 2. Both the certain local effects and the uncertain systemic effects of silicone breast implants must be factored in when deciding whether the product is unreasonably dangerous. However, manufacturers also must bear liability for all foreseeable harms, due to both local and systemic effects, that would have been prevented had their product been produced reasonably safe. This means that the manufacturer in Example 2 should bear liability for the harms resulting from the local effects of the implants, *even if those effects, on their own, did not justify changing the product design.*

II. OBJECTIONS

Part I made the basic argument for liability for ex-post reasonable/ex-ante negligent behaviors. Most law and economics scholars would admit that this argument is straightforward. They would find it hard, however, to explain why the law has not explicitly endorsed the ex-ante rule in ex-post reasonable/ex-ante negligent cases. What is more, they would find it most

23 Note that other reasons could lead to the over-deterrence of doctors, which, arguably, might offset the under-deterrence resulting from the ex-post rule. For an example of one type of over-deterrence, see Ariel Porat, *Offsetting Risks*, 106 MICH. L. REV. 243 (2007) (arguing that when negligent behavior simultaneously increases and decreases risks, allowing full compensation to plaintiffs will typically create over-deterrence). But other factors could lead to doctors being under-deterred. See TOM BAKER, *THE MEDICAL MALPRACTICE MYTH* 22–44 (2005) (arguing that there is a huge underenforcement problem in medical malpractice, because many patients injured by medical malpractice do not sue). If there is some over-deterrence and alongside some under-deterrence of doctors, they could cancel each other out, but only by coincidence. Firstly, there is no reason to assume that there are identical extents of under-deterrence and over-deterrence. Secondly, and more importantly, not all distortions take place at the same time, in all areas, or for all doctors; therefore, it would not make any sense to justify under-deterrence that applies at particular given times, in some areas, or for some doctors by pointing to over-deterrence at other times, in other areas, or for other doctors. Generally, any distortion in doctors' incentives should be eliminated without "counting" on other distortions to cure it.

surprising that such cases are not brought to court on a daily basis; after all, there must be many cases where according to the information available at trial, a harmful behavior, or product, should be considered reasonable, but according to the information reasonably available at the time of the behavior, or the distribution of the product, should be considered unreasonable.

This Part proposes a solution to this puzzle, presenting three possible objections to the ex-ante rule advocated in Part I. These objections, although unconvincing in my view, could, *prima facie*, explain the lack of suits based on ex-post reasonable behaviors and products. Once the flaws of these objections are understood, however, the appeal of the ex-ante rule becomes evident.

A. *Causation and Corrective Justice*

As I speculated above,²⁴ the intuitive response to Example 1 is that the doctor should bear no liability for negligently performing a vaginal delivery, because there is no causal relationship between his negligence and the harm that occurred. As I have explained, this intuition is triggered by the fact that a reasonable doctor *with full information* about the baby's weight would also have delivered vaginally, and the baby would have suffered the same misfortune. The same argument can be made with respect to the silicone breast implants example: a reasonable manufacturer *with full information* would have produced exactly the same implants and the same harms would have occurred.

Section 29 of the *Restatement (Third) of Torts: Liability for Physical and Emotional Harm* can be used to develop a more elaborate argument against imposing liability on the doctor in Example 1. Section 29 states that “[a]n actor’s liability is limited to those harms that result from the risks that made the actor’s conduct tortious.”²⁵ In Example 1, the risk that made the doctor’s conduct negligent is the possibility of the baby weighing more than ten pounds. But since the baby’s weight was in fact precisely ten pounds, the baby did not suffer harm due to the materialization of the risk that made the doctor’s behavior tortious; therefore, liability presumably should not be imposed. A similar argument can be made with respect to the silicone breast implants case: since the possibility of long-term systemic effects was the risk that made the production of the implants tortious (i.e., defective) but the harm to the plaintiffs resulted from other risks (the local effects), liability should not be imposed on the manufacturer.

Let us start with the argument based on section 29 of the *Restatement*. This section reflects a corrective justice understanding of tort law, in particular, the correlativity requirement. Under this requirement liability should be

²⁴ See *supra* text following note 5.

²⁵ RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 29 (2010); see also DOBBS, *supra* note 19, at 463, § 187 n.1 (stating the principle that liability is imposed for risks that made the actor’s behavior wrongful); KEETON ET AL., *supra* note 19, at 273, § 42 (raising the same proposition).

imposed only for harms that result from the materialization of the risks that defined the injurer as negligent.²⁶ In line with section 29 and the correlativity requirement, it seems sound to argue that in both Examples 1 and 2, the harms caused did not ensue from risks that made (or defined) the actor's conduct (or product) tortious: were the risks from which the harms resulted to stand alone—and, indeed, in reality they stood alone even though the actors should have erroneously thought otherwise—the conduct (or the product) would not be defined as tortious.

This argument is flawed, however. What made the actors' conduct tortious in both Examples 1 and 2 were in fact *precisely* those risks that materialized into harms *together* with the risks that, although later proven to be nonexistent, were very threatening at the time of the conduct in question. Thus, the doctor in Example 1 should be considered negligent because he should have performed a cesarean delivery given the aggregation of all the risks: some associated with a twelve-pound weight and some with a ten-pound weight. *All* of the risks together made his conduct negligent, and liability for *all* of the harms caused by his negligent conduct is therefore consistent with both section 29 of the *Restatement* and the correlativity requirement. Similarly, the reasonableness of the product in Example 2 should be determined according to all risks, both local and systemic, and liability should be imposed for all harms materializing from those risks.

