

NEGLIGENCE AND INSUFFICIENT ACTIVITY: THE MISSING PARADIGM IN TORTS

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Conventional wisdom in tort law maintains that the prevention of undesirable risks mandates restriction of harmful conduct. Against this widely held conviction, this Article shows that undesirable risks often stem from insufficient, rather than excessive, activity. Because negligence requires investments in only cost-justified care, parties might deliberately limit their activity so that the size of the ensuing risk would be lower than the cost of welfare-enhancing precautions. Parties' incentives to strategically restrict their activity levels have striking implications for the inducement of efficient harm prevention. The overlooked paradigm of insufficient activity calls for the imposition of a new form of tort liability, justifies the application of controversial regulatory rules recently challenged before the Supreme Court, and supports overturning the standard guidelines concerning the choice between negligence and strict liability.

TABLE OF CONTENTS

INTRODUCTION	278
I. THE CONVENTIONAL PARADIGM: OPTIMAL CARE AND EXCESSIVE ACTIVITY	283
A. Reasonable-Behavior Standards and the Incentives for Excessive Activity.....	284
B. Normative Implications of Excessive Activity Levels.....	288
1. Maximum-Activity Regulation.....	288
2. Negligence, Strict Liability, and “The Lesser of Two Evils” Principle.....	289

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II. THE OVERLOOKED PARADIGM: SUBOPTIMAL CARE AND INSUFFICIENT ACTIVITY	291
A. <i>The Risk of Insufficient Activity—An Illustration</i>	292
B. <i>The Prerequisites for Insufficient Activity</i>	296
C. <i>The Risk of Insufficient Activity in Practice</i>	300
1. <i>Cost-Benefit Analysis in Negligence Cases</i>	300
2. <i>Regulatory Thresholds and Strategic Activity Levels</i> ..	302
III. INDUCING OPTIMAL PREVENTION AND MINIMIZING THE LOSS FROM INSUFFICIENT ACTIVITY LEVELS	303
A. <i>Applying the Negligence Standard to Insufficient Activity</i>	304
1. <i>Liability for Insufficient Activity</i>	304
2. <i>Objections: Liability for Nonfeasance and Parties' Autonomy</i>	307
B. <i>Regulations and Efficient Activity Levels</i>	309
C. <i>Insufficient Activity: Negligence v. Strict Liability Reconsidered</i>	313
CONCLUSION.....	317
APPENDIX	320

INTRODUCTION

Harm prevention, as tort literature has long shown, may take two forms. First, potential risks can be reduced by investments in *care*. For example, drivers may decrease the likelihood of accidents by driving more slowly; railroad companies can lessen the possibility of setting crops on fire by installing spark arresters; and factories can reduce pollution by using filters. Second, since investments in care may not entirely eliminate the risk of harm, drivers, railroad companies, and factories can also reduce risks by lowering the *level of their activities*.¹ Less driving, for example, just like careful driving, diminishes the probability of car accidents. In an ideal world, therefore, tort law rules would induce parties to behave optimally with respect to levels of both care and activity.²

Legal scholarship, however, has shown that in practice tort law often provides incentives only for optimal care.³ In a typical lawsuit for negligent

1. See, e.g., *Bethlehem Steel Corp. v. U.S. EPA*, 782 F.2d 645, 652 (7th Cir. 1986) (“It is becoming a familiar principle in the analysis of tort law that potential injurers can avoid accidents by either of two basic methods—by taking more care, or by reducing the amount of activity that they engage in that gives rise to accidents; in the traditional example of damage to crops from locomotive sparks, by having good spark-arresting equipment, or by running fewer trains per day.”).

2. Alan J. Meese, *The Externality of Victim Care*, 68 U. CHI. L. REV. 1201, 1206 (2001) (“A well-crafted liability rule will do more than ensure that an activity . . . is carried out with due care; it will also alter . . . the level at which it is conducted . . .”).

