

SHARING RESPONSIBILITY INSTEAD OF ALLOCATING BLAME: REFORMING TORTS AND REDUCING ACCIDENTS

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Imagine a pedestrian and driver both approaching a crosswalk. Both parties can take actions to prevent an accident, and traditional economic analysis of tort law recognizes the importance of making sure that both parties have an incentive to do so. But, traditional negligence rules can provide efficient incentives to both parties only under unrealistically ideal conditions.

This Article proposes a liability-sharing rule that focuses on responsibility, rather than blame, and apportions liability according to the degree to which each party's actions made the accident more likely. The rule this Article proposes forces each party to bear the costs of any additional risk that is imposed on the other party. Unlike current rules, this rule provides efficient incentives in the face of heterogeneous and imperfect actors, and it can be modified to maintain efficiency when courts imperfectly observe the parties' actions. Furthermore, the rule provides a coherent basis for apportioning liability, which is lacking in the existing comparative negligence doctrine. This Article argues that the proposed rule is a better fit with tort law's preference for objective standards. Finally, the focus on responsibility rather than fault could foster a more effective, collaborative approach to preventing accidents.

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I. INTRODUCTION

Consider a pedestrian wishing to cross a street in the path of a driver. The driver can reduce the likelihood of an accident by paying attention, refraining from speeding or talking on his¹ cell phone, ensuring that his brakes and tires are well maintained, and not allowing himself to be distracted by thoughts about home or work responsibilities. Likewise, the pedestrian can make sure she looks carefully before stepping out, make sure her shoes are tied, and make sure she herself is not distracted or impaired.

This Article argues that in bilateral care accidents such as the pedestrian crossing above, where both parties can take actions to reduce the likelihood of harm, losses should generally be shared. I propose a liability-sharing rule in which each party's share of the loss is adjusted according to how that party's actions affected the likelihood of the accident. Unlike a negligence rule, the rule I propose does not require the court to establish a level of due care or make a determination of what was reasonable for either party. Instead, the court would

1. To minimize confusion, throughout the Article, I will use male pronouns for the driver, defendant, or injurer and I will use female pronouns for the pedestrian, plaintiff, or victim.

focus on the likely consequences of the parties' actions. I refer to this as a "liability-sharing rule," rather than a comparative negligence rule, because imposing liability does not require the court to find that either party *should* have acted differently. On the other hand, it differs substantially from strict liability because each party's share of the loss does depend on the parties' respective levels of care.

When the actions of more than one party determine the likelihood of a socially relevant outcome, economists call it a team production problem.² Robert Cooter's seminal article "Unity in Tort, Property and Contract"³ pointed out that these team production problems are ubiquitous in common law. Cooter introduced the phrase "the paradox of compensation"⁴ to show how rules where the liability share does not vary according to conduct cannot simultaneously give efficient incentives to both potential injurers and victims. The intuition is that the injurer will not have efficient incentives to avoid an accident unless he must fully compensate the victim, but if the victim will be compensated, this reduces her incentive to avoid an accident. If liability is assigned according to a fixed split (such as fifty-fifty), neither party will have efficient incentives to avoid an accident.

In contrast, fault-based liability rules, which allocate financial responsibility depending on the blameworthiness of the parties' actions, might sometimes provide efficient incentives in bilateral care situations.⁵ One example of a fault-based liability rule is simple negligence. Under simple negligence, an injurer is liable for the loss from an accident if, and only if, he failed to exercise due care and is, thus, at fault.⁶

As many early accounts of the law and economics of torts have shown, under ideal conditions, it is possible to induce efficient behavior with a variety of all-or-nothing fault-based rules.⁷ If the court knows exactly what level of care a party should provide, by setting due care at that level, the court can induce that care. Under simple negligence, for example, a rational injurer would always provide due care so as to be absolved from liability. A rational victim would anticipate that the injurer will meet the due care standard and so would expect to bear full liability. Thus, she would have incentives to act efficiently as well.

Unfortunately, achieving efficiency with all-or-nothing fault-based rules places stringent requirements on both courts and parties. Courts must be able to perfectly determine which actions are efficient for a specific party at specific

2. See Bengt Holmstrom, *Moral Hazard in Teams*, 13 BELL J. ECON. 324, 324–25 (1982). Holmstrom uses the word team, but does not imply any cooperative spirit between the agents. *Id.*

3. See Robert Cooter, *Unity in Tort, Contract, and Property: The Model of Precaution*, 73 CALIF. L. REV. 1, 3–27 (1985) for an excellent discussion of how this paradox arises in tort, contract, and property law and how legal doctrines have evolved to ameliorate it.

4. *Id.* at 3.

5. Holmstrom proves that it is impossible to achieve efficient incentives without information about the individual contributions towards the outcome. In this case impossibility does not apply because by assigning fault, the rule differentiates between the contributions of the individuals. Holmstrom, *supra* note 2, at 325.

6. Mark F. Grady, *Multiple Tortfeasors and the Economy of Prevention*, 19 J. LEGAL STUD. 653, 658 (1990).

7. See GUIDO CALABRESI, *THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS* 239–43 (1970); John Prather Brown, *Toward an Economic Theory of Liability*, 2 J. LEGAL STUD. 323, 323 (1973). See generally RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* (1972).

times, rather than merely what is efficient in general.⁸ Furthermore, a court must be able to perfectly observe what actions the parties actually take. With respect to the parties, achieving efficiency requires that they are able to perfectly choose their care (*i.e.*, that they will never be inadvertently negligent), that they will correctly predict the law,⁹ and that all parties are rational.¹⁰

This Article argues that a liability-sharing rule can provide a better solution to the bilateral care problem than all-or-nothing rules. I focus on a rule that is symmetric, in that it starts with an even split of liability between the parties. The liability split is then adjusted by the degree to which each party's action increased the likelihood of accident. For example, suppose that the pedestrian above was proceeding carefully and the driver was talking on a cell phone, and this doubled the likelihood of an accident. Because the driver doubled the likelihood of an accident, the pedestrian's share of liability would be halved, to 25%, and the driver would be responsible for the remaining 75% of the loss.

Of the liability rules that are in use, the one closest to the rule I propose is a pure comparative negligence rule. Under a pure comparative negligence rule, an injurer will be liable if his negligence causes harm, but if the victim's negligence contributed to the accident, the injurer's share of liability will be reduced by the victim's share of negligence.¹¹ Like the efficient liability-sharing rule I propose, a comparative negligence rule often leads to liability sharing.¹² But the comparative negligence rule only leads to liability sharing when a court determines that both parties are at fault. If neither party is at fault, a pure comparative negligence rule allocates the entire loss to the victim. In contrast, the rule I propose views liability sharing as a default.

The efficient liability rule I propose builds on the intuition from a rule presented by Emons and Sobel¹³ that provided efficient incentives if parties act simultaneously even when courts do not know how costly it is for parties to take care. I show how to construct a rule that shares this property but is also efficient when parties act sequentially. The rule I present provides efficient incentives to act and respond when parties may not be rational or perfectly choose their levels of care. The proposed rule can also be modified to maintain efficiency even when courts cannot perfectly observe the parties' behavior.

The sharing rule I propose is both robust and flexible—robust in the sense that it provides nearly efficient incentives in a range of circumstances even when courts or parties lack the information available for perfect efficiency, and flexible because I construct a framework that provides guidance on how to adjust the

8. See ROBERT COOTER & THOMAS ULEN, *LAW AND ECONOMICS* 339–41 (4th ed. 2004); see also Daniel L. Rubinfeld, *The Efficiency of Comparative Negligence*, 16 J. LEGAL STUD. 375, 376 (1987).

9. For an overview of the effects of uncertainty on incentives to avoid accidents, see STEVEN SHAVELL, *FOUNDATIONS OF ECONOMIC ANALYSIS OF LAW* 224–27 (2004).

10. See Samuel A. Rea, Jr., *The Economics of Comparative Negligence*, 7 INT'L REV. L. & ECON. 149, 160 (1987).

11. *Id.* at 149.

12. See Eli K. Best & John J. Donohue III, *Jury Nullification in Modified Comparative Negligence Regimes*, 79 U. CHI. L. REV. 945, 961 (2012) (showing that, in pure comparative negligence cases, when asked, juries assign some share of liability to both parties approximately 95% of the time).

13. See Winand Emons, *Efficient Liability Rules for an Economy with Non-Identical Individuals*, 42 J. PUB. ECON. 89, 91 (1990); Winand Emons & Joel Sobel, *On the Effectiveness of Liability Rules When Agents Are Not Identical*, 58 REV. ECON. STUD. 375, 376 (1991).

rule to make it more efficient in light of practical limitations. This robustness and flexibility implies that imperfectly implementing the proposed rule should lead to less negative consequences than imperfectly implementing a traditional rule.

A complete adoption of my proposal would require a significant change in the analysis of breach of duty, a key element in a negligence claim.¹⁴ In particular, the comparison would not be with the actions of a reasonable person, but with the safest practicable actions, and a departure from the safest practicable actions would not necessarily be labeled fault but it would imply an assumption of increased responsibility for any accident.

In addition to improving the economic incentives faced by the parties, I argue that focusing on responsibility rather than fault aligns well with the objectivity goal of tort law. Furthermore, the liability-sharing rule is a closer fit to the organizational behavior approach towards accident prevention. Most consequentialist theories would see the ultimate goal of tort law as minimizing the social cost of accidents,¹⁵ and scholars who focus on the organizational aspects of accident prevention typically advocate focus on cooperative prevention rather than blame.¹⁶ The Swiss cheese model of accidents¹⁷ developed by James Reason analogizes each accident prevention opportunity to a layer of Swiss cheese. Accidents occur when the holes in the various layers line up, allowing an accident to slip through.¹⁸ Because human error is always a possibility,¹⁹ just as Swiss cheese always has holes, the best strategy for accident prevention should focus not on determining which slice had more holes, but rather ensuring that the holes do not line up. The proposed rule does so by making sure that each party who can prevent an accident always has proper incentives.

Even if one is skeptical that a wholesale reconfiguration of the breach of duty requirement is likely, the findings of this Article can provide a coherent basis for assigning responsibility shares efficiently under existing comparative negligence regimes. Additionally, the conceptual framework provided by this Article can be used to analyze the performance of extant liability rules and provide a basis for evaluating future proposals.

The next part of this Article presents a fuller explanation and example to illustrate how conventional rules fail to provide efficient incentives, as well as some intuition as to how sharing liability can be an improvement. Part III of the Article describes the basis of the efficient liability-sharing rule and argues that it is a practical and conceptual improvement over current doctrine. Part IV provides a detailed demonstration of the construction of the rule, along with examples and explanations of how it achieves efficiency where traditional rules fail.

14. A negligence claim is commonly said to have four required elements. See ARTHUR BEST & DAVID W. BARNES, *BASIC TORT LAW* 91 (3d ed. 2010). I do not propose changing the other elements.

15. CALABRESI, *supra* note 7, at 26–31.

16. For an argument that a focus on blame impedes learning, see TREVOR KLETZ, *LEARNING FROM ACCIDENTS* 4–6 (3d ed. 2001).

17. See James Reason, *Human Error: Models and Management*, 320 *BRIT. MED. J.* 768, 769 (2000).

18. *Id.*

19. See James Reason, *Understanding Adverse Events: Human Factors*, 4 *QUALITY & SAFETY* 80, 84 (1995) (“The psychological precursors of an error (that is, inattention, distraction, preoccupation, forgetting, fatigue, and stress) are probably the last and least manageable links in the chain of events leading to an error.”).

II. THE TROUBLE WITH TRADITIONAL RULES

A. *Intuition*

In a world of self-interested but completely rational agents and omniscient courts, it is possible to give incentives to both an injurer and victim with a variety of fault-based liability rules. The first generation of economic models showed that if agents can choose their levels of care perfectly, and courts can identify the efficient action, then courts can achieve efficiency with a simple negligence rule, a rule of strict liability with contributory negligence,²⁰ or a rule of negligence with a defense of contributory negligence.²¹ I refer to these as fault-based, all-or-nothing rules.²² Later models showed that efficiency could also be achieved by a comparative negligence rule.²³

In ideal circumstances, all-or-nothing rules achieve efficiency by setting the due care standard for one party at the efficient level of care and absolving that party of liability as long as he meets that standard. If the standard is at the efficient level, it will always be rational for the first party to meet the standard. Believing that the first party will meet the standard of care, the second party will expect to bear all liability for any accident and will have efficient incentives to avoid accidents.²⁴ If, however, the first party is mistaken about the efficient level of care, or simply cannot always choose his level of care perfectly,²⁵ the second party would not bear all liability and might not have efficient incentives.

In a world with perfect courts and infallible homogenous actors, the situation above would never occur. The mere fact that a defendant's liability has ever been denied on account of contributory negligence belies the applicability of the ideal model cited above.²⁶ Some people may be irrational or simply mistaken regarding the law.²⁷ Even rational actors may fail to meet the standard of care and be negligent. People are heterogeneous, so an actor could have a particularly high cost of care and may be willing to assume the liability to avoid paying the cost of care. Somebody who is late for an important meeting, for example, might find it very costly to wait at an intersection, and even the imposition of full liability may be insufficient to induce him to meet the due care standard. Finally, courts are imperfect, and agents who actually meet the due care standard may be judged to have fallen short.

20. This rule would apply full liability to the defendant-injurer, unless the victim-plaintiff was negligent, in which case there would be no liability. The level of care of the plaintiff would not be relevant.

21. See Brown, *supra* note 7, at 328. See generally CALABRESI, *supra* note 7; POSNER, *supra* note 7.

22. See COOTER & ULEN, *supra* note 8, at 348–49 for a taxonomy of all or nothing fault-based rules.

23. See Robert D. Cooter & Thomas S. Ulen, *An Economic Case for Comparative Negligence*, 61 N.Y.U. L. REV. 1067, 1069–70 (1986); see also Rea, Jr., *supra* note 10, at 150–54.

24. For a detailed explanation of how each of these rules lead to efficiency in ideal circumstances, see SHAVELL, *supra* note 9, at 184–87.

25. Grady, *Multiple Tortfeasors*, *supra* note 6, at 654 (describing how agents who are making efficient investments in what he terms “advertence” will sometimes be unintentionally negligent and how the traditional economic analysis of tort law has failed to account for this).

26. As Grady quips: “Economists commit negligence several times on the way to work, but once at their desks they continue to imagine that negligent behavior is exceptional.” *Id.* at 653.

27. Rea, Jr., *supra* note 10, at 157–60 notes the poor performance of all-or-nothing rules in the presence of unresponsive actors.

Using economic terminology, in bilateral care situations, care by one party is often a *substitute* for care by the other. As illustrated by the Swiss cheese model, it is more important that one slice has fewer holes when the other slices are particularly holey. Unfortunately, fault-based rules tend not to give an incentive for one party to substitute care for another party's lack of care.²⁸ In fact, as I will show, they do the opposite. Often, when one party fails to meet the standard of care, the other party is absolved from liability, giving them no incentive to provide care in precisely the cases where care is needed the most.

Given the long history of the common law, it is not surprising that courts have noticed this potential for perverse incentives and have made modifications to the doctrine where the incentives are the worst. As early as *Butterfield v. Forrester*,²⁹ courts worried that a simple negligence rule removed the incentive to avoid an accident from a victim who observed a negligent act that would make the injurer-defendant liable. Reasoning that “[a] party is not to cast himself upon an obstruction which has been made by the fault of another and avail himself of it,”³⁰ Lord Ellenborough announced the common law defense of contributory negligence, which barred recovery when a plaintiff's negligence contributed to the accident.³¹ This doctrine, however, removes liability from injurers when they observe negligent victims, precisely when care by the injurer is likely to be most important.³²

Recognizing this, in the mid-19th century case *Davies v. Mann*,³³ the court developed the last-clear-chance rule. This placed liability on an injurer who had the “last clear chance” to avoid an accident after observing a negligent victim.³⁴ Although this rule corrects the most egregious problems with the defense of contributory negligence, the last-clear-chance rule creates problems of its own. Under the last-clear-chance rule, the victim has an incentive to be inefficiently careless, and it imposes the burden of care on the injurer.³⁵

Another vulnerability of fault-based rules is uncertainty regarding the due care standard chosen by the courts (legal uncertainty) and regarding the court's assessment of care actually supplied by the defendants (evidentiary uncertainty).