On similar grounds, in establishing causation, it should be immaterial that a reasonable doctor (in Example 1) or a reasonable manufacturer (in Example 2) with full information would have caused the same harm actually suffered by the plaintiffs. What should matter for the purposes of tort law is not what a reasonable person with full information would do, but rather what the actor with the information reasonably available to him *should* have done. This is the way causation principles work, and this is what ensures the promotion of both efficiency and corrective justice.

A somewhat different corrective justice argument might be that in Example 1, the doctor has not breached a duty of care toward a baby weighing ten pounds; he would have breached that duty only had the baby weighed more than ten pounds (according to the numerical example, at a weight where the baby's risk from vaginal delivery was higher by more than 70 than from caesarian delivery).²⁷ This conception of corrective justice, which rejects the notion that negligence should be determined by the aggregation of all risks involved, does not reflect prevailing tort law, nor is it, in my view, a correct

26 See ERNEST J. WEINRIB, *THE IDEA OF PRIVATE LAW* 159 (1995) ("The consequences for which the defendant is liable are restricted to those within the risks that render the act wrongful in the first place."); see also JULES L. COLEMAN, *RISKS AND WRONGS* 346 (1992) (arguing that *P*'s loss is *D*'s fault if three conditions are met, one of them being "*P*'s loss falls within the scope of the risks that make that aspect of *D*'s conduct at fault").

27 Cf. Jules L. Coleman, *Tort Law and the Demands of Corrective Justice*, 67 *IND. L.J.* 349, 369 (1992) (arguing that the moral claim to repair arises only if the act is a "wrongful harming," i.e., when the actor has violated the standard of care he owes to the specific victim, who was put at risk as a result of the injurer's actions).

understanding of corrective justice. To see why, imagine a driver who increases the risk to seventy-five pedestrians by 1 for each, causing harm to one of them. Assuming the elimination of the risk would cost him 70, under the Hand formula, the driver would be found liable for the harm done ($70 < 75$). Would it make any sense to argue that the driver has not breached his duty of care toward the victim, since the risk to the latter was only 1, while the cost of precaution was 70, and therefore liability should not be imposed? No one would make such an argument, since it makes no sense, economic or otherwise, to focus on the risk to the specific victim in isolation in determining whether the injurer was negligent toward him. Aggregating the risks to all (foreseeable) victims is the only way to make negligence law meaningful, and this is true also with respect to Example 1. Indeed, in Example 1, there was only one potential victim whose weight (or risk) was unclear at the time the doctor made his choice. But the analogy is straightforward: if aggregation should not be allowed in Example 1, the doctor should arguably be considered negligent only toward a large-sized baby whose risk, according to the figures in that example, is 100. But if the baby was born large-sized, a court that adheres to a no-aggregation approach should conclude that the doctor was not in fact negligent toward the baby, because the probability of its (large-sized) existence was only 50%; this yields an expected harm of 50, which is lower than the cost of precaution (70). Thus, under the no-aggregation approach, the doctor in Example 1 should not be held liable regardless of whether the baby is born small (a risk of 50) or large (a risk of 100). It is difficult to imagine, however, anyone endorsing such an absurd result, which is the inevitable outcome if the aggregation of risks in applying negligence law is precluded.

B. Information

Another possible objection to the ex-ante rule for ex-post reasonable behaviors or products is information based. Under this objection, once a behavior is deemed reasonable at the time of trial, it will be too difficult for a plaintiff to convince the court that at the time of the behavior, the injurer possessed information indicating that the ex-post reasonable behavior was in fact ex-ante negligent. There are two reasons for this difficulty, the argument goes: first, the passage of time between the behavior and trial; second, the plaintiff's lack of access to the information that the defendant privately possessed.

This objection is *normatively* a non-starter: even if it is problematic for plaintiffs to bring evidence relating to defendants' behavior, that in itself is not reason enough not to allow them to sue if they wish. Plaintiff's information-gathering difficulties, however, could *potentially explain* why we don't in fact see such cases in the courts. But is it really the explanation? I am not sure. Plaintiffs are often required to bring evidence relating to defendants' past behavior, even when the trial takes place a long time after the injurious behavior, and they often succeed in doing so.

Thus, in product liability cases, manufacturers have a clear advantage over plaintiffs in their access to the information relating to the manufacturing and design of their products. Yet plaintiffs must often prove that the product was defective at the time of distribution. Indeed, in those cases the product is ex-post defective. This could make a plaintiff's life much easier in court, than in the case of an ex-post non-defective product, not only in jurisdictions that shift the burden to manufacturers to prove that the "state of the art" defense applies to their case,²⁸ but also when the burden of proof is borne by plaintiffs. For when the product is proven defective at the time of trial, it is presumably not overly burdensome for the plaintiff to convince the court that it should also be considered defective according to the information that was available to the manufacturer at the time of distribution.