3. For the first comprehensive analysis of the ineffectiveness of tort rules in inducing efficient activity levels (as opposed to care levels), see Professor Shavell’s influential article, Steven Shavell, *Strict Liability versus Negligence*, 9 J. LEGAL STUD. 1 (1980). Subsequent scholars addressing the interplay between care and activity levels have largely followed Shavell’s analysis. See *infra* note 18 (presenting the wide tort literature on care and activity levels).

driving, for example, courts usually explore the extent to which the defendant–driver took reasonable precautions (level of care). They do not, however, investigate whether the defendant’s mileage (level of activity) corresponds to the socially desirable level.⁴ A defendant who drives at an unreasonable speed may well be found negligent. In contrast, a defendant who avoids speeding—but whose driving provides little social benefit, thus creating unnecessary risk—will likely avoid any liability.⁵ Defendants will therefore avoid speeding, but drive even when the expected harm they inflict on others outweighs their own benefit.⁶

More generally, legal theory has argued that parties subject to reasonable-behavior regimes (such as negligence) will make efficient investments in precautions, but then overengage in their conduct. As Professor Steven Shavell has recently argued, under the negligence standard, “injurers will be led to take optimal care . . . Because they will take due care, however, injurers will escape liability for any accident losses they cause. They will therefore have no reason to consider the effect that engaging in their activity has on accident losses.”⁷ Thus, under the negligence standard, “injurers will be led to choose socially excessive activity levels.”⁸ Applying this analysis, scholars have demonstrated the risk of parties engaging in excessive activity across different tort-related areas.⁹

4. A. MITCHELL POLINSKY, *AN INTRODUCTION TO LAW AND ECONOMICS* 53 (3d ed. 2003) (“In practice . . . it often is not feasible to include the level of participation in the activity as an aspect of the standard of care. For example, it would be virtually impossible for a court to determine how many miles a particular person drives each year . . .”). For more discussion on courts’ ability to consider activity levels when deciding negligence cases, see *infra* text accompanying notes 69–77.

5. This point is famously illustrated in Warren Seavey’s classic example: “if you kidnap a child and, while driving carefully away with it, run down a pedestrian, you will not be liable in negligence for the pedestrian’s injury.” WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* 66 n.22 (1987) (citation omitted); Warren A. Seavey, *Mr. Justice Cardozo and the Law of Torts*, 39 COLUM. L. REV. 20, 34 (1939).

6. For some recent empirical findings on the excessive activity levels of drivers, see Aaron S. Edlin & Pinar Karaca-Mandic, *The Accident Externality from Driving*, 114 J. POL. ECON. 931, 950–54 (2006), and Allan C. Marco & Casey Salvietti, *What Does Tort Law Deter? Precaution and Activity Levels in No-fault Automobile Insurance* 19–21 (2nd Annual Conference on Empirical Legal Studies Paper, 2007), available at <http://ssrn.com/id=998741>.

7. Steven Shavell, *Foundations of Economic Analysis of Law* 196 (2004) [hereinafter Shavell, *Foundations*].

8. *Id.*; David Rosenberg, *The Judicial Posner on Negligence Versus Strict Liability: Indiana Harbor Belt Railroad Co. v. American Cyanamid Co.*, 120 HARV. L. REV. 1210, 1212 (2007) (“Indeed, courts often shy away from tackling this set of especially complex and elusive issues [of activity level], thereby allowing actors to engage in excessive levels of risky activity free from the check of tort liability.”).

9. See, e.g., John C. Coffee, Jr., *Gatekeeper Failure and Reform: The Challenge of Fashioning Relevant Reforms*, 84 B.U. L. REV. 301, 308–11, 347 (2004) (explaining the risk of excessive activity levels of gatekeepers); Jon D. Hanson & Kyle D. Logue, *The First-Party Insurance Externality: An Economic Justification for Enterprise Liability*, 76 CORNELL L. REV. 129, 167–68, 170–71 (1990) (discussing the risk of excessive activity levels by consumers and manufacturers—the quantity of products purchased and sold—under different insurance schemes); A. Mitchell Polinsky, *Strict Liability vs. Negligence in a Market Setting*, 70 AM. ECON. REV. 363, 366–67 (1980) (demonstrating the risk of excessive activity levels of firms in competitive markets); Matthew Schruers, Note, *The History and Economics of ISP Liability for Third Party Content*, 88

This Article, however, suggests that the existing view concerning the effects of negligence on parties' behavior is incomplete. It shows that while courts' adjudication and scholars' analyses have focused on the risk of *optimal care* and *excessive activity levels*, they have overlooked the parallel problem of *suboptimal care* and *insufficient activity levels*. Because the risk of harm usually increases together with more activity, maintaining a low level of activity may allow parties to escape a duty to invest in precautions. When their benefit from more activity is smaller than the costs of such precautions, parties are likely to restrict their activity even when a higher activity level and greater care are more socially desirable. Against the conventional paradigm, therefore, this Article demonstrates that under reasonable-behavior standards parties might deliberately set their activity *below* (rather than above) the socially desirable level while avoiding efficient care.