28. The prominent exception to this is the last-clear-chance rule, which does give an incentive for the injurer to substitute care. The last-clear-chance rule, however, does not generally give efficient incentives even under ideal circumstances. *Id.* at 159.

29. *Butterfield v. Forrester* (1809) 103 Eng. Rep. 926, 927 (K.B.).

30. *Id.*

31. *Id.*

32. *Id.*

33. *Davies v. Mann* (1842) 152 Eng. Rep. 588, 589 (K.B.).

34. *Id.* For a more recent, and more rigorous treatment, see Steven Shavell, *Torts in Which Victim and Injurer Act Sequentially*, 26 J.L. & ECON. 589 (1983), which examines the performance of a number of liability rules under sequential action, both in cases where care is determinate and where care may be stochastic. He shows that a last-clear-chance rule can give an injurer proper incentive to provide care to make up for a victim's shortcomings. *Id.* at 590–91.

35. See Donald Wittman, *Optimal Pricing of Sequential Inputs: Last Clear Chance, Mitigation of Damages, and Related Doctrines in the Law*, 10 J. LEGAL STUD. 65, 78 (1981) (proposing a solution where careless victims are required to reimburse other parties who were required to exercise extra care to avoid accidents); see also Susan Rose-Ackerman, *Dikes, Dams, and Vicious Hogs: Entitlement and Efficiency in Tort Law*, 18 J. LEGAL STUD. 25, 49–50 (1989) (discussing a complementary situation, and proposing a mirror image rule). These solutions, although theoretically elegant, would require payments whenever one party had to slow down to make up for another's lack of care, and are not practical for regulating every day interactions.

Under either of these types of uncertainty, parties cannot ensure that they will avoid liability by supplying precisely the due level of care. This leads to excessive care when courts are likely to find causation whenever there is a breach of care on the part of the defendant.³⁶ Mark Grady refers to this causation rule as the “full liability rule” and notes that it creates a discontinuous increase in expected liability at the standard of care.³⁷ Because parties wish to avoid the large jump in liability associated with being found to have exercised less than due care, they have incentives to provide excess care to avoid any chance of being found negligent. For example, if the standard of due care is to drive at sixty-five miles per hour and courts can only measure speed with a margin of error of five miles per hour, a driver may have an incentive to drive at sixty miles per hour to avoid any chance of liability.³⁸

Evidentiary uncertainty that leads to small errors leads parties to provide extra care so as to meet the due care standard, but as evidentiary uncertainty becomes more severe, it dilutes the relationship between care and fault and can lead to an opposite bias. Consider the most extreme form of evidentiary uncertainty, in which the court’s estimation of care bears no relationship to care actually provided. In this case, each party’s level of care would not affect the likelihood that that party is liable, so it would be as if each party bore liability for a fixed fraction of damages, and each party would underinvest in care. Thus, the direction of the bias from evidentiary uncertainty can be ambiguous. As I will demonstrate in this Article, the efficient sharing rule can be used to predict the direction of this bias under traditional rules.

Because people often vary in ways that are subjective or unverifiable, courts generally set an objective standard of care according to what they think is appropriate for an average person in a given circumstance. Encouraging everybody to choose the same standard of care prevents efficient self-selection whereby individuals choose an appropriate level of care according to their individual circumstances. This one-size-fits-all strategy leads to excessive care by those who face very high costs of care—for example, those who are hurrying for some important reason.

This also leads to insufficient care by those who face low costs of care and can cheaply supply care. In fact, under a traditional negligence rule, a skilled agent has no incentive to provide even a *de minimis* amount of extra care once he meets the standard of care.³⁹ Recognizing this, courts have generally allowed for the standard of care to be increased for subjective reasons. Individuals who

36. SHAVELL, *supra* note 9, at 228.

37. Mark F. Grady, *A New Positive Economic Theory of Negligence*, 92 *YALE L. J.* 799, 804 (1983).

38. Suppose that lowering speed costs the driver \$5 per miles per hour in time costs and that the likelihood of accident that caused \$10,000 in damage decreased from .01 to .008 as speed declined from sixty-five miles per hour to sixty miles per hour. If the courts error was uniform \pm five miles per hour, the driver would expect to face \$50 in liability at sixty-five miles per hour, but zero at sixty miles per hour, so he would drive at sixty. In this example, however, driving at sixty miles per hour saves only \$20 in accident costs, but adds \$25 in time costs, so it is inefficient.

39. See WILLIAM L. PROSSER, *HANDBOOK OF THE LAW OF TORTS* 161 (4th ed. 1971).

are gifted with unusual skill, knowledge, or foresight are required to make reasonable use of their talents in preventing accidents.⁴⁰ This may place a burden on the unusually skilled that their average brethren do not face. This, in turn, may provide a disincentive to acquire skills that come with the burden of a higher standard of care.

Under the efficient liability-sharing rule that I propose, improving care always reduces liability, so individuals always have an incentive to provide better care. This ensures that individuals with special skills have incentive to use those skills. Since using these skills results in lower liability, there are efficient incentives to invest in knowledge and skills that lower the cost of care.

In summary, traditional rules with no sharing of liability are able to induce efficient behavior in simple models where courts can directly identify the efficient action and participants are able to accurately choose their levels of care. In cases where parties vary in their costs of care, or where they are sometimes inadvertently negligent, however, simple rules tend to lead to inefficiencies. Some of these inefficiencies arise because when one party is forced to accept full liability when negligent, the other party will face no liability and will have no incentive for care. If one is convinced that most accidents are caused by a string of lapses by multiple parties, one might think it is precisely those times when one party is negligent that it is important to ensure incentives on the other party are correct. The fact that a rule provides efficient incentives only when both parties face average costs and are not inadvertently negligent is not reassuring.

B. *An Example of the Problem*

To illustrate the inefficiencies caused by all-or-nothing negligence rules, let us return to our pedestrian crosswalk. Suppose that if the passenger steps into the crosswalk and the driver fails to stop in time, there will be an accident that leaves the pedestrian with a broken leg, causing harm equivalent to monetary damages of \$2,000. Through this example, I will show that if there is some uncertainty about which actions the parties should take, no traditional rule can be generally efficient.

The pedestrian approaching the sidewalk can be *careless*, *moderate*, or *careful*. As the driver is approaching the intersection, he makes a choice between maintaining his speed or slowing down. When the pedestrian is *careful*, there is a 90% chance she stops before the crosswalk; when she is *moderate*, there is an 85% chance; and when she is *careless*, there is only an 80% chance. To use the language of the Swiss cheese model, when she is *careful*, her slice is 10% holes, but when she is *careless* it is 20% holes.

When the driver *maintains* his speed, the likelihood that he is able to stop before the crosswalk, if necessary, is 60%, but if he *slows down*, the likelihood increases to 80%. In other words, depending on his speed, there is either a 40% or 20% chance that he is unable to stop. After each party has chosen his or her

40. See *id.* (“[K]nowledge, skill, or even intelligence superior to that of an ordinary man . . . will demand . . . conduct consistent with it.”); see also RESTATEMENT (SECOND) OF TORTS §289(b) (AM. LAW INST. 1979).

level of care, the probability each party fails to stop is independent, so the probability of an accident for any combination of driver and pedestrian's care is simply the product of the likelihood that each individually fails.

TABLE 1: PROBABILITY OF ACCIDENT

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	.02	.04
<i>Moderate</i>	.03	.06
<i>Careless</i>	.04	.08

TABLE 2: EXPECTED ACCIDENT COSTS
(LIKELIHOOD OF ACCIDENT TIMES LOSS)

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	40	80
<i>Moderate</i>	60	120
<i>Careless</i>	80	160

First, consider a model in which the driver observes the pedestrian's level of care before choosing his own level of care. The first step is calculating the driver's socially optimal response to the pedestrian's action. If the pedestrian is careless, by slowing down instead of maintaining speed, the driver reduces the probability of an accident from .08 to .04 and reduces the expected accident damages from \$160 to \$80, so it is socially optimal to slow down whenever his cost of doing so is less than \$80. If the pedestrian is walking moderately, by slowing down the driver reduces the expected damages from \$120 to \$60. Therefore, it is efficient for the driver to drive defensively when it costs him less than \$60. In response to a careful pedestrian, the driver reduces expected damages only from \$80 to \$40 by slowing down, so he should do so only if the costs are less than \$40. Note that in this example, care provided by the driver substitutes for care by the pedestrian; it is generally more efficient for the driver to exert more care and drive slower when the pedestrian exerts less care.

I now examine the efficiency of incentives provided under various all-or-nothing rules where liability is never shared. All of these rules will fail to provide efficient incentives in some situations. For the sake of predicting what due care standard the court will use, assume that it costs the average driver \$50 to slow down rather than maintain speed. Throughout this example, I assume that courts presume causation whenever there is an accident and the relevant party did not exercise due care.⁴¹ As discussed later in Section II.C, applying liability only

41. Grady, *Positive Economic Theory*, *supra* note 37, at 804–06, refers to this as the full liability rule. In practice, a full liability rule is probably a good approximation of how courts behave. As explained by the Second Circuit, “if (a) a negligent act was deemed wrongful because that act increased the chances that a particular type of accident would occur, and (b) a mishap of that very sort did happen, this was enough to support a finding by the trier of fact that the negligent behavior caused the harm. . . . [I]t is up to the negligent party to bring in evidence denying but for cause . . .” *Zuchowicz v. United States*, 140 F.3d 381, 390 (2d Cir. 1998). Given the

when due care would have actually prevented the accident can lead to more efficient outcomes but presents practical and theoretical difficulties in implementation.

1. *Simple Negligence*

We start with a simple negligence rule under which the driver will be liable whenever he fails to meet the standard of care. Table 3 shows the driver's share of liability for every combination of actions under this rule. Under simple negligence, the driver has excessive incentive to slow down rather than maintain speed. By slowing down, he will meet the standard of care and absolve himself of *all* liability, even if there is an accident. For example, against a moderate pedestrian, he expects to save \$120 dollars of liability by slowing down, even though he only reduces the expected cost of accident by \$60 (from \$120 to \$60). This illustrates the lack of self-selection that results from negligence rules. If a driver has a relatively high cost of care (between \$60 and \$120), the negligence rule will induce him to meet the standard of care and slow down against a moderate pedestrian, even though it would be efficient for him to maintain speed. If the standard of care were set lower so that maintaining speed met the standard of care, high-cost drivers would drive efficiently, but low-cost drivers would not have any incentive to slow down.

Under simple negligence, if the pedestrian figures that the driver might maintain speed regardless of what she does, the pedestrian has insufficient incentive to be careful. For example, if the pedestrian thinks there is always a 25% chance that a driver will maintain speed, the pedestrian expects to be compensated for any accident against the 25% of the drivers who are most likely to cause accidents. Thus, she expects to bear liability for less than 75% of accidents (60% to be precise). Increasing her care from careless to moderate would decrease expected accident costs by \$25 from \$100 ($1/4 \times 160 + 3/4 \times 80$) to \$75 ($1/4 \times 120 + 3/4 \times 60$), but it would only reduce the pedestrian's uncompensated losses from \$60 to \$45. Since she would only reduce her losses by 60% of the reduced accident costs, she has insufficient incentive to increase her care.

TABLE 3: INJURER'S LIABILITY SHARE UNDER SIMPLE NEGLIGENCE

	<i>Slow Down</i>	<i>Maintain speed</i>
<i>Careful</i>	0	1
<i>Moderate</i>	0	1
<i>Careless</i>	0	1

difficulty of proving that the accident would have occurred in the absence of negligence, this approach implies that courts are likely to find cause whenever negligence increased the likelihood of an accident that occurred.

2. *Negligence with Contributory Negligence*

We now move on to the rule announced in *Butterfield v. Forrester*⁴² of negligence with an absolute defense of contributory negligence. This rule places liability on the injurer (driver) only if the injurer is negligent while the victim meets the standard of care.⁴³ Assuming that the standard of care for the driver again is to slow down while the standard for the pedestrian is to be careful, the liability share placed on the driver will be as follows.

TABLE 4: INJURER'S SHARE UNDER NEGLIGENCE WITH CONTRIBUTORY NEGLIGENCE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	0	1
<i>Moderate</i>	0	0
<i>Careless</i>	0	0

The driver will be liable only if he is negligent (maintains his speed) *and* the pedestrian meets the standard of care (is careful). Under this rule, the driver has *no* incentive to invest in care and slow down if the pedestrian is negligent (not careful). He will not be liable when he hits a careless or moderate pedestrian, even if he maintains his speed. It is precisely in these cases where it is socially most beneficial for the driver to be careful that contributory negligence provides the least incentive.

On the other hand, the driver has excessive incentive to slow down when facing a careful pedestrian. By slowing down, he meets the standard of care and absolves himself of *all* liability. The driver saves \$80 of liability by slowing down, even though he only reduces the expected cost of an accident by \$40 (from \$80 to \$40). This is another example of the lack of self-selection that results from negligence rules and implies that a driver might slow down in the face of a careful pedestrian although it would be efficient for him to maintain speed.

Turning to the pedestrian, she has excessive incentive to be careful under this rule. If she is careless or moderate, she must absorb all accident costs, and the driver has no incentive to slow down. If she is careful, the driver will either slow down, reducing the likelihood of accident, or the driver will maintain speed and compensate the pedestrian for the accident. In either case, the pedestrian's savings is greater than the reduction in social costs. If the driver slows down in response to the pedestrian being careful, the pedestrian enjoys the entire reduction of accident costs but does not absorb the driver's increased precaution costs. If the driver maintains speed, the pedestrian is absolved from any accident costs, even though the likelihood of accident is only reduced by one-third (from \$120 to \$80) relative to the pedestrian being moderate. It is worth noting that in either case, the driver prefers the pedestrian to be negligent. When the pedestrian is careful, although the likelihood of an accident is reduced, the driver must either

42. *Butterfield v. Forrester* (1809) 103 Eng. Rep. 926, 927 (K.B.).

43. *Id.*

accept liability for any accident that does occur, or slow down and absorb all of the cost of increasing his level of care.

3. *Last Clear Chance*

The last-clear-chance rule is generally interpreted as requiring injurers to choose the level of care that is an efficient response to victims' care.⁴⁴ Let us assume that the court sets its standard for the average driver, and remember, it costs the average driver \$50 to slow down. A driver who observes that the pedestrian is careless can reduce accident damage by \$80 by slowing down, and one who observes that the pedestrian is moderate can reduce accident damage by \$60, so if the pedestrian is careless or moderate, the last-clear-chance rule will place liability on the driver unless he slows down. On the other hand, if the pedestrian is careful, a driver reduces accident damage only \$40 by slowing down, so it is not efficient for the average driver to slow down. The driver's share of liability under the last-clear-chance rule is shown below. Because a decrease in the pedestrian's care makes the driver's care more important, it can lead to an increase in the driver's standard of care under this rule.

TABLE 5: INJURER'S SHARE UNDER LAST-CLEAR-CHANCE RULE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	0	0
<i>Moderate</i>	0	1
<i>Careless</i>	0	1

If the pedestrian is careless, the driver saves \$160 by slowing down, and if the pedestrian is moderate, the driver saves \$120. When the pedestrian is careful, the driver saves nothing by slowing down and always maintains speed. Here, a pedestrian never has an incentive to be careful. If she is careful, the driver will maintain speed, and there will be a 4% chance of an accident, for which she will not be compensated. If she is moderate, either the driver will slow down, and there will only be a 3% chance of an accident, or the driver will maintain speed and she will be compensated for any accident.

Compared to the contributory negligence rule, we see that last clear chance gives the driver better incentive to respond to a careless pedestrian. Last clear chance, however, gives the pedestrian an incentive to provide insufficient care and shift the costs of care and responsibility for avoiding an accident to the driver.