This difference between ex-post defective and ex-post non-defective cases could be one explanation, among others, for why more of the former than the latter are brought before the courts. It cannot explain, however, the complete absence of ex-post non-defective suits in the case-law!

C. *Moral Luck*

A third objection to the ex-ante rule for ex-post reasonable/ex-ante negligent behavior is that such cases are just one more manifestation of the "moral luck" phenomenon, which is common in tort law, where the injurer is allowed to enjoy his good luck in being exempt from liability. Put differently, the ex-post rule is more consistent with tort law's doctrines than the ex-ante rule. To better understand this objection, as well as its flaws, let us first consider "moral luck" in tort law.

Tort law has a lot to do with unfortunate outcomes: even if a person is only slightly negligent, he might be liable for huge amount of damages, which could affect him tremendously (if he is not insured).²⁹ Yet if a person is fortunate enough not to cause any harm while behaving wrongfully, she will bear no liability, regardless of the degree of her blameworthiness.³⁰ Sometimes this phenomenon of outcome responsibility—or outcome non-responsibility—is referred to as "moral luck," and although it is imbedded in tort law doctrines, theoreticians have raised the question of whether the law should allow it.³¹ Interestingly, the debate over moral luck in tort law has been conducted outside the spheres of efficiency, or deterrence, and usually

28 See *infra* notes 39–42 and accompanying text.

29 See Jeremy Waldron, *Moments of Carelessness and Massive Loss*, in *PHILOSOPHICAL FOUNDATIONS OF TORT LAW* 387, 389 (David G. Owen ed., 1995) (proposing a retributive justice rationale for outcome liability in tort law).

30 See Christopher H. Schroeder, *Corrective Justice and Liability for Increasing Risks*, 37 *UCLA L. REV.* 439, 439 (1990) (arguing that, from a corrective justice point of view, liability for risks is superior to liability for outcomes).

31 See generally Tony Honore, *Responsibility and Luck: The Moral Basis of Strict Liability*, 104 *L.Q. REV.* 530 (1988) (discussing outcome responsibility and connecting it with the issue of moral luck).

also without any relation to corrective justice.³² It arises mainly in the context of retribution and desert theories.³³ But this should come as no surprise. Outcome responsibility is generally efficient, because it threatens injurers by the expected harm of their behavior when deciding how to conduct their affairs. This threat of liability aligns their incentives with the social goal and secures economic efficiency.³⁴ Liability based on outcome is also at the essence of corrective justice, even more than efficiency. The idea of tort law under corrective justice is that the wrongdoer should rectify the injustice done to his victim by way of compensation. If no harm is done, there is nothing to rectify, and if the harm is huge, the wrongdoer should bear it all.³⁵

How does the “moral luck” phenomenon in tort law relate to ex-post reasonable/ex-ante negligent cases? At a superficial level, we could argue that just as where there is no bad outcome, there is no tort liability, if there is no (ex-post) bad behavior, there should be no liability. But this argument is critically flawed. When there is no bad outcome, the law allows the injurer to be exempted from liability, *because the wrongdoing caused zero harm*. Some would, indeed, call this “moral luck,” but the basic principle of tort law that wrongdoers should pay for the harm they caused is upheld in full. Things would be totally different were the injurer in the ex-post reasonable/ex-ante negligent case allowed to enjoy his good luck and pay no damages. Recall that in this case there *is* a bad outcome (harm to the victim) and that outcome is the result of *truly* wrongful behavior (ex-ante negligence). Waiving liability would mean the violation of the tort law principle that wrongdoers should pay for the harm they caused; waiving liability—as I have shown—will frustrate both efficiency and corrective justice.³⁶

III. EX-POST NEGLIGENT BEHAVIOR AND THE ALTERNATIVE LIABILITY RULE

While the ex-post reasonable/ex-ante negligent case (“the main case”) has failed to attract the attention of either the courts or commentators, the ex-post negligent/ex-ante reasonable case (“the reverse case”) is well explored in both the legal scholarship and the case law. With the reverse case, it is settled law that the ex-ante, and not the ex-post, rule prevails. Thus, the injurer whose behavior is negligent according to the information available at the time of the trial will escape liability if that behavior is considered reasonable according to the information reasonably available to him when he

32 *But cf.* Schroeder, *supra* note 30 (being the exception).

33 *See, e.g.*, Waldron, *supra* note 29, at 389–91.

34 Under certain conditions, liability for expected harm would provide injurers with similar incentives as harm-based liability. *See* ARIEL PORAT & ALEX STEIN, TORT LIABILITY UNDER UNCERTAINTY 103–10 (2001) (comparing risk-based liability with harm-based liability).

35 WEINRIB, *supra* note 26, at 153 (“For liability under corrective justice, the defendant’s negligent conduct must have materialized in injury to the plaintiff.”).

36 *See supra* Part I and Section II.A.

acted.³⁷ The fact that the injurious behavior is considered negligent at the time of the trial could have some evidentiary consequences, especially in cases in which the passage of time has made it difficult to know what information was available to the injurer at the time of his injurious behavior.³⁸ Regardless, the prevailing principle of negligence law remains that the ex-ante rule applies to the reverse case.