To illustrate, consider the case of a polluting factory. In line with the conventional paradigm, a leading tort scholar has recently concluded that "[n]egligence law may be fairly good at examining whether the plant is designed and maintained in a cost-effective fashion."¹⁰ However, since "courts may be unable to assess whether the scale of the plant is excessive in a social sense," the factory is likely to overengage in its activity.¹¹ Once the factory invests in optimal care and faces no risk of liability, so the argument goes, it will increase its level of production even when its benefit from such an increase is lower than the expected cost of pollution.¹²

Against this backdrop, consider the following hypothetical. Assume that a factory may choose between different levels of production and may invest in precautions that would eliminate any possible harm. Assume that the costs of precautions do not depend on the level of production. For example, suppose that the above-mentioned factory can avoid any pollution by elevating its smokestack at a cost of \$120. Suppose also that the factory can choose between engaging in a *low* activity level or a *high* activity level. In the *low* activity level, the factory's profits will be \$1000, and the harm inflicted on nearby residents will be \$110. In the *high* activity level, where the factory produces more, its profits will increase to \$1100, but the harm inflicted on nearby residents will increase to \$130.

Under a negligence regime, applying the Hand formula, the factory would be liable if it could prevent the harm by investing in cost-effective

VA. L. REV. 205, 240 (2002) ("Because a negligence rule will not impose liability for those injuries that could not efficiently be prevented, the ISP's activity level will not take into account the social cost of those accidents. Consequently . . . the ISP will sell too many accounts . . .").

10. Alan O. Sykes, *Strict Liability versus Negligence in Indiana Harbor*, 74 U. CHI. L. REV. 1911, 1919–20 (2007).

11. *Id.* at 1920.

12. See also Jason S. Johnston, *Punitive Liability: A New Paradigm of Efficiency in Tort Law*, 87 COLUM. L. REV. 1385, 1423 (1987) ("If a firm that took reasonable abatement steps is certain that there will be no liability for accidental factory pollution, it will have no incentive not to operate the factory at excessively high levels.").

precautions.¹³ In the *low* activity level, the loss to residents (\$110) is smaller than the cost of elevating the smokestack (\$120). In the low activity level, therefore, the factory is neither required to raise its smokestack nor is it required to compensate the residents. Consequently, since it will not bear any costs for precautions or liability, the factory's benefit while operating at low activity will be \$1000. In contrast, in the *high* activity level, the harm to the residents (\$130) outweighs the costs of precautions (\$120). Looking to avoid paying \$130 in damages, the factory must invest \$120 in elevating its smokestack. Thus, when operating at high activity, the factory's benefit includes its profits from production (\$1100) less its costs of elevating the smokestack (\$120), for a total of only \$980. Looking to maximize its payoff (\$1000 > \$980), the factory would therefore set its activity at the *low* level.

Maximization of social welfare, however, mandates that the factory produce at the *high* level and also invest in elevating its smokestack. At low activity—where the factory has no duty to invest in precautions and harm materializes—the net social benefit equals \$890 (the factory's \$1000 profits from production less the \$110 harm to the residents). By contrast, if the factory operates at high activity—where investments in prevention are made and the residents incur no harm—the net social benefit reaches \$980 (the factory's \$1100 profit from the increased production less the \$120 cost of the smokestack).¹⁴

13. *Mesman v. Crane Pro Servs.*, 409 F.3d 846, 849 (7th Cir. 2005) (“[F]ailure to take a precaution is negligent only if the cost of the precaution . . . is less than the probability of the accident that the precaution would have prevented multiplied by the loss that the accident if it occurred would cause . . .”); *Myers v. Dronet*, 801 So. 2d 1097, 1109 (La. Ct. App. 2001) (“To determine whether [a person] breached a duty or, in other words, acted unreasonably, courts often use Judge Hand’s *Carroll Towing* balancing test, most commonly referred to as the ‘Hand formula’ . . .”); JAMES A. HENDERSON, JR. ET AL., *THE TORTS PROCESS* 159 (6th ed. 2003) (“The proper balancing of social interests—both costs and benefits [of parties’] untaken precautions—has come to be recognized as the central inquiry in determining whether an actor has been negligent.”).