In addition to the three rules considered above, in this example, there are sixty-one other possible liability rules in which all liability falls on either one party or the other depending on the level of care.⁴⁵ None of these rules will lead

44. Fleming James, Jr., *Last Clear Chance: A Transitional Doctrine*, 47 YALE L.J. 704, 404 (1938).

45. A given row of the liability table, which represents the driver's liability holding the pedestrian's action constant, can take on four values: Strict liability (1,1); Perverse Liability (0,1); Negligence (1,0); or No Liability (0,0). Since there are three rows, representing three actions by the pedestrian, there are 4x4x4, or 64, possible rules.

to efficient incentives.⁴⁶ We now consider how comparative negligence rules might work and show that, although they are likely to be a substantial improvement over all-or-nothing rules, they fall short of full efficiency.

C. Some Partial Solutions: Comparative Negligence and Proportional Causation

Because comparative negligence rules often lead to sharing of liability, they tend to ameliorate some of the worst problems of all-or-nothing rules. We can divide comparative negligence rules into two major categories: 1) pure comparative negligence, which allows the plaintiff to recover at least a portion of damages so long as the defendant's negligent conduct contributed to the accident, and 2) modified contributory negligence rules, which allow a plaintiff to recover proportionately as long as his or her negligence was not too large compared to that of the defendant.⁴⁷ This Section demonstrates that while the problems inherent in an all-or-nothing rule are likely to be substantially less severe with a pure comparative negligence rule, such a rule still creates some inefficient incentives.

Because comparative negligence rules do not always bar recovery when the plaintiff is negligent, they provide some incentive to provide care when facing a negligent victim.⁴⁸ Furthermore, because liability is likely to be shared, comparative negligence rules may provide less incentive for excess care in the face of uncertainty.⁴⁹ As pointed out by Daniel Rubinfeld, a comparative negligence rule can mitigate the one-size-fits-all nature of all-or-nothing rules because it smooths the discontinuity in liability that occurs at the due care standard.⁵⁰ If the counterparty is at least somewhat negligent, agents face a liability schedule that increases continuously with their fault.⁵¹

46. To see that these rules do not lead to efficiency, note that neither Perverse Liability nor No Liability gives the driver any incentive to provide care. On the other hand, Negligence (1,0) gives the driver too much incentive to meet the due care standard. Only strict liability (1,1) gives the driver efficient incentive, but if each row is strict liability, then the pedestrian never faces liability, and has no incentive to provide care.

47. Modified comparative negligence rules can be divided further into the 'greater than' (or 50%) rule, which allows recovery as long as the negligence of the plaintiff is not greater than that of the defendant, and the 'not as great' (or 49%) rule, which only allows recovery if the negligence of the plaintiff is not as great as that of the defendant. Christopher Curran, *The Spread of the Comparative Negligence Rule in the United States*, 12 INT'L REV. L. & ECON. 317, 319 (1992). According to Curran, only four states and the District of Columbia have not adopted any comparative negligence rules. Thirteen states follow pure comparative negligence, and the remainder modified negligence rules. *Id.* at 320–21.

48. Rea, Jr., *supra* note 10, at 155 (justifying comparative negligence on essentially these grounds when he shows that it ameliorates the inefficiencies caused by the contributory negligence rule in the presence of "unresponsive actors"); Shavell, *supra* note 34, at 597 (also noting that comparative negligence gives an injurer incentive to avoid an accident when faced with a negligent agent, whereas contributory negligence does not). In the terms of this Article, unresponsive actors could be modeled as agents whose control over their care is so imperfect that they have no control at all. As shown in Section IV.F, the rule I propose gives efficient incentives to respond to such actors.

49. Cooter & Ulen, *supra* note 23, at 1087–92. But see Oren Bar-Gill & Omri Ben-Shahar, *The Uneasy Case for Comparative Negligence*, 5 AM. L. & ECON. REV. 433, 440–42 (2003), for an argument that the opposite can be true.

50. Rubinfeld, *supra* note 8, at 376.

51. For this reason, Rubinfeld suggests that with a comparative negligence rule, the standard of care be set artificially high. *Id.* at 378; see also Giuseppe Dari-Mattiacci & Eva S. Hendriks, *Comparative Negligence as a Buffer Against Erroneous Standards* 4 (Amsterdam Ctr. for Law and Econ., Working Paper No. 2010-13,

TABLE 6: INJURER'S SHARE UNDER PURE COMPARATIVE NEGLIGENCE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	0	1
<i>Moderate</i>	0	2/3
<i>Careless</i>	0	.5

Table 6 presents a pure comparative negligence rule where the standard of care for the pedestrian is to be careful and the standard of care for the driver is to slow down. We imagine that the court rules that a pedestrian who is moderate is half as negligent as a driver who maintains speed, and that a pedestrian who is careless is just as negligent as a driver who maintains speed.

Against a pedestrian who meets the standard of care, the comparative negligence rule functions just like any other negligence rule and gives too much incentive for the driver to meet the standard of care and too little incentive to engage in self-selection. Against a pedestrian who is negligent, comparative negligence can give too much or too little incentive for care. In particular, against a moderate pedestrian, with this rule, a driver will still have too much incentive to slow down. If he maintains speed, he faces \$80 ($2/3 \times 120$) in expected liability, so he could save \$80 by slowing down, even though it only reduces expected accident costs by \$60. Finally, against careless pedestrians, he actually has efficient incentives; he saves \$80 in liability by slowing down and reduces accident costs by \$80 as well. We can generalize from this and note that under comparative negligence, there will be a steep liability gradient for the injurer at the standard of care whenever the victim meets the standard of care, or is close to it, leading to excessive incentives for the injurer.

Turning to the pedestrian, if she expects the driver to slow down, she expects to bear all liability and internalize all social costs, so she has efficient incentives. If she expects the driver to maintain speed, it turns out that she has efficient incentives as well. This is because the shares happened to be just right; if the jury assigned $3/4$ of the loss to the driver when he maintained speed and the pedestrian was careless, the pedestrian would have excessive incentive to be moderate rather than careless. Against a driver who maintained speed, being moderate would reduce the pedestrian's expected loss by \$50 (from $1/2 \times 160$ to $1/4 \times 120$) but would only reduce accident costs by \$40.

Although it improves on all-or-nothing rules even in this simple example, a pure comparative negligence rule does not achieve efficiency. When the victim is exercising due care, a pure comparative negligence rule functions just like a negligence rule and does not lead to self-selection by the injurer. Also, the injurer never has incentive to increase care beyond due care, even when it is efficient. A modified comparative negligence rule is closer to traditional contributory negligence in that it will sometimes allocate the entire loss to one party (the

2010) (showing that comparative negligence rules tend to mitigate inefficiencies from setting the standard of care too high).

plaintiff), even when both parties are negligent. Although a defendant must ensure that he is not more negligent than the plaintiff, an injurer who observes a negligent defendant will still have insufficient incentive to avoid an accident.

Another approach, suggested by Steven Shavell in the context of accidents caused by one agent, is to use a rule of proportional causation. Rather than applying full liability if some threshold conditions of causation are found and no liability otherwise, liability would be applied according to the probability of causation—the degree to which the defendant’s negligence increased the likelihood of the accident.⁵² Because expected liability increases smoothly, proportional liability can give efficient incentives over a range of actions, even when a court does not know which action is efficient.

The rule proposed in this Article could be seen as taking the spirit of Shavell’s single-agent proportional causation rule and applying it to the problem of bilateral care. The next Part discusses the general principles behind the efficient liability-sharing rule. Following that, using the example of the pedestrian crossing, I provide a detailed demonstration of the construction of the rule and illustrate how it provides efficient incentives.

III. A PROPOSAL FOR EFFICIENT LIABILITY SHARING

I propose a liability-sharing rule in which each party’s share of liability for accidents is adjusted according to the degree that their action increased the risk of accident or forced the other party to make up for the lack of care. The rule is constructed so that each party expects to internalize the external effects of their choice of action across a broad spectrum of actions. Thus, the rule provides efficient incentives in the face of uncertainty and as individual circumstances change.

Under the proposed rule, agents generally face less than full liability. Therefore, if the liability split was constant, both parties would have insufficient incentive to avoid harm. Under the sharing rule, however, carelessness by an agent increases the share of liability borne by that agent. If the share of liability increases at precisely the correct rate, the marginal liability faced by each agent will be equal to the marginal social harm, and each agent will have the correct incentives across a spectrum of actions. The important feature of the efficient liability-sharing rule is that it adjusts each party’s share of liability so that the other party is, on average, compensated for changes in the first party’s level of care. To put it most simply, if one party takes an action that triples the likelihood of an accident and the other party has no chance to react, the efficient liability rule cuts the other party’s share of the loss from an accident by $2/3$. Since the other party faces three times the risk of a loss that will be only $1/3$ as great, the other party is on average indifferent. Similarly, if the first party took an action that was unusually careful so the likelihood of accident was only $2/3$ as great, the other party’s share of liability would be increased by $3/2$, so the other party would still be indifferent.

52. Steven Shavell, *Uncertainty over Causation and the Determination of Civil Liability*, 28 J.L. & ECON. 587, 589 (1985).

From the point of view of the agent choosing an action, as long as the other party is compensated on average, the agent has efficient incentives. In order to have efficient incentives, the first agent must expect to internalize any externalities she imposes on others. If she expects to compensate the other party on average, she will expect to internalize the externalities, even if the other party is sometimes overcompensated and sometimes undercompensated.

Furthermore, even when the agents choose levels of care sequentially (for example, the injurer observes the victim's level of care before choosing his own action), the victim has no incentive to act strategically and distort the injurer's level of care. This occurs because the injurer's marginal liability is equal to the marginal harm from his carelessness. Since the victim expects to be exactly compensated for any change in the injurer's care, the victim has nothing to gain by distorting the injurer's action and choosing the efficient level of care is a dominant strategy for her.

When the second party has an opportunity to react to the first party's action, the social costs are not solely measured by either the direct or the indirect impact on the likelihood of accident. When care by the other party is a substitute, the second party may increase his care in response to the first party's lack of care, and this will mitigate the direct increase in the likelihood of accident. The second party, however, will bear some costs in doing this, so looking only at the equilibrium change in accident likelihood would understate the impact of the first party's carelessness. The solution is to convert the second party's extra cost of care into an accident-likelihood equivalent.

It is worth noting that nothing in the construction of the rule requires a measure of care that is either discrete or quantifiable; it merely requires that the court is able to accurately estimate the consequences of care. Furthermore, while in many accident situations care by one party substitutes for lack of care by another, there are situations where this is not the case. For example, there might be a spacecraft that would explode if any one component fails. In that case, when one manufacturer fails to exercise care, it would be efficient for all other manufacturers to exercise less care.⁵³ In either case, the proposed liability rule will still be efficient.

A. *Conceptual Changes and Practical Issues*

The ubiquity of liability sharing under my proposed rule is in stark contrast to the theoretical results of traditional fault-based rules, which lead to liability always falling on the same party.⁵⁴ Similarly, the most concrete theoretical difference between the proposed liability-sharing rule and a pure comparative negligence rule is how liability is allocated when neither party is negligent. It would be possible to construct a theoretically efficient rule that more closely resembles comparative negligence than the liability-sharing rule proposed. In this rule, an injurer who exercised the highest level of care that was ever efficient would not

53. Michael Kremer, *The O-Ring Theory of Economic Development*, 108 Q.J. ECON. 551, 551 (1993) (noting that it took just one faulty part to take down the space shuttle Challenger in January 1986).

54. In theoretically ideal conditions, with ideal agents, a negligence rule should never lead to liability. See COOTER & ULEN, *supra* note 8, at 328.

be liable for accidents.⁵⁵ Under such a rule, the victim will generally not be fully compensated, even when she exercises the highest level of care, so one might interpret such a rule as setting a due care standard for the victim that is so high that it is never efficient for her to meet it. At this point, the concept of due care is stretched so far that failing to meet it could hardly be considered fault, and a rule like the one I propose that explicitly sets liability sharing as a default would have the virtue of candor.

In contrast to the theoretical differences, the practical differences in how losses are allocated are likely to be much smaller. Because a party seldom escapes an allegation of negligence when there are actions the party could have taken to reduce the likelihood of accident and it is difficult to be certain from the outset how a court will rule, negligence rules lead to a possibility of liability in most accidents.⁵⁶ Very often, the mere fact of an accident is interpreted to be proof of fault on the part of somebody—what legal psychologists call “hindsight bias.”⁵⁷ Furthermore, the likelihood that a court assigns liability to a party typically decreases with that party’s care and increases with the care of the other, so in real life situations, all-or-nothing rules may approximate the efficient rule presented in this Article. One might quip that traditional rules work better in practice than in theory. Legal imperfections can actually make simple negligence rules more robust to other imperfections. The framework created in this Article explains why and when this will occur.

The practical difference between the efficient rule and a comparative negligence rule is smaller still. Juries may be more receptive to finding negligence when it does not require them to allocate the entire loss to a party they think was only slightly negligent.⁵⁸ This explains the finding that parties very frequently share liability under comparative negligence.⁵⁹ Although a comparative negligence rule could be practically similar to the efficient rule, it is important to understand both conceptually and practically how liability sharing should work, rather than to count on a happy coincidence of errors. In particular, understanding the efficient rule can help us understand when other rules will be effective and when they will not. Thus, the framework I present is both diagnostic and prescriptive.

55. See *infra* Table 21.

56. See Best & Donohue, *supra* note 12, at 961–67 for an empirical analysis of findings of negligence by federal juries.

57. See Kim A. Kamin & Jeffrey J. Rachlinski, *Ex Post ≠ Ex Ante: Determining Liability in Hindsight*, 19 LAW & HUM. BEHAV. 89, 90 (1995).

58. See Lars Noah, *Civil Jury Nullification*, 86 IOWA L. REV. 1601, 1612 (2001) (“Under the old rule that any contributory negligence by a plaintiff would defeat recovery in tort, widespread jury nullification occurred to soften the harshness of this doctrine.”). At least one judge has lamented his duty to find negligence where it existed, even when doing so prevented recovery for a deserving plaintiff: “[A]s every trial lawyer knows, the jury would likely have ignored its instructions on contributory negligence and applied a standard of comparative negligence. It would be comfortable for me simply to guess what the jury’s verdict would have been and then file a one-sentence decision holding defendants liable in that amount. Comfortable but false.” *Alibrandi v. Helmsley*, 314 N.Y.S.2d 95, 96–97 (N.Y. Civ. Ct. 1970).

59. See Best & Donohue, *supra* note 12, at 945.

Current comparative negligence doctrine is imprecise about how a judge or jury should weigh the negligence of the various parties.⁶⁰ Speaking of apportioning fault, the Third Restatement notes: “This involves apportioning the loss both by causation and by percentages of responsibility. Very few courts have addressed how this should be done.”⁶¹ One notable exception is *Dobson v. Louisiana Power & Light*,⁶² in which the court explicitly endorsed applying a version of the Hand Formula⁶³ in proportioning fault under comparative negligence.⁶⁴

Similarly, there is little consensus on even a theoretical basis for comparing relative degrees of negligence. The law and economics literature has suggested a formula for assigning shares that relies on an assumption that care can be coherently quantified.⁶⁵ Even when it is possible to assign a level of care a cardinal number, such as driving speed or seconds spent looking, it is not clear that the cardinal number corresponds to the effect of that care. For example, the increase in likelihood of an accident from doubling driving speed may be much greater than the impact from halving the time a pedestrian spends looking for traffic before crossing. A more recent suggestion has come from Paul Edelman, who provides a suggestion for assigning fault when care is not naturally commensurable, for example, if care by plaintiffs and defendants has different natural units.⁶⁶ Although Edelman shows his scheme can be coherent, it does not necessarily lead to efficient incentives. In contrast, the liability-sharing rule presented here avoids the commensurability problem by focusing on the increase in likelihood of an accident—something that has a clear and consistent numerical magnitude regardless of the actions being compared.

60. See William L. Prosser, *Comparative Negligence*, 41 CALIF. L. REV. 1, 9 (1953), for an early argument that comparative negligence would give juries an opportunity to divide liability according to their sympathy or prejudices, rather than on any firm and consistent legal basis.

61. RESTATEMENT (THIRD) OF TORTS §7 cmt. e (AM. LAW INST. 1999).

62. 567 So.2d 569, 575 (La. 1990).