Things become more complex in the context of products liability for design defects. Here, most jurisdictions apply the ex-ante rule in the reverse case, with only few preferring the ex-post rule. Thus, most jurisdictions will require plaintiffs to show that the design of the particular product was unreasonably dangerous³⁹ at the time of its distribution⁴⁰ by applying a risk-utility

37 *Saddler v. United States*, No. 02-476, 2003 U.S. Dist. LEXIS 25237, at *2 (W.D. Tex. July 11, 2003) (releasing a doctor from liability since he had acted reasonably according to the information available at the time of his behavior); RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 7 cmt. j (2010) (stating that the factfinder needs to assess the foreseeable risk at the time of the defendant's act, in order to determine whether appropriate care was taken); DOBBS, *supra* note 19, § 122 (arguing that since knowledge varies over time, courts need to inquire about the knowledge at the time of the act when deciding whether the action was reasonable); RICHARD EPSTEIN, TORTS § 5.3 (1999) (contending that when the jury needs to decide if the defendant was negligent, it should consider the knowledge available to the defendant at the time of the accident).

38 *See, e.g., Pacella v. Resorts Casino Hotel*, No. 01-CV-4424, 2007 WL 2873651, at *5 (E.D.N.Y. Sept. 28, 2007) (denying summary judgment even though plaintiff could not provide evidence as to the actual or reasonable level of escalator maintenance, because the accident that resulted from the escalator malfunction made it likely that the level of maintenance was too low); *cf.* EPSTEIN, *supra* note 37, § 7.10 (stating that courts use the *res ipsa loquitur* doctrine to shield plaintiffs from summary judgments in cases where the accident appears to have been caused by negligence at the time of trial, but the plaintiff cannot prove it; the case is then referred to a jury, which can, but is not compelled to, find the defendant negligent).

39 *See* *Radiation Tech., Inc. v. Ware Constr. Co.*, 445 So. 2d 329, 331 (Fla. 1983) (balancing “the likelihood and gravity of potential injury against the utility of the product,” public awareness of the dangers of the product, and the costs of making a safer design, to determine liability on the part of a manufacturer under the “unreasonably dangerous” standard); RESTATEMENT (THIRD) OF TORTS: PRODUCT LIABILITY § 2 cmt. a (a design is defective if it is unreasonably dangerous); DOBBS, *supra* note 19, § 354 (a defendant is only liable for a design that is unreasonably dangerous); EPSTEIN, *supra* note 37, § 16.11.3 (same); MARK A. GEISTFELD, PRINCIPLES OF PRODUCT LIABILITY 102 (2006) (same).

40 RESTATEMENT (THIRD) OF TORTS: PRODUCT LIABILITY § 2 (“A product . . . is defective in design when foreseeable risks of harm posed by the product could have been reduced or avoided by the adoption of a reasonable alternative design . . .”); DOBBS, *supra* note 19, § 359 (when the risk is unknowable at the time of a product's manufacture, there will be no liability for design defect or failure to warn about the risks). Some jurisdictions, however, will impose liability for design defects or lack of warning by referring to the time of the trial. *See, e.g., Beshada v. Johns-Manville Prods. Corp.*, 447 A.2d 539, 549 (N.J. 1982) (imposing liability on manufacturers of asbestos products for their failure to warn the plaintiffs of the risks of being exposed to asbestos dust, although those risks became knowable only after the exposure took place).

test⁴¹ or will at least allow manufacturers to invoke a “state of the art” defense, by showing that even though the product is unreasonably dangerous, they should not have realized it at the time of distribution, given the information reasonably available at that point in time.⁴²

Imagine now that the ex-post rule is adopted for the reverse case: Would this lead to inefficiency similarly to how the rule yields inefficiency in the main case? The answer is that the ex-post rule could create inefficiency, but not to the same degree as in the main case and only under certain circumstances. Furthermore, in the reverse case, as opposed to the main case, the ex-post rule has some advantages over the ex-ante rule. The discussion that follows compares the reverse case with the main case in two respects: the injurer’s incentives prior to the injurious behavior and his incentives after the injurious behavior.

A. *Incentives Prior to the Injurious Behavior*

Example 3, which is a variation of Example 1, along with the discussion that follows, illustrates what distinguishes the reverse case from the main case.⁴³

Example 3. Delivering a Baby in the Face of Uncertain Risks: New Negative Information. A doctor must decide whether to deliver a baby by cesarean section or vaginal delivery. From an ultrasound scan, the doctor estimates the baby to

41 See *Osorio v. One World Techs., Inc.*, 659 F.3d 81, 86 (1st Cir. 2011) (applying risk-utility analysis to determine whether the design had a defect); *Quintana-Ruiz v. Hyundai Motor Corp.*, 303 F.3d 62, 70–71 (1st Cir. 2002) (ruling that the car’s air bags were not defective since the utility of the product’s design outweighed its risks); *Dart v. Wiebe Mfg.*, 709 P.2d 876, 880 (Ariz. 1985) (recognizing the risk-utility test as an appropriate test of design defect); RESTATEMENT (THIRD) OF TORTS: PRODUCT LIABILITY § 2 cmt. d. (stating that in determining whether a design is defective, some courts apply a risk-utility balancing test); DOBBS, *supra* note 19, § 357 (arguing that most courts apply a risk-utility test when called upon to determine whether a design is defective); EPSTEIN, *supra* note 37, § 16.11.6 (arguing that modern product liability doctrine employs risk-utility analysis when determining whether a product is “not reasonably safe”).