14. The following table summarizes the expected costs and benefits under a negligence regime for both activity levels:

	Plant's Profits	Harm to Neighbors	Costs of Precaution	Plant's Net Benefit	Social Benefit
Low Activity Level	\$1000	\$110	\$120	\$1000	\$890
High Activity Level	\$1100	\$130	\$120	\$980	\$980

As the table shows, while production at the *high* activity level is socially desirable, the plant maximizes its private gains by operating at the *low* activity level. Absent transaction costs, the neighbors may attempt to “bribe” the plant to elevate the smokestack and produce at the high level. Since in this case the risk of pollution is removed, neighbors’ benefit will be \$110. As for the plant, elevating the smokestack and producing at the high level diminishes its profits by \$20 (\$1000 – \$980). Accordingly, any payment between \$20 and \$110 will make both parties better off and social welfare will be maximized. In the context of tortious behavior, however, transaction costs are prevalent and often prohibitive. Such transaction costs usually take two forms. In many cases, negotiation is infeasible since potential harm doers cannot identify their potential victims *ex ante*; in other cases, the large number of parties makes negotiation especially costly. For discussion of other possible transaction costs in the pollution context, see, for example, Ward Farnsworth, *Do Parties to Nuisance Cases*

While courts and scholars have emphasized parties' incentives to optimally invest in precautions and engage excessively in activities, the polluting-factory hypothetical demonstrates that the risk of inefficient behavior might be in the opposite direction. Negligence-based regimes may induce parties to engage *too little* in a socially desirable activity and forgo investments in efficient prevention. Looking to avoid a duty of care, parties may strategically restrict their activity below the socially desirable level so that the magnitude of the ensuing risk will be lower than the costs of welfare-enhancing precautions. As the following analysis shows, the risk of such conduct may arise under various contingencies and in a wide set of cases.

The overlooked paradigm of insufficient activity and suboptimal care has important normative implications. Conventional legal scholarship, addressing the risk of inefficient activity levels, has proposed several recommendations as to the design of regulations and the choice between liability regimes.¹⁵ It has thus claimed to provide both legislatures and courts with clear guidelines for inducing optimal prevention. Yet, given the literature's focus on the risk of excessive conduct, it has failed to consider parties' possible incentives to undesirably limit their activity. This Article, aiming to rectify this gap, reassesses the conventional recommendations and elaborates on the ways in which the legal system can discourage parties from restricting their activity and avoiding efficient investment in precautions.

The discussion of this Article unfolds as follows. Part I presents the conventional wisdom regarding care and activity levels. It first sets out the traditional prediction of optimal care and excessive activity, and then discusses the normative consequences of this prediction. Part II claims that the standard analysis concerning the interplay between care and activity levels is incomplete. It establishes that tort rules may often induce suboptimal care and insufficient activity. The risk of such behavior, it is shown, has been overlooked by judges, scholars, and the new Restatement of Torts. Part III argues that the legal system can discourage parties from setting their activity below the efficient level and can minimize the social loss that may result from such conduct. First, tort law may remove parties' incentives to restrict their activity and avoid efficient precautions by allowing liability for insufficient activity. Under this new form of liability, parties who engage in such behavior will be considered negligent and will be required to compensate for the harm they cause. Second, in contexts where such an inquiry by the courts is likely to be costly, regulations setting either prespecified safety standards or maximum-harm ceilings can be used to prevent deliberate restrictions of parties' activity levels. This insight provides a novel justification for a highly contested form of regulation recently challenged before the Supreme Court. Finally, the conventional paradigm of optimal care and excessive activity has led to important policy recommendations as

Bargain After Judgment? A Glimpse Inside the Cathedral, 66 U. CHI. L. REV. 373 (1999). Farnsworth examined twenty nuisance cases and found no bargaining between the parties. *Id.*

15. See *infra* Section I.B.

to the choice between different liability regimes. The overlooked paradigm of suboptimal care and insufficient activity implies that in many cases, these policy recommendations may be flipped: in situations where negligence was conventionally believed to be superior to strict liability (or vice versa) the opposite may in fact be true.