63. The Hand Formula, formulated in *United States v. Carroll Towing Co.*, 159 F.2d 169, 173 (2d. Cir. 1947), determines whether failing to take a precaution constitutes negligence by comparing the harm prevented (in Hand’s terms: $P \times L$) with the cost of the precaution (in Hand’s terms B).

64. *Dobson* does not explicitly state how the Hand Formula is to be applied, but refers to a journal article that analyzes the formula. *Dobson*, 567 So.2d at 575; see David C. Sobelsohn, *Comparing Fault*, 60 IND. L.J. 413, 420 (1985). The formula that Sobelsohn suggests for the injurer’s share is (in Hand’s notation):

$$\frac{\frac{P_I \times L_I}{B_I}}{\frac{P_I \times L_I}{B_I} + \frac{P_V \times L_V}{B_V}}$$

where the I and V subscripts refer to the values for the injurer and victim respectively. One should note that this formula would give a party (say the injurer) a share of liability even if $P_I \times L_I < B_I$; that is to say, even if the injurer was not negligent under the Hand rule, and furthermore, does not lead to efficiency, even in simple models. *Id.* at 419–20.

65. See, e.g., COOTER & ULEN, *supra* note 8, at 320–47. Specifically, if x and y are the levels of care for the injurer and victim respectively and x^* and y^* are the respective legally mandated standard of care, the injurer’s share of liability is taken to be:

$$\frac{x^* - x}{(x^* - x) + (y^* - y)}$$

66. See Paul H. Edelman, *What Are We Comparing in Comparative Negligence?*, 85 WASH. U. L. REV. 73, 75 (2007) (arguing that if care is not commensurate, but if the relative deviations in care affect the likelihood of care in the same way, a comparison of relative negligence is appropriate).

Because the rule focuses on the degree to which the parties' actions increased the probability of an accident, rather than the wrongfulness of the actions, it is closer to comparative causation than comparative negligence. Discussions of comparing causation necessarily engender metaphysical confusion, in particular between but-for (*sine qua non*) causation and proximate causation—or, in other terms, between *ex-post* causation and *ex-ante* causation. If the accident would not have happened if either party had performed impeccably, each party's fault is equally a but-for cause.⁶⁷ Yet, if we are interested in allocating responsibility, from a policy perspective, we might be interested in how much each party should have expected to be a cause for that type of accident, and look at cause from an *ex-ante* perspective. One of the factors mentioned in the Third Restatement is “the strength of the causal connection between the person's risk-creating conduct and the harm.”⁶⁸ To the degree to which this “strength of the causal connection” refers to foreseeability, one can see it as compatible with the approach suggested here.⁶⁹

In summary, the liability-sharing rule finds clear conceptual justification for apportioning damage by the degree to which lack of care contributed to the accident rather than the degree to which the lack of care was inherently blameworthy. As I will demonstrate in Part IV, this approach provides robust and efficient incentives in a wide range of circumstances.

B. Objectivity and Individuality

Moving beyond the precise mechanism of apportionment, the liability-sharing rule's focus on responsibility rather than fault aligns well with the objectivity goal of tort law. First-year torts students are often introduced to negligence by *Vaughan v. Menlove*,⁷⁰ which holds that reasonable care is objective, but they are soon taught the numerous exceptions. The tensions in traditional tort rules include the asymmetric treatment of especially skilled and unskilled actors,⁷¹ as well as the differential treatment of mistakes due to poor judgment as opposed to mistakes due to rushed judgment.⁷² Negligence law holds an adult who is possessed of less than average knowledge or skill to the level of judgment

67. This could justify Prosser's contention that “once causation is found, the apportionment must be made on the basis of comparative fault, rather than comparative contribution.” Prosser, *supra* note 60, at 15.

68. RESTATEMENT (THIRD) OF TORTS § 8(b) (AM. LAW INST. 2000).

69. On the other hand, “strength of causal connection” might be interpreted as directness, which would not be relevant to the liability-sharing rule.

70. *Vaughan v. Menlove* (1837) 132 Eng. Rep. 490, 492 (C.P.).

71. See Anita Bernstein, *The Communities that Make Standards of Care Possible*, 77 CHI-KENT L. REV. 735, 740 (2002) (lamenting that the “choices between objective and subjective approaches to the standard of care reveal no particular logic”).

72. *Compare* *Cordas v. Peerless Transport. Co.*, 27 N.Y.S.2d 198, 201–02 (N.Y. City Ct. 1941) (“The law in this state does not hold one in an emergency to the exercise of that mature judgment required of him under circumstances where he has an opportunity for deliberate action.”) (quoting *Kolanko v. Erie R.R. Co.*, 212 N.Y.S. 714, 717 (N.Y. App. Div. 1925)), with *Vaughan*, 132 Eng. Rep. at 492 (refusing to consider the defendant's “misfortune of not possessing the highest order of intelligence”).

and skill of an average person.⁷³ Nevertheless, it requires that courts consider “knowledge, skill, or even intelligence superior to that of the ordinary person,” and “demand of that person conduct consistent with it.”⁷⁴ Additionally, traditional negligence rules excuse reasonable imperfections in execution but excuse no mistakes in judgment. An agent who has chosen a plan of action that entails reasonable risk will not be held responsible if that risk comes to pass. If an accident is caused by a lapse in attention or judgment, however, the injurer will be held responsible. The liability rule I propose does not force courts to distinguish between these types of mistakes.

This asymmetric treatment of superior and inferior skill, as well as the distinction between mistakes in judgment and mistakes in execution, might be seen as a pragmatic response to the one-size-fits-all nature of negligence rules. Specifically, one might worry that actors with exceptional skills would not have any incentive to make use of these skills unless their standard of care is raised. Unfortunately, imposing additional duties on those who obtain special skills can decrease the incentive to develop those skills. In theory, making reasonable investments in obtaining skills could be part of the reasonable care analysis, but just like investments in attention, such investments could be hard to evaluate.

Just as the liability-sharing rule I propose provides efficient incentives to invest in attention when parties do not choose their care, it provides efficient incentive to invest in skills. Because expected liability falls with risk created by an action, the agent internalizes all of the benefit from the safer action and has an incentive to reduce the costs of making the safer action available. The rule is objective in that liability share depends on risk created, not a judgment about the appropriateness of the action. Consequently, as long as the court can tell how much risk an agent actually created, it does not need to concern itself with whether an agent had skills that would allow her to reduce risk at a low cost.

C. *Collaboration and Learning from Accidents*

In addition to providing more robust and objective incentives to individual parties, the liability-sharing rule is more likely to foster cooperative attitudes towards accident prevention. The efficient sharing rule emphasizes the parties’ shared responsibility to avoid accidents, in contrast to the emphasis on fault and blame in negligence rules. In a review article, sociologist Maurizio Catino compares two approaches to responding to accidents in organizations, the Individual Blame Logic (“IBL”) and the Organizational Function Logic (“OFL”).⁷⁵ Catino notes that most safety experts believe that IBL, which seeks to allocate blame, can lead to scapegoating of one individual and impede identification of means of prevention that would come from a more systematic understanding of the

73. See, e.g., OLIVER WENDELL HOLMES, JR., *THE COMMON LAW* 108 (1881) (“If, for instance, a man is born hasty and awkward, is always having accidents and hurting his neighbors . . . his slips are no less troublesome to his neighbors . . . and the courts which they establish decline to take his personal equation into account.”).

74. W. PAGE KEETON ET AL., *PROSSER AND KEETON ON THE LAW OF TORTS* 185 (5th ed. 1984).

75. See Maurizio Catino, *A Review of Literature: Individual Blame vs. Organizational Function Logics in Accident Analysis*, 16 *J. CONTINGENCIES & CRISIS MGMT.* 53, 55–60 (2008).

many factors leading to the accident.⁷⁶ On the other hand, OFL seeks to identify organizational and structural factors that create conditions under which an accident is likely.⁷⁷ Proponents of OFL argue that “blame culture, reinforced by a certain type of legal action, becomes the first obstacle to the creation of greater safety.”⁷⁸ Thus, the focus on wrongfulness of individual decisions inherent in traditional negligence doctrine can be counterproductive.

Similarly, in his book *Learning from Accidents*, safety expert Trevor Kletz writes “a dozen or more people have opportunities to prevent a typical accident and it is unjust to pick on one of them . . . and make him the scapegoat.”⁷⁹ He goes on to quote an official U.K. Government Safety report, “[t]he real need is for a constructive means of ensuring that practical improvements are made and preventative measures adopted.”⁸⁰

This points to another weakness of both the last-clear-chance rule and current comparative negligence doctrine: the emphasis on the last link in the causal chain. The Third Restatement’s reference to the strength of the causal connection can be interpreted as placing more responsibility on whomever acted last chronologically, especially in light of the substantial factor analysis that is often used to determine proximate cause.⁸¹ Furthermore, substantial factor analysis seems to be less likely to attribute causation to latent factors, which OFL sees as the most effective targets for prevention. The Restatement (Second) of Torts suggests that when conduct creates “a situation harmless unless acted upon by other forces,” it is less likely to be a proximate cause than when it creates “a force or series of forces that are in continuous and active operation up to the time of the harm.”⁸² The last link in the chain is often not in the best position to prevent the accident.⁸³

Although most safety experts worry that a focus on IBL can impede learning from accidents, some fear that OFL may neglect the importance of holding individuals accountable for choices they make. As pointed out by Professors Wells, Morgan, and Quick, OFL’s focus on avoiding individual blame creates a “danger of overlooking aspects of valid individual responsibility. . . . It is difficult to deny the deterrence aspect of blame particularly with legal processes.”⁸⁴

The rule I propose reconciles the tension between maintaining deterrence and focusing on prevention rather than blame. It allocates liability and financial responsibility so deterrence is maintained. But the focus on prevention rather than fault could result in less secrecy and defensiveness than a focus on moral blame. The very use of the term fault can be inappropriate for many instances of negligence because “courts, commentators and jurors continue to equate fault

76. *Id.* at 57.

77. *Id.* at 59.

78. *Id.* at 56.

79. KLETZ, *supra* note 16, at 5.

80. COMMITTEE ON SAFETY AND HEALTH AT WORK, SAFETY AND HEALTH AT WORK, 1970-72, Cmnd. 5034, at 82 (UK).

81. RESTATEMENT (THIRD) OF TORTS: § 8(b) (AM. LAW INST. 2000).

82. RESTATEMENT (SECOND) OF TORTS § 433(b) (AM. LAW INST. 1965).

83. See KLETZ, *supra* note 16, at 1 (“But putting the immediate causes right will prevent only the last accident happening again; attending to the underlying causes may prevent many similar accidents.”).

84. Celia Wells et al., *Disasters: A Challenge for the Law*, 39 WASHBURN L.J. 496, 503 (2000).

with moral indiscretion.”⁸⁵ Defendants might be more forthright when liability is not equated with fault, so there is less risk of moral condemnation.

The departure from an allocation of fault to an assignment of responsibility can make the stakes of the trial more administrative and financial. Many defendants will be insured and might be more cooperative in such a trial, making it easier to learn from accidents. One might worry that this insurance would cut against the financial incentives provided by the sharing rule. But as argued by Ben Shahaar and Logue, insurers often monitor the insured and act as effective intermediaries to make the insured internalize the expected liability from their actions.⁸⁶ Thus, insurance does not necessarily imply that the incentives from financial responsibility for accidents are dampened. By tying financial responsibility to the choices of actions, removing the taint of moral disapproval, and focusing the trial on factual inquiries, the liability system can work more effectively to prevent future accidents.

D. Potential Objections

The requirement of fault for liability has been defended on philosophical grounds, which the analysis in this Article is not directed toward.⁸⁷ One common practical argument against strict liability rules, and in favor of negligence rules, is that strict liability rules lead to more lawsuits because the plaintiff need not prove fault.⁸⁸ Since the proposed rule leads to at least some liability in virtually all bilateral care cases, it is vulnerable to the same criticism. This criticism, however, is made in the context of theoretical models that predict that agents generally act with due care and that negligence is rare. Furthermore, the criticism presumes that jurors will not find negligence where none exists—an assumption that is called into question by the prevalence of hindsight bias. Looking at over 800 negligence cases, Best and Donohue find that juries, when asked, found both parties at least 5% negligent in about 95% of cases.⁸⁹ Thus, it seems unlikely

85. Alan Calnan, *The Fault(s) in Negligence Law*, 25 QUINNIPIAC L. REV. 695, 701 (2007).

86. See Omri Ben-Shahaar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197, 199 (2012).

87. I take a consequentialist approach in this Article and focus on the practical impact of my proposed rule. Philosophers such as Jules Coleman and Ernest Weinrib who have argued that addressing wrongs between individuals is the most important function of tort law, would likely be skeptical of a move away from a fault-based system. See Jules L. Coleman, *Tort Law and the Demands of Corrective Justice*, 67 IND. L.J. 349, 349–51 (1992); Ernest Weinrib, *The Special Morality of Tort Law*, 34 MCGILL L.J. 403, 410 (1989). Unfortunately, a more comprehensive engagement with this literature is beyond the scope of this Article.

88. See STEVEN SHAVELL, *ECONOMIC ANALYSIS OF ACCIDENT LAW* 264 (1987). Here, Shavell points out that this could be counterbalanced by cheaper trials under strict liability because strict liability is not concerned with fault. *Id.* Unfortunately, because the rule I propose adjusts the liability split according to behavior, it would not share this advantage.

89. See Best & Donohue, *supra* note 12, at 961–67. This finding excludes cases where a judge refused to put the question to the jury. It does suggest that if a judge concludes that a reasonable jury could find negligence, the jury tends to do so.

that the necessity of convincing a jury that the defendant was somewhat negligent is a substantial deterrent to many lawsuits.⁹⁰ We might conclude that this criticism has more theoretical force than practical weight.

Even if one is committed to the negligence principle that agents who meet the standard of care should never face liability, the analysis in this Article can be used to construct a more efficient comparative negligence rule. One could do this by assigning the defendant a zero liability share when he meets the standard of care and the plaintiff uses the baseline level of care. We could then use this baseline to assign liabilities for other combinations of care using the methods described in Part IV. Although this rule would not give an incentive for the defendant to exceed the due care standard when it was efficient to do so, it would still provide efficient incentives to react to negligent victims.

One might be skeptical of the importance of the victim's incentives in most accidents and doubt that many people would be more likely to put themselves in harm's way when they know they would have a good lawsuit if they were injured. Some tort lawsuits undoubtedly do occur between sophisticated parties that are responsive to financial incentives. Furthermore, in many cases, such as most automobile accidents, both parties are represented by insurers who price insurance so as to make them responsive to such incentives. Automobile accidents have been the largest cause of accidental deaths in the United States,⁹¹ and several studies have found that no-fault laws, which reduce the financial incentives for careful driving, lead to measurable increases in fatal accidents.⁹² Additionally, there are good fairness reasons to support rules that provide efficient incentives. One who does not believe that incentives change peoples' actions might believe it is desirable for people to absorb the costs their choices impose and that it is unjust for an injurer to bear the full costs of an accident that the victim could have prevented with a moderate degree of care.

In order to determine the efficient liability shares, the courts must make estimates of the relationship between the agents' actions and the probability of an accident. Most people are not accustomed to evaluating and considering exact numerical risks from actions. Many estimates of the additional risks from common behavior, however, are available. For example, traffic engineers have pub-

90. The fact that a plaintiff might not recover much if she was much less careful than the defendant might deter lawsuits, but that factor would be present in the rule proposed here as well as under pure a comparative negligence rule.

91. See Sherry L. Murphy et al., Ctr. Disease Control & Prevention, *Deaths: Final Data for 2010*, in 61 NAT'L VITAL STAT. REP. 1, 40 (2013).