42 See *Fibreboard Corp. v. Fenton*, 845 P.2d 1168, 1172 (Colo. 1993) (admitting evidence for the “state-of-the-art” defense and ruling that the defendant could not warn of risks that were unknown to it or unknowable in light of the generally recognized and prevailing scientific and technical knowledge available at the time of manufacture and distribution); *Beech v. Outboard Marine Corp.*, 584 So. 2d 447, 450 (Ala. 1991) (rejecting claims of defective motorboat propeller designs since the alternative design offered by plaintiff had not reached the stage of being practically adoptable at the time of sale); RESTATEMENT (THIRD) OF TORTS: PRODUCT LIABILITY § 2 cmt. d, IV.B (noting that the “state of the art” defense has been accepted in one form or another in most jurisdictions); EPSTEIN, *supra* note 37, § 16.11.5 (arguing that if the technology is created after the product is marketed, the “state of the art” defense will always exclude design defect liability); GEISTFELD, *supra* note 39, at 104 (a manufacturer could invoke the “state of the art” defense by showing that the precaution in question was not available on the market, and thus not technologically feasible, at the time of sale).

43 The differences between the two examples are marked with *italics*. See *supra* Section I.A.

weigh between 10 and 12 pounds, with no other way of more accurately determining the weight. Assume that given this range in estimated weight, a reasonable doctor would deliver *vaginally*. The doctor *reasonably* chooses to perform a vaginal delivery. The baby is severely injured during the course of the procedure due to his large size, which would have been prevented had the doctor performed a cesarean section. Immediately upon delivery, the baby's weight is measured at 12 pounds. Assume that *cesarean delivery* is reasonable for a baby weighing 12 pounds (as opposed to a weight ranging between 10 and 12 pounds). Should the doctor be held liable for the harm caused to the baby?

In Example 3, there would be no liability under an ex-ante rule, whereas under the ex-post rule, liability would be imposed. But in contrast to Example 1, here, both the ex-ante and ex-post rules would provide the doctor with efficient incentives.

To illustrate, assume that the cost of precaution (the additional costs of cesarean delivery) is 70 (as in Example 1), that the difference in expected harm between vaginal and cesarean deliveries for a 12 pound baby is 90 (as opposed to 100 in Example 1) and for a 10 pound baby 40 (as opposed to 50 in Example 1). Assume further that at the time of delivery, there was a 50% probability that the baby's weight would be 10 pounds and a 50% probability that it would be 12 pounds. Given these figures, efficiency dictates vaginal delivery, since the cost of precaution (70) is higher than the expected harm ($50\% \times 90 + 50\% \times 40$), or $70 > 65$. Under an ex-ante rule, then, the doctor, in performing a vaginal delivery, was not negligent and should bear no liability for the baby's harm. With no liability, the doctor would deliver vaginally as efficiency requires. But the doctor would also deliver vaginally under the ex-post rule. Under the latter rule, the doctor in Example 3 would be found liable, since $70 < 90$. The risk of bearing liability, however, would not affect his decision to perform a vaginal delivery. His expected liability in Example 3, under the ex-post rule, would amount to 45 (the probability that the baby's weight is 12 pounds and the expected harm 90 is 50%, and only then will the doctor bear liability if harm occurs); since $70 > 45$, the doctor would prefer to save 70 in precautions over reducing his expected liability by 45.

Indeed, if in Example 3, a strict liability rule were to apply, the doctor would also prefer vaginal delivery and risking liability for any harm that materializes, since the cost of precaution is higher than the expected harm ($70 > 65$). As has been established in the law and economics literature, a strict liability rule (with a defense of contributory or comparative negligence) is as efficient as a negligence rule, and in fact sometimes even preferable because of its effect on injurers' activity level.⁴⁴ Accordingly, the argument could be made that the ex-post rule is efficient when applied to the reverse case,

44 See Richard A. Posner, *Strict Liability: A Comment*, 2 J. LEGAL STUD. 205, 206 (1973) (comparing a negligence rule with a strict liability rule); see also Guido Calabresi & Jon T. Hirschoff, *Toward a Test for Strict Liability in Torts*, 81 YALE L.J. 1055, 1056 (1972) (same); Steven Shavell, *Strict Liability Versus Negligence*, 9 J. LEGAL STUD. 1, 21 (1980) (indicating the effects of a strict liability rule on the injurer's activity level).

because it is a midway point between a negligence rule (which is always an ex-ante, rather than ex-post, rule) and a strict liability rule. Just as the doctor would have efficient incentives under both a negligence rule and strict liability rule, so would he be efficiently incentivized under the midway (ex-post) rule.