The current tort system has been criticized on the basis of two theories that are usually perceived as incompatible. On the one hand, prodefendant critics often complain that existing liability rules are *too harsh*. In their view, the tort system creates too much deterrence and stifles, rather than encourages, activities that are welfare enhancing.¹⁶ On the other hand, pro-plaintiff critics contend that liability rules are *too lenient*. According to their claims, the tort system fails to provide suitable protection for potential victims and allows injurers to expose others to unjustifiable risks.¹⁷ This Article argues that both of these apparently opposing claims often manifest two sides of a single deficiency of the tort system. The Article shows that current tort liability stimulates *both* insufficient activity *and* suboptimal care. It further demonstrates how tort rules can be modified to alleviate both problems.

I. THE CONVENTIONAL PARADIGM: OPTIMAL CARE AND EXCESSIVE ACTIVITY

The preceding factory hypothetical established that, under a rule of negligence, a potential injurer might strategically restrict her activity to save the costs of care. In contrast, conventional tort analysis has claimed that negligence-based regimes are likely to have the opposite effect: parties will be incentivized to adopt efficient precautions but then engage in excessive activity levels. The actual incentives to overengage in an activity, it has been argued, depend on the applicable regime—a rule of *negligence* would induce *injurers* to overengage in activities, whereas *victims* would overengage under a regime of *strict liability with contributory negligence*.¹⁸ Tort scholarship has

16. See, e.g., VINCENT R. JOHNSON & ALAN GUNN, *STUDIES IN AMERICAN TORT LAW* 8 (3d ed. 2005) (“[T]here is continuing concern that tort liability not be so readily imposed that industrial creativity is stifled, that entrepreneurship is chilled . . .”); Deborah J. La Fetra, *Freedom, Responsibility, and Risk: Fundamental Principles Supporting Tort Reform*, 36 *IND. L. REV.* 645, 649 (2003) (“The stifling effect of the tort system is not speculative; examples abound.”).

17. See, e.g., Robert S. Peck et al., *Tort Reform 1999: A Building Without a Foundation*, 27 *FLA. ST. U. L. REV.* 397, 400 (2000) (“[T]he recent demands for widespread tort reform, while directing attention to dissatisfaction with the tort system, tend to miss their mark, since significant underdeterrence already exists.” (quoting Nicholas A. Ashford & Robert F. Stone, *Liability, Innovation, and Safety in the Chemical Industry*, in *THE LIABILITY MAZE: THE IMPACT OF LIABILITY LAW ON SAFETY AND INNOVATION* 367, 419 (Peter W. Huber & Robert E. Litan eds., 1991))).

18. For the conventional analysis concerning the risk of excessive activity levels under negligence and strict liability, see, for example, STEVEN SHAVELL, *ECONOMIC ANALYSIS OF ACCIDENT LAW* 66–71 (1987) [hereinafter SHAVELL, *ACCIDENT LAW*], who demonstrates the risk of excessive activity under both negligence and strict liability regimes. See also ROBERT COOTER & THOMAS ULEN, *LAW & ECONOMICS* 348–49 (5th ed. 2008) (explaining that given courts’ focus on care, both negligence and strict liability induce parties to engage in their activities beyond the socially desirable level); LANDES & POSNER, *supra* note 5, at 66–73 (discussing the care–activity distinction and arguing that tort law usually induces optimal levels of care but also excessive activity levels on the part of either the victim or the injurer).

proposed several policy recommendations to address this risk of excessive activity levels. Section I.A demonstrates the reasoning underlying the conventional arguments. Section I.B presents the related normative recommendations.