92. See Alma Cohen & Rajeev Dehejia, *The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities*, 47 J.L. & ECON. 357, 357 (2004) (estimating a 6% increase in fatalities); J. David Cummins et al., *The Incentive Effects of No-Fault Automobile Insurance*, 44 J.L. & ECON. 427, 444 (2001) (estimating a 13% increase in fatalities). But see Paul Heaton & Eric Helland, (2008) *No-Fault Insurance and Automobile Accidents 20* (RAND Inst. for Civil Justice, Working Paper No. WR-551-ICJ, 2008) (finding little increase in total accident prevalence from no fault, but finding evidence of an increase in accident severity).

lished many estimates of the additional risks from driving behaviors such as increased speed,⁹³ talking on the phone,⁹⁴ blood alcohol content,⁹⁵ and texting.⁹⁶ In fact, one recent article in the *New England Journal of Medicine* estimated the increased odds of accidents for six separate distracted driving behaviors among both experienced and inexperienced drivers.⁹⁷ When reliable studies are not available, expert witnesses or, at worst, the rough estimates of the jurors might be used. It is hard to believe that a jury would have more trouble estimating the answer to a well-defined question regarding how much a particular action increased risk than it would assigning fault shares with virtually no guidance whatsoever, as it does under the current system.

One possible mechanism to implement the rule would be to use special verdict forms, in which juries were asked to find what degree the actions of each person increased the likelihood of the accident. The court would then use the jury's estimates to calculate shares of liability according to the liability-sharing rule. Finally, it is worth noting that forming implicit estimates of many of these factors is typically necessary in order for a jury to determine what actions are reasonable under current doctrine. In order to identify which action is efficient, courts much estimate the marginal changes in probability of accident engendered by alternate actions, as well as the costs of those actions.

IV. CONSTRUCTING AND APPLYING THE RULE

In this Part, I explain precisely how to construct an efficient and robust liability-sharing rule. Subsequently, I apply these methods and demonstrate how the rule achieves efficiency where traditional rules fail. I show how liability shares must be changed to maintain efficiency when parties act in a different sequence or do not perfectly choose their actions. Finally, I show how to modify the rule when courts cannot perfectly observe the parties' actions and use these results to explain how the efficient liability-sharing rule can provide insight into the operation of traditional liability rules under uncertainty.

When the victim acts first and the injurer acts after observing the victim's actions, or when both parties act simultaneously, the efficient rule can be constructed as follows. The first step is to choose a specific liability share and set levels of care as a starting point. The rule proposed in this Article sets the injurer's starting share of liability at one half when both parties choose the highest level of care that is ever efficient. It is possible to construct an efficient rule with

93. For an influential early study, see DAVID SOLOMON, U.S. DEP'T COMMERCE/BUREAU OF PUB. ROADS, ACCIDENTS ON MAIN RURAL HIGHWAYS RELATED TO SPEED, DRIVER, AND VEHICLE 1-3 (1964), <http://www.ohiomemory.org/cdm/ref/collection/p267401ccp2/id/55>. For a more recent study, see C.N. KLOEDEN ET AL., NHMRC ROAD ACCIDENT RESEARCH UNIT, TRAVELLING SPEED AND THE RISK OF CRASH INVOLVEMENT 299-313 (1997), <http://casr.adelaide.edu.au/speed/SPEED-V2.PDF>.

94. See, e.g., Suzanne P. McEvoy et al., *Role of Mobile Phones in Motor Vehicle Crashes Resulting in Hospital Attendance: A Case-Crossover Study*, 331 BRIT. MED. J. 428, 428 (2005).

95. See, e.g., Raymond C. Peck et al., *The Relationship Between Blood Alcohol Concentration (BAC), Age, and Crash Risk*, 39 J. SAFETY RES. 311, 317 (2008).

96. See, e.g., Simon G. Hosking et al., *The Effects of Text Messaging on Young Drivers*, 51 HUM. FACTORS 582, 589 (2009).

97. See Sheila G. Klauer et al., *Distracted Driving and Risk of Road Crashes Among Novice and Experienced Drivers*, 370 NEW ENG. J. MED. 54, 57 (2014).

a different starting liability split. This would not affect the agents' efficient incentives to choose care, but it would have distributional consequences. As I discuss in Section IV.H, it may be desirable to change this starting share to encourage or discourage activities or to reflect other public policy concerns.⁹⁸

A. *The Victim's Rule*

The next step⁹⁹ in constructing the efficient liability-sharing rule is determining the expected impact of a given change in care by the victim, assuming that the injurer is acting efficiently. In cases where the injurer acts before he knows the action of the victim, this impact is just the expected change in the likelihood of accidents. In cases where the injurer sees the victim's action and has a chance to react, the efficient rule must take into account the cost of any change in care supplied by the injurer. Suppose that if care by the injurer is a substitute for care by the victim, the injurer should react to a lack of care by the victim by supplying more care himself. In this case, the fact that the injurer has to supply more care might be more important than the increased likelihood of accident. Thus, a computation of the expected social cost of the victim's lack of care must also take into account the cost of increased care supplied by the injurer.¹⁰⁰

Once the social cost of the lack of care by the victim is determined, the next step is determining liability shares to make the victim bear this cost on the margin. At any combination of care levels, the expected unreimbursed harm to the victim is simply the likelihood of accident multiplied by the damage from an accident, multiplied by the share of the damage that is not reimbursed (that is to say one minus the injurer's share of liability). For example, if a rule allocates one-half share of liability to the driver when he slows down and the pedestrian is careful, the pedestrian will bear the other half of the cost of an accident. If the likelihood of an accident causing \$2,000 in harm is then .02, the pedestrian's expected loss is \$20 (.02 × \$2000 × .5).

When the victim's care decreases and this increases social costs, the injurer's share of liability must decrease enough so that the victim's expected un-

98. For a discussion of the importance of who bears baseline liability in minimizing inefficient distortions of activity levels, see Steven Shavell, *Strict Liability Versus Negligence*, 9 J. LEGAL STUD. 1, 1–6 (1980). For further discussion of situations in which it may be desirable to adjust the baseline share of liability, see Allan M. Feldman & Ram Singh, *Comparative Vigilance*, 11 AM. L. & ECON. REV. 134, 138–39 (2009). Here, the authors show that it is possible to achieve efficient care that uses any liability share as a baseline. The rule they propose, however, only achieves efficient care in the ideal conditions in which an all-or-nothing rule can achieve efficiency. *Id.*

99. Applying the injurer's rule first and then applying the victim's rule for each column would result in the same liability shares, but because the injurer's rule is easier computationally, it is preferable to apply the victim's share once and then apply the injurer's rule for each row.

100. Formally let us use $f(x,y)$ to denote the likelihood of accident when the injurer supplies care x and the victim supplies care y , and let the injurer's liability share be given by $L(x,y)$. Let us use z to refer to the type of injurer so that $c_f(x,z)$ is the cost to an injurer of type z of supplying care x , and let $x^*(y,z)$ be the efficient level of care for an injurer of type z in response to care y by the victim. We could define a function $C(y) = E_z f(x^*(y,z), y) \times D + E_z c_f(x^*(y,z))$. Here $C(y)$ would be the total expected external cost and would consist of the expected damage from accidents ($E_z f(x^*(y,z), y) \times D$) plus the expected cost of victim's care ($E_z c_f(x^*(y,z))$).

reimbursed harm from an accident increases as much as social costs do. Calculating how much the share must decrease is made simpler by the fact that under the injurer's rule, which I will soon explain, the liability share varies with the injurer's care so as to keep the victim indifferent to the injurer's action. Since the level of care the injurer takes will not affect how much accident cost the victim expects to bear, for this step, we can assume that the injurer takes the baseline level of care.¹⁰¹ It is now simply a matter of determining what share of liability leads to the correct expected increase in loss for the victim.

Let us use the symbol x to refer to injurer's level of care and y to refer to the victim's level of care. Let us call the baseline levels of care \bar{x} and \bar{y} . Suppose that when the victim chooses level of care \bar{y} , and when the injurer chooses \bar{x} , liability is split 50/50, and the probability of an accident that causes \$2,000 worth of damage is 2%, leading to expected accident costs of \$40. Note that the victim expects to bear half of this, for expected costs of \$20. Now suppose that if the victim chooses a lower level of care called y' , this leads to an increase in expected social costs of \$55. Furthermore, suppose that when the victim chooses y' and the injurer chooses \bar{x} , the likelihood of an accident that causes \$2,000 worth of damage is 4%. In order to make the victim internalize the cost of her carelessness, her expected loss must increase by \$55 (to \$75), so her share of the expected loss (of \$80) must increase to 15/16, and the injurer's liability share must decrease to 1/16. We can use this method to obtain the proper liability share for any level of care y' by the victim when the injurer exercises the baseline level of care \bar{x} .¹⁰²

B. *The Injurer's Rule*

The next step in constructing the efficient rule is determining how the injurer's liability share should vary with his own care. Since he acts after the victim has chosen her level of care, the only external effect of his care is on the likelihood of accident. The rule should ensure that changing the injurer's care changes his own expected liability exactly as much as it changes the expected accident costs. Since the costs of accidents are divided between the injurer and victim, if we hold the victim indifferent to the injurer's level of care, this implies that the injurer will be liable for the entire change in costs. We do this by making sure that the victim's share of liability declines proportionally with the increase in accident probability. If the injurer acts carelessly and doubles the likelihood of an accident relative to the baseline, the victim's share of responsibility for damages must be reduced by half. The victim's share is the portion the injurer is not liable for, so if we started at a one-half share for the injurer, halving the

101. Note that for the purposes of determining the social cost of the victim's carelessness, the injurer's level of care *is* important, and to achieve efficiency, the rule-maker must be able to know, on average, what level of care injurers are likely to take.

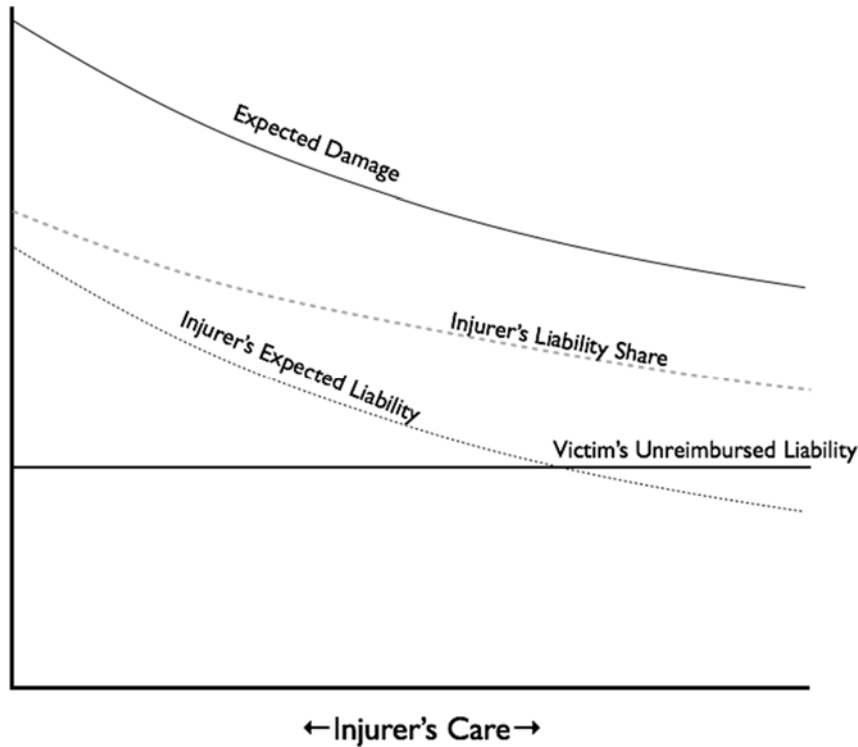
102. More formally, if for any x and y , $L(x,y)$ is the liability assigned to the injurer, and $f(x,y)$ is the chance of accident, the victim's rule requires that $(1-L(x,y')) \times D \times f(x,y') - (1-L(x,\bar{y})) \times D \times f(x,\bar{y}) = C(y') - C(\bar{y})$. Solving we have

$$(1-L(x,y')) = (1-L(x,\bar{y})) \frac{f(x,\bar{y}) + \frac{C(y') - C(\bar{y})}{f(x,\bar{y}) \times D}}{f(x,y')}$$

victim's share would imply that the injurer is liable for three-fourths of the damage. We refer to the principle that the victim's unreimbursed share varies with injurer's care in inverse proportion to the likelihood of accident as the injurer's rule.¹⁰³

The effect of the injurer's rule is illustrated in Figure 1. The injurer's share of liability (short dashes) decreases with the injurer's care, while the expected damage (solid line) also decreases. Thus, the injurer's expected liability decreases in parallel with total damage, implying that the injurer internalizes the consequences of his choice of care. This implies that the victim's expected net harm (flat solid line), which is the distance between total expected harm and injurer's liability, is held constant.

FIGURE 1: THE EFFECT OF INJURER'S CARE



To return to the example above, we have determined that if the injurer chooses \bar{x} and the victim chooses y' , this leads to a 4% chance of accident, leading to expected accident costs of \$80, and the injurer should be liable for 1/16 of the loss, so the victim should expect to bear \$75 ($15/16 \times \80) in losses. The injurer's rule implies that if, instead of \bar{x} , the injurer chooses x' , which led to an

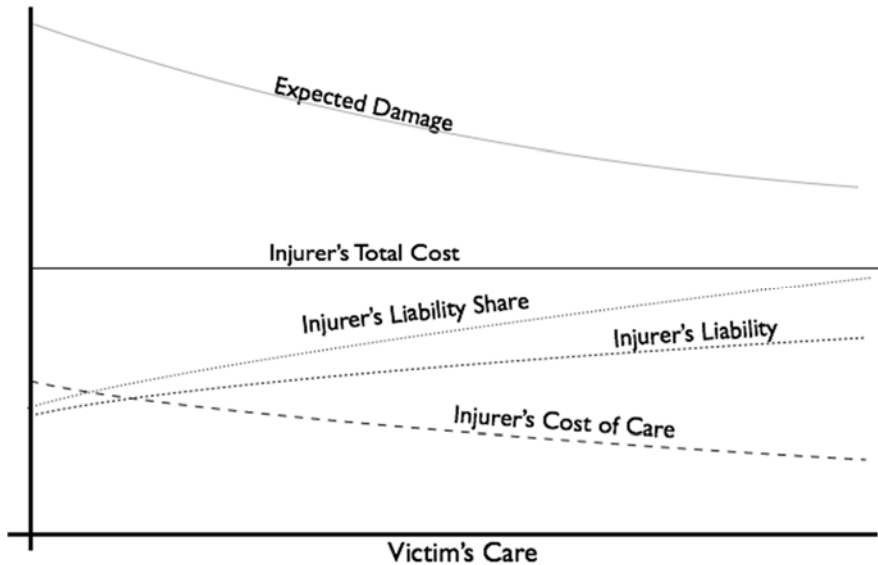
103. Formally, if $f(x,y)$ is the likelihood of accident when the injurer supplies care x and the victim supplies care y , and the injurer's liability share is given by $L(x,y)$, the injurer's rule can be stated as the equality:

$$1-L(x',y) = \frac{f(x,y)}{f(x',y)} (1-L(x,y)).$$

8% likelihood of accident and \$160 of expected losses, the victim's share should be reduced by half from 15/16 to 15/32 so the injurer would bear liability for 17/32 of the harm, and the victim's expected unreimbursed loss would be $15/32 \times \$160$, which is still \$75.

Figure 2 shows how the injurer's liability share and expected liability varies with the victim's care. In this example, the care of the injurer and the victim are substitutes; as care by the victim increases, the average injurer decreases his care in response. As a result, the savings to society are greater than the decrease in expected damage from accidents, and the injurer's expected liability for accidents decreases faster than the expected damage from accident. That is to say, when the victim supplies more care, the injurer finds it efficient to provide less care, but expects to bear not only a larger share of accident costs, but also more total accident costs.¹⁰⁴ For the average injurer, this is exactly compensated by his reduced costs of care, so the sum of his liability and care costs remains constant.