This argument, however, does not hold in all cases. The main reason is that the ex-post rule, under certain circumstances, could distort the incentives of injurers to overinvest in precautions in order to reduce their expected liability.⁴⁵ The following example, which applies to both negligence and product cases, can explain this distortion. Imagine an injurer who faces an expected harm of 150 on average across three states of the world: (1) 33% likelihood that the expected harm is 90; (2) 33% likelihood that it is 160; and (3) 33% likelihood that it is 200. Assume that precautions of 74 will reduce the expected harm by 75, so that it will amount to 45, 80, and 100 in the three states of the world, respectively [$33\% \times (45 + 80 + 100) = 75$]. Further assume that additional precautions are not cost-justified. Under these assumptions, efficiency requires precautions of 74 to reduce the expected harm by 75.

Under an ex-ante rule, the injurer would take precautions of 74, satisfy the standard of care, and bear no liability. But under an ex-post rule, taking these precautions would not exempt the injurer from liability if state of the world (3) were to transpire. Under realistic assumptions, with an initial expected harm of 200, precautions above 74 would be considered efficient. Thus, the injurer who did not take sufficient precautions would be considered negligent and bear an expected liability of 100 (the expected harm in state of the world (3) after taking precautions of 74). Moreover, it is certainly plausible that even if state of the world (2) were to transpire, precautions of more than 74 would be considered efficient, so that the injurer who did not take sufficient precautions would be considered negligent and be held liable for an expected harm of 80 (the expected harm in state of the world (2) after taking precautions of 74). Accordingly, the injurer would have incentive to take precautions of more than 74—at least to the level that would exempt him from liability if state of the world (2) were to transpire.

Yet underlying this argument is the premise that if the injurer is found negligent, he bears liability for *all* harms resulting from his behavior. There is heated debate in the law and economics literature over the validity of this assumption (often called “the discontinuity” feature of the negligence rule) and in what circumstances it holds.⁴⁶ In particular, if causation principles are properly applied, the injurer’s liability should be limited to only those

45 In the general context, see Steven Shavell, *Liability and the Incentive to Obtain Information About Risk*, 21 J. LEGAL STUD. 259, 267 (1992) (arguing that an ex-post rule can cause injurers to overinvest both in acquiring knowledge about risks and in precautions). For elaboration of this argument in the context of product liability, see Ben-Shahar, *supra* note 16, at 333–34 (arguing that under an ex-post regime, the manufacturer may take too much, or too little, precaution, but never the optimal level).

46 For a fuller description of the “discontinuity” debate, see *supra* note 18.

harms that would have been prevented had he taken efficient precautions. This application of the causation principle eliminates the “discontinuity” of liability. Consequently, in our example, given such an application of the causation principle, liability would be imposed on the injurer who took precautions of only 74 and state of the world (3) or (2) subsequently transpired, but only for the harm that would have been prevented by the precautions considered efficient under the ex-post rule and not for all other harms. Thus, for example, if in state of the world (2) (an expected harm of 80), precautions that cost 79 are what efficiency prescribed, the injurer who takes precautions of only 74 will bear liability if that state of the world transpires, but only for those harms that additional precautions of 5 (the difference between 79 and 74) would have prevented, and no more. Knowing in advance that he will bear the marginal costs of his failure to take what would be considered later as efficient precautions and no more, the injurer will not invest in precautions beyond 74, since the benefit he would reap from greater precautions will be less than the additional costs entailed.⁴⁷

This notwithstanding, an ex-post rule could still create other distortions in incentives for injurers, even if causation principles are properly applied. These distortions will stem from the fact that under an ex-post rule, the injurer will try to minimize his expected liability rather than social costs. Such distortions will not arise under an ex-ante rule, where the injurer’s expected harm and social costs are in alignment. Thus, under an ex-post rule, injurers might invest to increase the probability of the materialization of the state of the world in which they will not be held liable and to decrease the probability of the state of the world in which they are liable, even if social costs remain the same or even increase.⁴⁸ Moreover, whenever possible, injurers will prefer precautions that are more effective in the state of the world in which they will bear liability and less effective in the state of the world in which they will not.

B. *Incentives After the Injurious Behavior*

Does an ex-post rule offer any advantage over an ex-ante rule if applied to the reverse case, and if so, can the same advantage be achieved if an ex-post rule is applied to the main case? The first part of the question has been analyzed extensively in the context of products liability. In particular, an ex-post rule would better incentivize manufacturers to gather information about risks and invest in research and development before distributing their product, since they would be barred from invoking the state of the art defense.

47 Since in our example 74 is the efficient level of precautions, by definition, additional precautions would reduce expected harm by less than the cost of taking those added precautions. In the context of product liability, Ben-Shahar argues that the distortion in incentives arises even if causation is properly applied, but chiefly in the direction of under- rather than over-deterrence. See Ben-Shahar, *supra* note 16, at 334 n.13.

48 See *id.* at 338–39 (arguing that since investment in new technology gives private utility that differs from the social utility, both ex-ante and ex-post rules can lead to under- and over-investment in research and development).

But more importantly, under an ex-post rule, manufacturers would have incentives to gather information and invest in research and development *after* distribution, since they would realize that if, at some time in the future, the product is found to be ex-post defective, they will be liable for the harms suffered by plaintiffs. That risk can be reduced if they find out in time, before harm has occurred, that the product is unreasonably dangerous, and recall the product.⁴⁹

Note that these advantages to the ex-post rule can arise in part also when applied in some negligence cases. Thus, whenever there is a long passage of time between the injurious behavior and the expected materialization of the harm and there is a practical way for the injurer to prevent the injury or mitigate its harmful consequences when new information transpires, an ex-post rule could be more beneficial. It is no coincidence, however, that this specific advantage to the ex-post rule has been mostly discussed in the area of products liability and rarely in the context of other fields,⁵⁰ since the conditions for its applicability are more often met in products cases than in other contexts.⁵¹

Let us focus now on the effect of an ex-post rule on an injurer's incentives to gather information and invest in research and development *following* the injurious behavior, but in the main, rather than reverse, case. Here we will concentrate on products cases, where the manufacturer's incentives to take such precautions after distribution are potentially of major significance. Would an ex-post rule create better incentives for manufacturers to take these precautions? Let us return to Example 2. On the one hand, an ex-post rule would incentivize the implants manufacturer to take the precautions after distribution: he will realize that under this rule, his expected liability is 50, and since taking precautions could lead to its reduction, he will invest in these measures. However, since the expected harm is 75, and not 50, the manufacturer's investment in precaution will be sub-optimal. Conversely, under an ex-ante rule, the manufacturer would have efficient incentives to

49 See *id.* at 348 (arguing that an ex-post rule will incentivize manufacturers to become more informed about their product's risks before they materialize, but stating that this could also lead to overinvestment in acquiring such information).

50 See Wendy E. Wagner, *Commons Ignorance: The Failure of Environmental Law to Produce Needed Information on Health and the Environment*, 53 DUKE L.J. 1619, 1631 (2004) (arguing that current environmental law applies an ex-ante rule that discourages actors from conducting research after creating the risk in order to avoid future liability).

51 This advantage could be relevant for mass torts, when injurers expose victims to a hazardous substance over the course of many years and then later argue that they were unaware of how risky the exposure was. See, e.g., *Allen v. United States*, 588 F. Supp. 247, 257 (D. Utah 1984) (discussing lawsuit where plaintiffs suffered radiation poisoning from nuclear experiments that took place thirty years before litigation); *Beall v. United States*, 567 F. Supp. 131, 134 (M.D. Pa. 1983) (discussing lawsuit where plaintiff suffered from various illnesses allegedly caused by swine flu vaccination that he received a few years prior); *In re Johns-Manville Corp.*, 36 B.R. 743, 745 (Bankr. S.D.N.Y. 1984) (discussing lawsuit where some of the plaintiffs in asbestos litigation suffered illnesses arguably resulting from asbestos poisoning forty years after initial exposure).

take precautions. First, ideally, he would eliminate the risks in advance by taking precautions of 70 (since $70 < 75$). Second, if for some reason he were to make a mistake and produce a product with an expected harm of 75, he would invest optimally in precautions after distribution, since his expected liability would equal the expected harm.

Things become more complicated when the manufacturer takes efficient precautions *before* distribution, but there are still risks that could be reduced by precautions *after* distribution. Under an ex-ante rule, the manufacturer would know he is exempt from liability and therefore would not take precautions after distribution. Conversely, under an ex-post rule, the manufacturer is not exempt from liability and has incentives to take precautions after distribution.

This argument, however, applies only to the reverse case. In particular, it relates to cases in which the manufacturer was *not* negligent ex-ante, but *there is a risk that he would be* negligent ex-post. Indeed, an ex-post rule would function well for such cases in providing incentives to take precautions *after* distribution.⁵² The conclusions of the analysis are therefore as follows: first, in the main case, the ex-ante rule is clearly more advantageous than an ex-post rule in that it creates better incentives to take precautions both before and after distribution; and second, in the reverse case, an ex-post rule could offer some advantages over the ex-ante rule in incentivizing manufacturers to take precautions after distribution. Yet at the same time, an ex-post rule could distort incentives to take precautions prior to distribution, as demonstrated in the discussion above.⁵³

The policy implications of this analysis are that if we seek a rule to fit both the main and reverse types of cases, and assuming we take incentives after distribution seriously, a rule that imposes liability whenever a product is unreasonably dangerous from either an ex-ante or ex-post perspective could be a viable option. This is what I term the “alternative liability rule.” Such a rule could, of course, distort incentives for precautions before distribution, and therefore, when this is a significant risk, an ex-ante rule would likely be best. However, the alternative liability rule is clearly preferable to an ex-post rule, for it provides efficient incentives before distribution in the main case, which is where the ex-post rule fails. Therefore, the best solution is an alternative liability rule if we seek the main advantages of both the ex-ante and ex-post rules, even though it comes at some cost.

The alternative liability rule could, of course, be challenged from perspectives that are not explored in this Article. For example, the alternative liability rule could have a dampening effect on production; it could undercut consumer incentives to take due care when using products; and it could trigger excessive litigation. My argument, therefore, is that in focusing on incentives to take precautions before and after distribution, the alternative liability rule could be a plausible solution. The same solution could apply, at least in

52 See *supra* text accompanying note 49.

53 See *supra* notes 45–48 and accompanying text.

theory, to the more general case of negligence. I say in theory because, as I have already explained, in non-products cases, taking precautions after the injurious behavior occurred is typically impractical.⁵⁴ Accordingly, in such instances, an ex-ante rule could work for both the main case and the reverse case and should probably be preferred over any other rule.