FIGURE 2: AVERAGE EFFECT OF VICTIM'S CARE



Although the victim will never care what level of care the injurer uses, some injurers will be affected by the victim's level of care. Because the victim's expected liability does not depend on the injurer's action or type, the victim expects to pay the *average* expected social cost of her action regardless of the type or action of the injurer. Low-cost injurers supply more care and can more cheaply adjust their care to make up for the victim's carelessness. Thus, the social cost of a lack of carelessness by the victim is lower when the injurer can

104. If increased care by one party increased the likelihood that care by the other party would prevent an accident, care by each of the parties would be complementary, and so the slopes of the average injurer's cost of care and the injurer's expected liability would be reversed.

supply care at a low cost.¹⁰⁵ Since the increase in the victim's expected loss is equal to the average expected social cost, it will be greater than the social cost when there is a low-cost injurer. If the victim's expected unreimbursed loss is increased by more than the social cost of her action, the injurer gets to keep the difference and will be better off. So, injurers with low cost of care will prefer victims to supply less care. If the injurer has a very high cost of providing care, the impact of the victim's carelessness will be greater than average, and reduction in liability share will not fully compensate the injurer for the increased cost of accident and care, so the injurer will be worse off.¹⁰⁶

When an agent internalizes the consequences of his actions, he has efficient incentives whether he can perfectly choose his action or can only make choices that change the likelihood of various actions. For the injurer, the efficient rule provides efficient incentives regardless of what level of care the victim provides, so the fact that the victim is not able to perfectly choose her care does not affect the efficiency of the injurer's incentives.¹⁰⁷ Likewise, the expected liability of the victim does not depend on the injurer's action, so for a given rule, the fact that the injurer cannot choose his action perfectly will not affect the incentives of the victim.¹⁰⁸

Because providing less care increases each agent's own costs as much as it increases social costs, each agent will make any efficient investment in providing care, regardless of whether it will ensure that he provides a certain amount of care or just probabilistically increases the amount of care he provides. The method constructs a liability-sharing rule that provides efficient incentives when the agents act simultaneously and also when the victim acts first and the injurer acts subsequently. As will be shown in an example, the social cost of the victim's action might differ if the injurer does not have a chance to react to the victim's action, so liability shares will vary slightly. Likewise, we could imagine that the injurer might not perfectly observe the action of the victim but only gets an imperfect signal of her action. In this case, the liability rule can still provide efficient incentives. The only change is that the computation of the cost of the victim's action must account for the fact that the injurer can react only imperfectly to the victim's action.¹⁰⁹

105. If care is complementary, lack of care by the victim will have more effect when the injurer's level of care is higher (*i.e.*, when his cost of care is lower).

106. *See, e.g.*, Table 10 (demonstrating how a high-cost injurer is worst off with a careless victim).

107. Under the efficient liability-sharing rule, it is a dominant strategy for the victim to provide the efficient level of care because the victim's payoff does not depend on the injurer's action. Although the injurer always has efficient incentives under the efficient rule, he has incentive to respond efficiently to the action he thinks the victim will take, so if he miscalculates the victim's actions, his action will not be efficient. Of course, in the case where the injurer acts after he sees the victim's action, this is not a factor, and efficiency will be reached as a dominant strategy equilibrium.

108. Note that the liability rule may depend on the way the injurer chooses care. The social impact of the victim's action will depend on how the injurer is expected to act. The liability rule will reflect the change in the way the injurer chooses care if the distribution levels of care correspondingly change.

109. For a formal proof, see Ezra Friedman, *The Robust Efficiency of Comparative Negligence* (2009) (unpublished working paper) (on file with author).

C. *The Victim's Last-Chance Rule*

If the injurer acts first and the victim reacts to the injurer's action, a different rule must be used. Because the victim's expected loss does not depend on the injurer's action under the original rule, it does not give the victim an incentive to adjust her care in response to the injurer's care. Suppose that care offered by the victim is a substitute for the injurer's care, and suppose that the victim has observed that the injurer has supplied a low level of care. In this case, the social cost of providing less care would be especially high, but the victim would expect to only pay the average cost of supplying less care; thus, the victim would have insufficient incentive to provide care.

Let us call this alternative the Victim's last-chance rule. The construction of this rule is the mirror image of the construction of the original sharing rule. The liability share must vary with the injurer's action so that the injurer internalizes the average impact of his action.¹¹⁰ For any fixed level of care by the injurer, the victim's share must vary with her care so as to leave the injurer's expected liability constant. Because the injurer's share of liability is adjusted to reflect both the increased likelihood of accident from his lack of care and the cost of extra care provided by the victim to make up for his lack of care, the injurer does not have an incentive to inefficiently shift the burden of providing care onto the victim.

In both the simultaneous or sequential-action case, for some combinations of care, the method we use to construct an efficient rule could lead to a liability share for the defendant above one or below zero. We can interpret a liability share above one as punitive damages because it would require the injurer to compensate the victim beyond the victim's actual damages. Since punitive damages are imposed in practice, it is not clear that sometimes requiring punitive damages would make a rule impractical. A liability share below zero would represent reverse payments; that is to say, payments from the victim to the injurer and would be more novel.

Reverse damages could occur when the defendant chooses a very high level of care in response to a lack of care by the plaintiff. In this case, if the expected accident costs are less than the expected social cost of the plaintiff's lack of care, this would imply that for efficient incentives, the plaintiff must bear costs above the accident costs. In case of an accident, the efficient rule would require the victim to receive negative compensation; that is, to pay the injurer.

Conversely, if the plaintiff chooses a level of care above the baseline and causes social benefit greater than her expected losses at baseline, then her expected losses from accidents must be negative, which would imply compensation in excess of harm, or punitive damages. Fortunately, if punitive damages are available, it is always possible to adjust our starting liability share so as to construct an efficient liability-sharing rule without reverse damages.

Nonetheless, one might be leery of a rule that requires punitive damages or feel that it is in tension with the shared responsibility spirit of the proposed

110. Either method could construct an efficient rule when the victim and the injurer act simultaneously or when the victim acts without any knowledge of the injurer's action. See Wittman, *supra* note 35, at 65–68.

rule. In prior work, I have shown that when the effectiveness of care by the victim and care by the injurer is independent—that is to say, when care by the victim is neither a substitute nor a complement to care by the injurer—punitive damages will never be required.¹¹¹ In general, when care is a substitute and when the likelihood of accident is sensitive to both the victim and the injurer's level of care and a wide range of actions may be efficient, it is more likely that this will occur.

D. *An Example of an Efficient Liability-Sharing Rule*

We will now return to the example we considered in Section III.B and construct a liability-sharing rule that will provide efficient incentives. As described above, the first step is to set baseline levels of care and liability shares, so we assign a liability share of one-half to the driver when he slows down and the pedestrian is careful. The next step is determining the expected social costs of any action by the pedestrian, assuming that the driver reacts efficiently to the pedestrian. In order to do this, the court does not need to know what a particular driver's cost of care is, but it does need to know the general distribution of costs among drivers.

At this point, we assume that both the courts and the pedestrians know the general distribution of driver's costs.¹¹² We suppose that there are three types of drivers—*rushed*, *average*, and *leisured*—each with a corresponding cost of slowing down. Let us assume that one quarter of drivers are *rushed* with a cost of \$90 to slow down, half the drivers are *average*, with a cost of \$50 to slow down, and the remaining quarter are *leisured* with a cost of only \$10 to slow down.

Let us now calculate the social cost of each level of the pedestrian's care, for each type of driver. Referring back to the expected accident costs presented in Table 2, when the pedestrian crosses carelessly, it is efficient for the rushed driver to maintain speed since slowing down would cost \$90 in care but only save \$80 in accidents. Thus, if the pedestrian is careless against a rushed driver, this leads to accident costs of \$160 and no additional care costs. It is efficient for average and leisured drivers to slow down, since it only costs them \$50 and \$10 respectively but saves \$80 in accident costs. This leads to accident costs of \$80 and care costs of \$50 and \$10, and total costs of \$130 ($80 + 50$) and \$90 ($80 + 10$) against average and leisured drivers respectively. Taking an expectation across all types of drivers ($1/4$ rushed, $1/2$ average, and $1/4$ leisured), the expected additional social costs of the pedestrian crossing carelessly are \$127.50 ($160 \times 1/4 + 130 \times 1/2 + 90 \times 1/4$).

If the pedestrian is moderate, it is efficient for rushed drivers to maintain speed (they would only save \$60 by slowing down), leading to accident costs of \$120, with no costs of care, while it is efficient for average and leisured drivers to slow down, since the \$60 in savings still outweighs the care costs of \$50 or

111. See Friedman, *supra* note 109.

112. As long as the pedestrian does not have more information about the driver than the court does, it will be possible to achieve information constrained first best. That is to say, the pedestrian will choose the action that is socially optimal given the information she has at the time.

\$10. This leads to accident costs of \$60, and total costs of \$110 and \$70 for the average and leisured drivers respectively. Averaging over all types of drivers, total expected costs from a pedestrian crossing moderately are \$102.50 ($120 \times 1/4 + 110 \times 1/2 + 70 \times 1/4$).

Finally, if the pedestrian crosses carefully and all drivers respond efficiently, rushed and average drivers maintain speed because the average driver's \$50 cost of slowing down now outweighs the \$40 in accident costs prevented, while leisured drivers slow down (it only costs them \$10 to do so). For the rushed and average drivers, this leads to accident costs of \$80 and no care costs. For leisured drivers, accident costs are \$40 and care costs are \$10, so total costs are \$50. Expected total costs are thus \$72.50 ($80 \times 3/4 + 50 \times 1/4$). The consequences of the pedestrian's actions are summarized in Table 7.

TABLE 7: SOCIAL COSTS FROM PEDESTRIAN'S ACTIONS

	<i>Rushed</i>	<i>Average</i>	<i>Leisured</i>	<i>Expected</i>
<i>Careful</i>	80	80	50	72.5
<i>Moderate</i>	120	110	70	102.5
<i>Careless</i>	160	130	90	127.5

Having calculated the social costs from the pedestrian's actions, we now are ready to apply the victim's rule and start calculating efficient liability shares. We start by assigning a one-half split when both choose the highest practical level of care, so the pedestrian is careful, and the driver slows down. From the last column of Table 7, we see that when the pedestrian is moderate rather than careful, she increases social costs by \$30 (102.5-72.5). Therefore, we choose a liability share that increases her uncompensated harm by \$30 when she is moderate rather than careful. If she is careful and the driver slows down, she expects accident costs of \$40, but the driver will be liable for one-half of that, so she expects uncompensated harm of \$20. Thus, we must choose a liability share that implies when she is moderate, she expects to bear accident costs of \$50. Since expected accident costs are \$60 if she is moderate and the driver slows down, she must be compensated for only \$10 of the costs. Therefore, the driver should be liable for 1/6 of the harm. Thus, by the victim's rule, we set the driver's share of liability to 1/6 when he slows down and the victim is moderate.

If the pedestrian is careless rather than moderate, we see from the last column of Table 7 that it increases social costs by \$25. Since the pedestrian faces \$50 of uncompensated losses if she is moderate, she must face \$75 of uncompensated losses if she is careless. If the driver slows down while the pedestrian is careless, expected accidents will be \$80, and in order for the pedestrian to bear \$75 of this, 1/16 of the liability must be placed on the driver.

TABLE 8(A): VICTIM'S RULE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	1/2	?
<i>Moderate</i>	1/6	?
<i>Careless</i>	1/16	?

We can now fill in the second column of Table 8(a) by applying the injurer's rule. We set liability shares to hold the pedestrian indifferent as to the driver's action. When the pedestrian is careful and the driver slows down, she will face \$20 (half of \$40) in expected losses. Thus, if the driver maintains speed, we must set his liability to keep the pedestrian's losses at \$20. Since if the driver maintains speed and the pedestrian is careful, expected accident costs are \$80, the pedestrian must bear one-fourth of the loss, and the driver must be liable for three-fourths of the loss. Similarly, the pedestrian must bear \$50 of loss when she is moderate, so she must bear 5/12 of the \$120 in accident costs when the driver maintains speed, and the driver must be liable for the remaining 7/12. Finally, the pedestrian's expected loss must be kept at \$75 when she is careless, whether the driver maintains speed or slows down. Since the accident costs would be \$160 if the driver maintains speed, the pedestrian must bear \$75 of that, and the driver must be liable for 85/160, or 17/32 of the damages.

TABLE 8: EFFICIENT LIABILITY-SHARING RULE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	1/2	3/4
<i>Moderate</i>	1/6	7/12
<i>Careless</i>	1/16	17/32

We now confirm that the driver faces efficient incentives. In response to a careless pedestrian, he reduces his expected liability by \$80 (from \$85 to \$5) by slowing down. In response to a moderate pedestrian, he reduces his liability by \$60, from \$70 to \$10, and in response to a careful pedestrian, he reduces his liability by \$40, from \$60 to \$20. Recall that these savings in liability are equal to the corresponding savings in accident costs, so a rational driver will choose to slow down whenever his costs of doing so are less than the costs of accidents he will prevent. Thus, the driver has efficient incentives regardless of whether he is faced by a careless, moderate, or careful pedestrian. Because the pedestrian's expected loss, as given in Table 9, increases exactly as much as expected social loss, she has efficient incentives as well.

TABLE 9: PEDESTRIAN’S EXPECTED UNCOMPENSATED HARM
(WITH EFFICIENT RULE)

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	20	20
<i>Moderate</i>	50	50
<i>Careless</i>	75	75

Table 10 shows the costs imposed by the pedestrian’s care on each type of driver. These are computed by adding the driver’s costs of care to the expected accident costs multiplied by the driver’s share of liability. For example, in response to a moderate pedestrian, a medium driver will slow down and be liable for 1/6 of the expected accident costs of \$60, for expected liability of \$10. He will also bear his care costs of \$50, for total costs of \$60.

TABLE 10: DRIVER’S COSTS FROM PEDESTRIAN’S ACTIONS

	<i>Rushed</i>	<i>Medium</i>	<i>Leisured</i>	<i>Average</i>
<i>Careful</i>	60	60	30	52.5
<i>Moderate</i>	70	60	20	52.5
<i>Careless</i>	85	55	15	52.5

Although each type of driver may have preferences over the pedestrian’s actions, we note that, on average, drivers are indifferent between the pedestrian’s actions. Because it is costly for rushed drivers to slow down and they expect to bear liability regardless of what the pedestrian does, rushed drivers prefer the pedestrian to be careful and minimize the cost of accident. On the other hand, leisured drivers can easily bear the costs of care and actually prefer it when the pedestrian is careless and accepts most of the risk of an accident. On average, however, when the pedestrian is careless, the driver’s share of liability decreases just enough to counteract the increased cost of care and liability borne by the driver. Since the pedestrian does not know what type of driver she is facing, this is enough to give her the correct incentives.

E. Alternative Timing Structures: Simultaneous Action

In the example above, we assumed that the driver had a chance to evaluate and react to the pedestrian’s choice of care before he chooses his level of care. If the driver doesn’t have a chance to react, this can change the implications of the pedestrian’s actions. Because the welfare implications and social costs of the pedestrian’s actions are changed slightly, the optimal rule changes slightly.

1. Efficient Behavior

If the driver does not get to observe the pedestrian’s level of care, he must make his choice based on his expectations of how the pedestrian is likely to act.

Following the custom of law and economics, we assume the driver makes a rational prediction based on his (correct) beliefs about the distribution of pedestrian's costs. Let us assume that there are three types of pedestrians—*busy*, *standard*, and *relaxed*—and that each is equally likely. Each type of pedestrian's cost of care is shown in Table 11. These costs were chosen to illustrate the inefficiencies under the traditional rules.¹¹³ If these numbers are chosen differently, some of the traditional rules might end up being efficient, but no matter how they are chosen, we could construct an efficient liability-sharing rule.

If three-fourths of drivers slow down, then pedestrians reduce accident costs by \$25 (from $1/4 \times 160 + 3/4 \times 80$ to $1/4 \times 120 + 3/4 \times 60$) by being moderate rather than careless and by another \$25, by being careful (from $1/4 \times 120 + 3/4 \times 60$ to $1/4 \times 80 + 3/4 \times 40$). If this is the case, it is efficient for busy pedestrians to be careless, standard pedestrians to be moderate, and relaxed pedestrians to be careful. If they do this, so one-third of pedestrians choose each level of care, a driver saves \$60 by slowing down (accident costs go from \$120 ($1/3 \times 160 + 1/3 \times 120 + 1/3 \times 80$) to \$60 ($1/3 \times 80 + 1/3 \times 60 + 1/3 \times 40$)). Since it costs \$90 for rushed drivers to slow down, but it only costs \$50 and \$10 for the average and leisured drivers, respectively, to slow down, social welfare is maximized if all but the rushed drivers slow down.