In the event, however, that the alternative liability rule is not adopted, the choice between an ex-ante and ex-post rule should rest on a comparison of the inefficiencies resulting from the effects of an ex-post rule on incentives prior to the injurious behavior against the inefficiencies resulting from the effects of an ex-ante rule on incentives after the injurious behavior. In negligence cases, there should be no dilemma whatsoever; as it has been shown throughout this Article, an ex-post rule is detrimental to efficiency, while it has only minimal potential positive effects on incentives after the injurious behavior has taken place. As with products cases, it appears that in the choice between an ex-ante and ex-post rule, the former is preferable to the latter. Applying an ex-post rule will mean that many products, as in the circumstances of Example 2, will not be efficiently produced. It is doubtful that this huge cost could be offset by the benefits yielded by the rule.

CONCLUSION

Liability for ex-post reasonable/ex-ante negligent behavior is vital. The reason is straightforward: no liability in such cases will lead to under-deterrence, since injurers, when they decide whether or not to take precautions, will consider only some of the risks they create. Moreover, corrective justice principles as well would support imposing liability on ex-ante negligent injurers, regardless of the information that became available only after their injurious behavior.

This Article has two important policy implications, the first for courts and the second for legislatures. *First*, in negligence and product liability cases, the ex-ante rule is preferable to the ex-post rule on both efficiency and corrective justice counts and, therefore, should be adopted by courts. Plaintiffs will then be entitled to recover damages for harms they suffered also from behaviors and products considered reasonable at the time of trial. *Second*, for product cases, the alternative liability rule could be the preferable solution, if we assume incentives to mitigate the effects of ex-post defective/ex-ante non-defective products *after* distribution to be practical and important. Under the alternative liability rule, the manufacturer is held liable for harms caused by his product if the product was *unreasonably dangerous* from either an ex-ante or ex-post perspective.

The arguments developed in this Article are not limited to negligence and product liability cases.⁵⁵ Indeed, they can apply to any area of law where

⁵⁴ See *supra* note 50 and accompanying text. But see *supra* note 51 (noting exceptions).

⁵⁵ In torts, the argument can also be applied to the mitigation of damages and to the contributory and comparative negligence defenses. For example, if the plaintiff failed to mitigate damages, his failure might be considered ex-post reasonable, but ex-ante negli-

reasonableness is a criterion for liability, be it contract law,⁵⁶ criminal law,⁵⁷ or international law.⁵⁸ Each field of law has, of course, its own unique features, and other considerations could filter in and yield different conclusions. I thus leave the question of how the ex-post reasonable/ex-ante unreasonable puzzle should be solved in other fields, for future inquiry.

gent. Similarly, if the plaintiff failed to take precautions that would have prevented the accident, those precautions might be considered ex-post reasonable, but ex-ante negligent.

56 One contractual example is liquidated damages. Courts will not enforce a liquidated damages clause if it is unreasonable “in the light of the anticipated or actual loss caused by the breach and the difficulties of proof of loss.” RESTATEMENT (SECOND) OF CONTRACTS § 356 (1981). Thus, courts are instructed to refer to both ex-ante reasonableness (anticipated loss) and ex-post reasonableness (actual loss) in deciding whether to enforce a liquidated damages clause. As Zhiyong Liu and Ronen Avraham have suggested, the ex-post scrutiny could distort incentives to incorporate a reasonable liquidated damages clause into contracts, because even an ex-ante reasonable liquidated damages clause would be struck down by the courts if it were to be considered ex-post unreasonable. See Zhiyong Liu & Ronen Avraham, *Ex Ante Versus Ex Post Expectation Damages*, 32 INT’L REV. L. & ECON. 339, 340 (2010).

57 Take the doctrine of self-defense, for example. Suppose an actor defends himself unreasonably by applying excessive force, but the injury to the other party turns out to be not too severe. Under an ex-ante rule, the actor should not be allowed to claim self-defense, but under an ex-post rule, this should be allowed. Under an ex-post rule, however, the actor would have incentive to use excessive force, knowing that he will not be punished if the outcome is non-severe. (This distortion in incentives could be corrected under an ex-post rule with a high enough punishment for severe outcomes to compensate for the zero sanction for non-severe outcomes.) Cf. Kenneth W. Simons, *Self-Defense: Reasonable Beliefs or Reasonable Self-Control?*, 11 NEW CRIM. L. REV. 51, 52 (2008) (arguing that the self-defense standard should be applied by reference to the information available at the time the accused acted in self-defense).

58 In international law, one state’s reaction to another state’s aggressiveness must be reasonable. See M.A. Weightman, *Self-Defense in International Law*, 37 VA. L. REV. 1095, 1097, 1114 (1951) (arguing that under international law, the state has the right to use reasonable force in response to an attack or imminent danger). An ex-post rule would provide the reacting state with incentives to use excessive force, as it would know that it will be condemned (or punished) only if the outcome is considered ex-post unreasonable. As a result, the state would consider only part, and not all, of the possible outcomes of its reaction. (This distortion in incentives could be corrected under an ex-post rule if the condemnation (or punishment) were to be great enough for an ex-post unreasonable outcome, to compensate for the zero sanction for an ex-post reasonable outcome.)