TABLE 11: PEDESTRIAN'S COST OF CARE

	<i>Busy</i>	<i>Standard</i>	<i>Relaxed</i>
<i>Careful</i>	79	54	29
<i>Moderate</i>	27	18	9
<i>Careless</i>	0	0	0

TABLE 12: DRIVER'S COST OF CARE

	<i>Rushed</i>	<i>Average</i>	<i>Leisured</i>
<i>Slow Down</i>	90	50	10
<i>Maintain Speed</i>	0	0	0

2. *Efficient Rule*

We will proceed straight to constructing the efficient rule rather than repeating our illustration of the inefficiencies from the traditional rules in the simultaneous action case.¹¹⁴ We start by determining the social costs of the pedestrian's actions. Because the driver cannot adjust his care in response to the

113. When there are finite choices of actions, distorted incentives will not matter sometimes because the agents will choose the efficient action anyway. If the agents have a continuous choice of their level of care, and the effects and costs of care are sufficiently smooth, then any inefficient incentives will lead to inefficient actions.

114. If one computes the incentives under the traditional rules, it is worth noting that the inefficiency from negligence with contributory negligence is somewhat lessened with simultaneous actions. This lessening occurs because the over-incentive to provide care against a victim who meets the standard can be balanced out by the

pedestrian, the only impact of the pedestrian's action is on the likelihood of accidents. Table 13 shows the expected accident costs of the pedestrian's actions assuming that drivers act efficiently. Recall that it is efficient for rushed drivers to maintain speed and the remaining three-fourths of drivers to slow down.

TABLE 13: EXPECTED ACCIDENT COSTS

	<i>Slow Down</i>	<i>Maintain Speed</i>	<i>Expected</i>
<i>Careful</i>	40	80	50
<i>Moderate</i>	60	120	75
<i>Careless</i>	80	160	100

We construct the efficient rule (shown in Table 14) as before. Note that crossing carefully rather than moderately saves only \$25 in social costs, rather than \$30 as it did in the sequential action case (shown in Table 8). Because the driver does not have time to react to the pedestrian's lack of care, average drivers must slow down anyway, and thus the benefit of a pedestrian being careful rather than moderate is slightly lower. Applying the victim's rule and starting at one-half when the pedestrian is careful and the driver slows down, the pedestrian expects \$20 in losses if she is careful, and this must increase by \$25 to \$45 if she is moderate. Against a driver who slows down, expected accident losses are \$60, so she must bear 3/4 of this, and the driver must be liable for the remaining 1/4.

Because the social losses caused by the pedestrian being moderate, rather than careful are slightly lower in this example, the pedestrian's share of liability need not increase as much (it increases only to 3/4 rather than 5/6 as in the sequential example). Consequently, the driver's share decreases by less. Alternatively, the social costs are lower because the driver is more likely to slow down in any case. Because the driver is more likely to slow down, the pedestrian is expecting to bear a higher share of the loss. Because the pedestrian is expecting to bear a higher share of the loss, her share of the loss does not need to be adjusted as much to make up for the portion borne by the driver.

If the pedestrian is careless, her expected losses must increase by \$25, so she must expect \$70 in losses and should be compensated for only 1/8 of the \$80 in expected accident costs. We apply the driver's rule as before and fill in the last column of Table 14 so the pedestrian is indifferent to the driver's actions and the driver faces efficient incentives as well.

under-incentive against a victim who does not meet the standard when the injurer doesn't know the victim's care. *See generally* Brown, *supra* note 7.

TABLE 14: EFFICIENT SIMULTANEOUS RULE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	1/2	3/4
<i>Moderate</i>	1/4	5/8
<i>Careless</i>	1/8	9/16

F. Imperfect Action

As discussed above, the simple all-or-nothing rules can distort incentives when agents are not able to perfectly choose their level of care. We can divide these distortions into two basic categories. First is an over-incentive for care that comes from the fact that negligence rules concentrate incentives just at the standard of care. Second is the under-incentive that applies when the counter-party might be negligent. In this example, we assume intention to provide care cannot be observed and courts cannot base liability on intended care or attention level. Courts instead base liability on the actions of the pedestrian and driver (*i.e.*, whether they slowed down or appeared careless).

TABLE 15: EFFECTS OF DRIVER'S ATTENTION

Action	Cost	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Focused</i>	75	7/8	1/8
<i>Attentive</i>	50	5/8	3/8
<i>Inattentive</i>	25	1/8	7/8

In this example, we assume that agents do not choose care directly but choose an attention level, which affects their care. Here, against a careless pedestrian, if the driver is *inattentive*, expected accident costs will be \$150, which is the sum of $7/8 \times 160$ (if he maintains speed) plus $1/8 \times 80$ (if he slows down). If the driver is *attentive*, expected accident costs will be \$110, $(3/8 \times 160) + (5/8 \times 80)$. If the driver is *focused*, expected accident costs will be \$90, $(1/8 \times 160) + (7/8 \times 80)$. Against a moderate pedestrian, expected accident costs for an inattentive driver will be \$112.50 $(7/8 \times 120 + 1/8 \times 60)$, and so on. The expected accident costs that result from each combination of the pedestrian's care and the driver's attention level are given in Table 16:

TABLE 16: EXPECTED ACCIDENT COSTS

Pedestrian's Care/ Driver's Attention	<i>Careful</i>	<i>Moderate</i>	<i>Careless</i>
<i>Focused</i>	45	67.50	90
<i>Attentive</i>	55	82.50	110
<i>Inattentive</i>	75	112.50	150

1. *Efficient Actions*

We can see here that it is socially efficient for the driver to be attentive when faced by a careless or moderate pedestrian. It is not efficient for the driver to be focused because, even when the pedestrian is careless, the driver only reduces expected accident costs by \$20 by being focused, but it costs him \$25 to be focused. Against a careful pedestrian, it is most efficient for the driver to be inattentive, since the driver only reduces accident costs by \$20 through being attentive, while it costs him \$25.

If we assume that the driver adjusts his level of attention efficiently when he observes the pedestrian's level of care, we note that if the pedestrian is careless, the driver should be attentive, leading to care costs of \$50 and expected accident costs of \$110, for total costs of \$160. If the pedestrian is moderate, the driver should still be attentive, but the expected accident harm drops to \$82.50, and total costs drop to \$132.50. If the pedestrian is careful, then the driver should be inattentive, leading to care costs of \$25 and accident costs of \$75, for total costs of only \$100. Table 17 summarizes these social costs as a function of the level of care the pedestrian actually provides.

Turning to the pedestrian, let us assume that the pedestrian's costs of attention are as given in Table 18. Like the driver, the pedestrian cannot be certain what level of care she will ultimately provide. She can pay attention and that will increase the likelihood that she is careful (or at least not careless) as she approaches the intersection.

TABLE 17: IMPACT OF PEDESTRIAN'S LEVEL OF CARE

	<i>Careful</i>	<i>Moderate</i>	<i>Careless</i>
<i>Accident Costs</i>	75	82.50	110
<i>Care Costs</i>	25	50	50
<i>Total Costs</i>	100	132.50	160

TABLE 18: RESULTS OF PEDESTRIAN'S ATTENTION

Attention Level	Cost	Careful	Moderate	Careless
<i>Focused</i>	54	.7	.2	.1
<i>Attentive</i>	36	.3	.5	.2
<i>Inattentive</i>	18	.1	.2	.7

If the pedestrian is *inattentive*, there is a 10% chance she ends up careful, a 20% chance she is moderate, and a 70% chance she is careless. Multiplying these likelihoods by the social costs in Table 17 implies the expected social costs of being inattentive are \$148.50 ($.1 \times 100 + .2 \times 132.5 + .7 \times 160$). If she is *attentive*, costs drop to \$128.25 ($.3 \times 100 + .5 \times 132.5 + .2 \times 160$), and if she is *focused*, costs drop further to \$112.5 ($.7 \times 100 + .2 \times 132.5 + .1 \times 160$). Note that by spending an extra \$18 to be attentive, she reduces social costs by \$20.25, so it is efficient for her to be attentive. By spending another \$18 to be *focused*, she only reduces social costs by \$15.75, so that is not efficient. Thus, it is most efficient for her to be attentive.

TABLE 19: SOCIAL COSTS OF PEDESTRIAN'S ATTENTION

Attention Level	From being Careful	From being Moderate	From being Careless	Expected
<i>Focused</i>	$.7 \times 100$	$.2 \times 132.5$	$.1 \times 160$	112.5
<i>Attentive</i>	$.3 \times 100$	$.5 \times 132.5$	$.2 \times 160$	128.25
<i>Inattentive</i>	$.1 \times 100$	$.2 \times 132.5$	$.7 \times 160$	148.5

To illustrate how there can be excessive incentives for care with imperfect actions, note that, against a careful pedestrian, if slowing down is the standard of care, under a negligence with contributory negligence rule, the driver expects to face liability of $3/8 \times 80$ if he is attentive and $7/8 \times 80$ if he is inattentive, so he saves \$40 by being attentive, and will spend \$25 to do so, even though it only lowers accident costs by \$20. In contrast, a driver has no incentive to be attentive against a careless pedestrian, and this forces a pedestrian into excessive expenditures to avoid being careless.

2. *The Efficient Rule with Imperfect Action*

The fact that agents cannot perfectly choose their actions has little impact on the efficient sharing rule. The key to an efficient rule is that the agents expect to internalize the effects of their level of care, and if the rule is set up properly, an agent will have efficient incentives whether she chooses her level of care with certainty or can only influence the chances she uses the various levels of care. The fact that one agent cannot perfectly choose his level of care does change the consequences of the other agent's actions. For example, the fact that a driver

will not always be able to slow down may make carelessness by the pedestrian costlier, and the efficient liability rule must take this into account.

To construct the efficient rule, we start with the victim’s rule again. We must base the liability on the level of care observed, rather than the attention level which cannot be observed by the court, but that does not prevent efficient incentives. Referring back to Table 17, we note that when the pedestrian’s care is decreased from careful to moderate, social costs are increased by \$32.50, and when it is decreased further from moderate to careless, social costs are increased by an additional \$27.50. Using the pedestrian’s rule and starting with a liability split of one-half when the driver slows down and the pedestrian is careful, we must increase the pedestrian’s loss to \$52.50 when she ends up moderate. Since expected accident costs are \$60 when the pedestrian is moderate and the driver slows, the driver must expect to pay \$7.50 and bear 1/8 of the liability. When the pedestrian is careless, this increases social costs by an additional \$27.50 relative to being moderate, so she must expect an additional \$27.50 of uncompensated loss, bringing her total to \$80. Since the expected accident costs in this case are \$80, this implies the pedestrian bears the whole loss and the driver faces no liability. The liability share varies a bit more with the pedestrian’s care in this example because the driver’s investment in attention is less effective, so he is less able to make up for a careless pedestrian (he can only slow down 7/8 of the time). Thus, the consequences of the pedestrian’s carelessness are slightly more serious. We use the injurer’s rule to fill in the remaining column as before.

TABLE 20: DRIVER’S SHARE UNDER THE EFFICIENT RULE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	1/2	3/4
<i>Moderate</i>	1/8	9/16
<i>Careless</i>	0	1/2

The fact that the efficient liability rule forces each party to internalize the consequences of his or her actions allows the court to sidestep the difficult questions of how much control a party had over her actions and whether an action was justified under the particular circumstances, and still give efficient incentives under a truly objective rule.

G. *Robustness*

The previous sections showed how to construct a liability rule that leads to efficient incentives in numerous circumstances where simple all-or-nothing rules cannot. The sharing rule achieves efficiency in economic models with more uncertainty and imperfections, which can be seen as more realistic than the simpler models in which all-or-nothing rules can be efficient. I have shown that if the courts know the likelihood of accident for any combination of actions and the distribution of costs for the party that acts later, they can construct rules that

give perfect incentives. In cases where a party cannot react (simultaneous action), the courts can provide perfect incentives if they know how likely it is for each action to be chosen, rather than knowing the costs.

Here, I argue that compared to all-or-nothing rules, the efficiency of the rule I propose is unlikely to be sensitive to violations of the (less stringent) assumptions I have made in showing its efficiency. In other words, although imperfect information and other real-world limitations are likely to indicate that courts will not be able to implement the sharing rule perfectly, the design of the sharing rule implies that it will continue to perform well in face of these imperfections.

As demonstrated previously, the discontinuities in liability from all-or-nothing rules provide strong incentives for the agent to end up on one side of that discontinuity. Thus, whether a party will have too much or too little incentive to provide care will depend critically on what side of the discontinuity that party expects to find itself. Furthermore, under the traditional rules, one agent typically faces efficient incentives because they think the other agent will take a particular action. For example, under negligence with a defense of contributory negligence, an injurer has incentive to provide due care because he believes he will be liable for any accident if he does not; this belief depends on his prediction that the victim will also provide due care. If he believes the victim is unlikely to provide due care, however, he has less incentive to ensure that he meets the standard.¹¹⁵

In contrast, parties under the proposed rule generally expect to face nearly efficient incentives regardless of what action the other party takes. Because the parties expect to face relatively smooth incentives that correlate to the social costs of their actions, uncertainty is not a large problem. For example, to get perfect efficiency, I assumed that courts knew the exact probabilities of accidents as a function of each combination of actions and knew the actual distribution of costs in the population. If the agent thinks that courts will get the distribution of costs and expected probabilities right on average but knows courts are imperfect, this does not necessarily lead to inefficient incentives because the errors will tend to balance each other out under efficient liability-sharing rules. Suppose the injurer takes an action that increases the risk of accident. When the court overestimates the increase in harm from an action, the liability share will be too high, but when the court underestimates the increased harm, the liability share will be too low. Since the injurer cares about the expected share, it is not clear that he will face inefficient incentives.

Difficulties arise when there is asymmetric information and the agents have information about the other party's costs or other information about the effectiveness of care or the likelihood of accident that the courts do not have—for example, when one agent knows that the court is likely to underestimate the

115. For a general discussion about how incentives under liability rules are sensitive to assumptions about the other party's actions, see DOUGLAS G. BAIRD ET AL., *GAME THEORY AND THE LAW* 19–31 (1994). Rather than simply examining how agents act under various rules in a Nash Equilibrium, the authors focus on which rules can achieve efficiency as a dominant strategy. A dominant strategy is a strategy that an agent prefers to all other strategies regardless of his beliefs about how the other agent is likely to act. A Nash Equilibrium merely requires that each agent's strategy is a best response to the other agent's actual strategy.

probability of accident or when the agent who acts first knows that the second agent is particularly unlikely to be able to react.¹¹⁶ Unlike traditional all-or-nothing rules, however, such information is unlikely to cause grave distortions in my proposed rule. In a seminal paper on managerial incentives, Paul Milgrom and Bengt Holmstrom show that under rules that provide linear incentives, private information by agents is less likely to lead to big distortions.¹¹⁷ In contrast, under highly non-linear incentive schemes, private information can lead to very inefficient outcomes.

One might make an analogy between bouncing a ball off the corner of a step and bouncing a ball off a ramp. If one knows precisely where the ball will hit, one can accurately predict how the ball will rebound off either the step or the ramp. But, because the slope of the step is discontinuous, a small error in where the ball hits will produce a large error in the bounce, whereas, because the ramp is smooth, a small error will only produce another small error. Because of the smoothness of the expected liability (as exemplified by the liability shares in Figures 1 and 2), small errors by the courts or parties are likely to produce only small errors in incentives.

As discussed in Section IV.C, a different rule must be used to provide efficient incentives when the victim has a chance to adjust to the injurer's care. One might be concerned that the choice of liability rule must depend on the timing of the model and worry that trials would begin to focus on the timing of the agent's actions and information rather than more substantive issues of responsibility. Timing of the actions, however, is already a crucial determinant of liability under the last-clear-chance rule. Even in jurisdictions that have ruled that comparative negligence has obviated the need for last clear chance, the extent to which one party has had a chance to react to the negligence of the other can be a factor in determining the relative shares.¹¹⁸ Under the proposed rule, the stakes from determining the timing of the model are greatly reduced.

Under all-or-nothing rules and a finding of negligence by both parties, the timing determines which agent bears liability for the entire loss. For example, in Table 5, a last-clear-chance rule gives full liability to the driver if he maintains speed while the pedestrian is moderate. A reverse last-clear-chance rule, which would require the pedestrian to react efficiently to the driver's action, would give no liability to the driver if he maintained speed and the pedestrian reacted by crossing moderately. Under the shared liability rule, the court's ruling tends to have a less stark impact. For example, compared to the efficient rule in Table

116. Such knowledge will only distort incentives if the knowledge is unavailable to the court. Because, compared to the likelihood that a party has private information about itself, it seems less likely that one party will have private information about the other party, this may not be a major concern.

117. See Bengt Holmstrom & Paul Milgrom, *Aggregation and Linearity in the Provision of Intertemporal Incentives*, 55 *ECONOMETRICA* 303, 326 (1987) (describing the effects of linear incentives with private information).

118. See RESTATEMENT (THIRD) OF TORTS: § 3 cmt. b (AM. LAW INST. 2000) (“[T]he timing of the plaintiff's and defendant's negligence and whether the defendant was aware of the plaintiff's peril is still relevant in assigning percentages of responsibility to the parties. By rejecting the last-clear-chance doctrine, this Section merely rejects a rule that the timing of the plaintiff's and defendant's negligence is conclusive.”).

8, an efficient victim last sharing rule would increase the driver's liability share only slightly from 7/12 (105/180) to 59/90 (118/180).¹¹⁹

1. *Private Information about Risks*

The liability-sharing rule provides efficient incentives in the face of private information about the costs of care, but in addition to private information about the costs of his actions, a party might also have private information about the risk created by his action. In other words, an actor who is observationally identical to others may know that his actions create a different level of risk. This could lead to inefficient incentives under the liability-sharing rule. Depending on the form of the court's errors regarding risk, however, it might have very little effect.

Suppose that a particular driver is very skilled in a way that is unobservable to the court and is only half as likely to be involved in an accident as an average driver who took the same observable actions (*i.e.*, slowed down or maintained speed). In the examples presented in Sections IV.D and IV.E, the driver would still face efficient incentives. We can see this by noting that halving the likelihood of accident is economically equivalent to halving the damage if an accident occurs and that it is not necessary to know the damage if an accident occurs in order to construct efficient incentives. When a driver adjusts his care in response to the pedestrian's actions, a particularly skilled pedestrian would not face exactly efficient incentives because we penalize the pedestrian for the costs of care she imposes on the driver by adjusting her share of liability. If the likelihood of accident is reduced, she would not fully internalize the driver's costs of care and would have slightly inefficient incentive to shift costs of care onto the driver.¹²⁰

We might imagine circumstances where a particular agent had private information that the baseline likelihood of an accident was particularly high or low, but the marginal effectiveness of care was unaffected, so the same action was efficient in either case. This would lead to inefficient incentives under the liability-sharing rule because changing the baseline probability of an accident changes the costs imposed on the agents by a given change in liability shares. Thus, although the social costs imposed by changing actions would be the same, the marginal cost borne by agents of changing an action would be different.

119. If we assume pedestrian costs of care are as given in Part IV.E, then if the pedestrian acted last, the efficient rule would be:

	<i>Slow Down</i>	<i>Maintain speed</i>
<i>Careful</i>	1/2	59/60
<i>Moderate</i>	1/3	59/90
<i>Careless</i>	1/4	59/120

Here, we see that if the court determines that the driver acted first, her share actually would increase slightly from 7/12 (105/180) to 59/90 (118/180). The stakes now would only be 13/180 of the loss.

120. The misalignment in this scenario, however, would be much less than the misaligned incentive from the last-clear-chance rule. We can see this by noting that under the last-clear-chance rule, if the driver adjusts his action in response to the pedestrian's carelessness to keep the probability of accident constant, the pedestrian would internalize none of the costs he imposes on the driver. On the other hand, if the particularly skilled pedestrian had half the predicted probability of accident, under this rule she would still internalize half the cost of care she imposes on the driver. See Wittman, *supra* note 35, at 69–70.

If this scenario was common enough, and agents did not vary much in their costs so that there was little variation across agents in which action was effective, then all-or-nothing rules could conceivably provide more efficient incentives than the liability rule proposed. Although this is not a logical impossibility, one might be hard pressed to conceive of specific factors which would change the overall probability of an accident which would not affect the efficient level of care or the marginal likelihood that care would prevent an accident.

One can make analogies between the choice of liability-sharing and all-or-nothing negligence rules and the question of whether to regulate pollution by prices or quantities. In a highly influential paper,¹²¹ Martin Weitzman shows that when there is uncertainty about the private benefits of an action, but when the social costs of pollution can be estimated fairly accurately, a price-based regulatory system tends to be more accurate. On the other hand, if the efficient amount of pollution is known, it is better to use a quantity-based regulation. By providing incentives to agents to perform exactly at the due care standards, traditional rules are more akin to quantity regulation that attempts to identify the efficient action. Yet, when the efficient action depends on subjective factors, an objective and efficient quantity-based rule is impossible. In contrast, because it acts like a price, the liability-sharing rule can achieve efficiency while maintaining objectivity.

2. *Adjusting for Evidentiary Uncertainty*

Another important assumption that has been made in the examples is that the courts are able to observe the parties' actions. Unlike the case with simple negligence rules, where evidentiary uncertainty can lead to excessive or insufficient incentives, under the efficient liability-sharing rule, this kind of uncertainty is more likely to lead to insufficient incentive to provide care. If there is evidentiary uncertainty, an agent's expected share of liability will, on average, adjust less than intended to an agent's action. Since the adjustment in the share of liability is calibrated to make up for the accident costs that would otherwise be imposed on the other party, the agent would not fully internalize these costs and might not have enough incentive to provide the efficient level of care.

For example, consider a pedestrian who knows that there is a 1/6 chance that the court will misidentify her level of care, so that if she is careless, there is a 1/12 chance she will be adjudicated moderate and a 1/12 chance she will be adjudicated careful, and if she is moderate, there is a 1/12 chance each she will be adjudicated careless or careful. Suppose that the driver slows down. Under the efficient rule given for simultaneous action in Table 14, if she is careful, the pedestrian will expect to bear 53/96 of the harm¹²² instead of one-half, whereas if she is moderate, her share¹²³ will be 71/96 instead of three-fourths, and if she is careless her share will be 80/96 instead of seven-eighths. Note that because of the evidentiary uncertainty, reducing her care from careful to careless will only

121. Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD., 477, 477–79 (1974).

122. The pedestrian's share is $5/6 \times (1-1/2) + 1/12 \times (1-1/4) + 1/12 \times (1-1/6) = 53/96$.

123. Here, her share is $1/12 \times (1-1/2) + 5/6 \times (1-1/4) + 1/12 \times (1-1/6) = 71/96$.

increase her expected share of liability by $27/96$, instead of by three-eighths ($36/96$). Because of this, the pedestrian will have inefficiently low incentive to provide care.

The efficient rule could be modified, however, to make the liability share vary more with observed care so as to provide efficient liability. In particular, if we changed the liability share of a driver who slows down to $53/96$, $23/96$, and $8/96$ against a pedestrian who is observed to be careful, moderate, and careless, respectively, the pedestrian would again face efficient incentives. Now a pedestrian who is observed to be careless rather than careful, sees her share of liability go up from $43/96$ to $88/96$ rather than just from one-half ($48/96$) to seven-eighths ($84/96$). A pedestrian who actually is careful will expect a liability share of one-half, and a pedestrian who actually is moderate or careless will expect a share of the losses of three-fourths and seven-eighths respectively.¹²⁴ The new version of the victim's rule assigns liability shares to observed actions so that the expected share as a function of actual actions is the same as the efficient liability shares given in Table 14 for perfectly observed actions. Increasing the degree to which liability share varies with observed level of care makes up for the fact that, because of evidentiary uncertainty, changing actual care will not necessarily change the observed care.

In earlier work,¹²⁵ I showed that in cases where agents choose from a finite number of actions and the court's signal is sufficiently informative,¹²⁶ it is possible to construct an efficient rule. As evidentiary uncertainty becomes greater, however, the liability shares must vary more, and the rule is more likely to call for damage shares above one or below zero. That is to say, it may no longer be possible to get to efficient incentives without punitive damages or reverse damages.

Our examination of the rule under evidentiary uncertainty also highlights how the approach of this Article can be used as a framework to understand the existing literature on incentives under evidentiary uncertainty or legal uncertainty. For example, work by Bar-Gill and Ben-Shahar challenges some efficiency justifications for comparative negligence.¹²⁷ Using simulations under conditions of uncertainty, they show that a comparative negligence rule will not necessarily lead to better self-selection than all-or-nothing rules.¹²⁸

124. A careful pedestrian will face an expected share of

$$\frac{5}{6} \times \frac{43}{96} + \frac{1}{12} \times \frac{73}{96} + \frac{1}{12} \times \frac{88}{96} = \frac{1}{2}$$

a moderate pedestrian will face an expected share of

$$\frac{1}{12} \times \frac{43}{96} + \frac{5}{6} \times \frac{73}{96} + \frac{1}{12} \times \frac{88}{96} = \frac{3}{4}$$

and a careless pedestrian will face an expected share of

$$\frac{1}{12} \times \frac{43}{96} + \frac{1}{12} \times \frac{73}{96} + \frac{5}{6} \times \frac{88}{96} = \frac{7}{8}$$

125. See Friedman, *supra* note 109.

126. Formally, we require that the signal matrix is full rank. Informally, this implies that each action (or randomization over actions) by an agent leads to a distinct probability distribution over signals. See Friedman, *supra* note 109.

127. See Bar-Gill & Ben-Shahar, *supra* note 49, at 459.

128. See *id.* at 442, 450–53.

Uncertainty tends to morph traditional rules into a form of liability sharing. Because it is no longer certain that an injurer can escape liability by choosing a level of care just above the standard and an agent is more likely to be deemed to have met the standard if he provides more care, each agent's expected share of liability becomes a smooth function of the care that he provides. Under some parameters, it is possible that the noise added by uncertainty might lead the expected liability share curve to have just the right slope in some region, and in that region, agents will efficiently self-select. What matters to agents is the liability share they expect to face as a function of their actions. Abstracting away from risk aversion, when there is some uncertainty about how the courts will allocate liability under certain actions, it functions as if the courts were sharing liability; it leads to the same incentives if the defendant is liable for one-third of the damage or if the defendant is liable for the entire damage one-third of the time. By converting any rule in any model into expected liability shares and comparing them to the shares under an efficient rule, we can determine exactly where any rule is likely to give excessive or insufficient incentives.

H. Policy Factors and Baseline Liability

This Article has focused on a rule that is *ex-ante* symmetric and is based on a premise that it is not generally more desirable for the injurer or the victim to bear the bulk of accident costs. There are circumstances, however, when policy factors might suggest that it makes sense to place more of the burden on one party. For example, if the potential injurer is engaged in an activity with significant social value that we do not want to discourage (such as providing medical care or free recreational services), it might be desirable to minimize the expected liability from that activity, particularly when it is performed with care. Fortunately, the liability-sharing rule is flexible and the default share could be adjusted to place less liability on the defendant.

For example, consider the simultaneous action example presented in Section IV.E. If we determined that the defendant was engaged in socially valuable activities and should face less liability, we could change the shares to those given in Table 21, and both parties would still face efficient incentives.

TABLE 21: ALTERNATE EFFICIENT SIMULTANEOUS RULE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	0	3/4
<i>Moderate</i>	0	1/2
<i>Careless</i>	0	3/8

Likewise, if we felt the potential victim was engaged in socially important activity and should be protected to the maximum extent possible while maintaining efficient incentives, we could use the following rule:

TABLE 22: ALTERNATE EFFICIENT SIMULTANEOUS RULE

	<i>Slow Down</i>	<i>Maintain Speed</i>
<i>Careful</i>	1	1
<i>Moderate</i>	7/12	19/24
<i>Careless</i>	3/8	11/16

In order to switch more burden away from the injurer than in Table 21 or more away from the victim than in Table 22, it would be necessary either to depart from full efficiency or to use punitive damages. Since accidents are relatively unlikely when parties are using high levels of care, it may not be so socially costly to remove some incentives in those cases.

One example of an area where it may be desirable to move away from the default of shared liability might be medical malpractice. Given the contractual relationship between the patient and the provider, the provider often has incentive to provide at least a sufficient level of care, and in fact, there is often concern that physicians provide excessive care.¹²⁹ Furthermore, there is great social concern about expenditures on treatment. Given that many state legislatures have legislated specifically regarding medical malpractice, it would not be administratively impractical to use a substantially different rule for medical malpractice that did not impose liability on providers who exercised due care.¹³⁰ Although one might not want to shift any more costs on providers when they exercise reasonable care, in terms of economic analysis, it makes little difference whether both the injurer and the victim's conduct leads to the possibility of accident or the actions of two independent actors lead to an accident that causes harm to a third party.¹³¹ Thus, once malpractice has been found, the framework used in this Article could still be used to divide up liability between the involved practitioners in a way that would provide efficient incentives.¹³²

V. CONCLUSION

I propose an efficient liability-sharing rule that is based on the principle of adjusting liability shares according to the degree that each party increases the likelihood of accident so that each party expects to bear any increased costs created by their lack of care. Because the rule provides relatively smooth incentives over a range of care levels, the rule does not require that all agents react in the

129. Health care economists refer to the provision of excess care so as to avoid liability as "defensive medicine." See Daniel Kessler & Mark McClellan, *Do Doctors Practice Defensive Medicine?*, 111 Q. J. ECON. 353, 353–34 (1996).

130. See Kenneth S. Abraham, *Medical Malpractice Reform: A Preliminary Analysis*, 36 MD. L. REV. 489, 497–512 (1977) (detailing the prevalence of legislation specifically directed at malpractice liability).

131. The fact that these cases are analytically identical has been noted by William M. Landes and Richard Posner. William M. Landes & Richard A. Posner, *Joint and Multiple Tortfeasors: An Economic Analysis*, 9 J. LEGAL STUD. 517, 538–39 (1980).

132. See generally Daniel Carvell et al., *Accidental Death and the Rule of Joint and Several Liability*, 43 RAND J. ECON. 51 (2012) (presenting an empirical study of the importance of division of liability between multiple negligent parties in the context of medical malpractice).

same way, nor does it require the courts to identify which actions are most efficient in given circumstances. This flexibility implies that the liability-sharing rule can give efficient incentives whether the parties act simultaneously or in sequence.

The findings in this Article also provide a clear intellectual framework for looking at the bilateral care problem. The analysis makes clear what the expected shares of liability must be to provide efficient incentives. By comparing the shares of liability produced by any proposed rule in any model to the efficient shares, one can understand where and how the proposed rule will fail to give efficient incentives.

Although the rule I propose achieves efficiency in a broad range of circumstances, courts may not have the information necessary to implement the rule perfectly. In particular, they may not know the exact probability that any pair of care levels will lead to accidents. The smoothness of the rule, however, makes it less sensitive to asymmetric information and mistaken predictions by courts or agents. Finally, the framework created in this Article provides a good basis for determining how to adjust the rule to minimize the effects of any anticipated imperfections or information problems.

Implementing the rule would require courts to make explicit quantitative estimates when assessing the impact of the parties' actions. Courts are already called on to make numerical judgments of values that are not usually quantified when assessing damages for pain and suffering or lost lives. Furthermore, in order for traditional negligence rules to achieve efficiency, they force juries to implicitly make numerical judgments when they evaluate which risks are reasonable or even when they apply the "more likely than not" standard of causation. To the degree that juries do not make such judgments, requiring them to think seriously about the risks increased by an action (or the lack of risk) might improve the accuracy of incentives.

In addition to properly calibrating incentives to avoid accidents, I maintain that fully implementing the rule would lead to a focus on consequences, which is more consistent with the aims of an objective tort system. This focus on responsibility rather than blame can help us look at accidents in a way that could lead to further improvements in safety and foster a more cooperative approach to accident prevention.