*A. Reasonable-Behavior Standards and the
Incentives for Excessive Activity*

Legal scholarship has shown that negligence-based regimes are crucial for inducing optimal investments in precautions but may provide only partial incentives for efficient activity levels—the activity of either the injurer or victim will often exceed the socially desirable level.¹⁹

Consider parties' incentives to invest in care. Imagine a potential injurer who may unilaterally prevent harm—her behavior may cause damage of \$100 but she can prevent such damage by investing \$50 in precautions. Subjecting this potential injurer to either strict liability or a rule of negligence would induce her to invest in efficient harm avoidance. As the potential injurer is better off incurring a cost of \$50 rather than \$100, she will prefer to invest in prevention rather than pay out compensation. In other cases, efficient prevention may require bilateral investment by both the injurer and the victim. For example, assume a situation where an investment of \$20 by each party is required to eliminate a harm of \$100. In such situations, a regime of strict liability will not create the necessary incentives for efficient prevention—the victim, always entitled to compensation, will have no reason to invest in precautions.²⁰ In contrast, a rule of negligence, which imposes liability on the injurer if she fails to invest \$20 in precautions, will induce *both* parties to efficiently invest in precautions. Looking to avoid paying \$100 in damages, the potential injurer will prefer to invest \$20 in care. Given such behavior by the potential injurer, the potential victim faces a \$100 harm for which he is not entitled to compensation. To avoid incurring a loss of \$100, the potential victim will thus also invest \$20 in precaution.

The rule of negligence described above applies a reasonable-behavior standard with respect to the conduct of the injurer. As tort scholars have emphasized, the same result can be achieved by subjecting the victim (rather

19. John Prather Brown was the first to provide extensive analysis establishing that only negligence-based regimes can induce optimal levels of care. His seminal article, John Prather Brown, *Toward an Economic Theory of Liability*, 2 J. LEGAL STUD. 323 (1973), showed that only reasonable-behavior rules can encourage optimal investments in precaution in both unilateral and joint-care cases. Subsequent scholarship exploring the efficiency of tort liability regimes has largely followed Brown's analysis. *See, e.g.*, LANDES & POSNER, *supra* note 5, at 54–84; SHAVELL, ACCIDENT LAW, *supra* note 18, at 54–72. As our discussion suggests, however, the conventional model has overlooked the incentives that negligence-based regimes might create for insufficient activity levels and suboptimal care.

20. In the same vein, a rule of no liability (under which the victim shoulders the entire loss irrespective of the injurer's fault) is inefficient in joint-care cases. Since the *injurer* bears no liability under all circumstances, she has no incentive to invest in precaution. The regime of no liability induces optimal precaution where efficient prevention requires investments only by the potential victims. Brown, *supra* note 19, at 327–35.

than the injurer) to the standard of reasonable behavior.²¹ This legal regime would take the form of strict liability with contributory negligence, in which a failure on the part of the victim to invest in cost-effective precautions will deny him his right to compensation. Consider again the bilateral situation, in which both parties must invest in care to avoid the harm. The victim will invest \$20 in precautions to avoid shouldering the \$100 harm; since no contributory negligence is expected, the injurer will also invest \$20 to prevent paying \$100 in compensation. Thus, whether the situation demands unilateral or bilateral care, reasonable-behavior standards have been shown to induce optimal care by both parties.

Ideally, in evaluating reasonable behavior, negligence-based regimes would not only compare the costs and benefits of potential precautions, but also those of different activity levels.²² While information concerning precautions is usually available, in practice it is often the case that “the information costs of evaluating activity levels are especially high.”²³ Consequently, in many torts-related contexts, “courts ordinarily exclude activity levels from evaluation.”²⁴ This neglect, it has been argued, induces parties to overengage in activities. Under a rule of negligence, injurers will optimally invest in precaution, but then—since they do not face the risk of liability—will excessively perform. Under a rule of strict liability with contributory negligence—where the standard of reasonable behavior is applied with regard to victims’ conduct—the risk of excessive activity is in the opposite direction. Victims will optimally invest in precautions, but then—given that they are always compensated—will overengage in their activity.²⁵

A concrete example, employing the classic tort setting of a railroad and a farmer, can demonstrate the traditional prediction concerning optimal care

21. *Id.*

22. *E.g.*, Steven P. Croley & Jon D. Hanson, *What Liability Crisis? An Alternative Explanation for Recent Events in Products Liability*, 8 *YALE J. ON REG.* 1, 71 (1991) (“In an ideal negligence regime, courts would alter the activity levels of potential injurers by taking activity levels into account in their negligence determinations. But . . . in practice, courts do not or cannot take activity levels into account in their negligence analyses.”).

23. LANDES & POSNER, *supra* note 5, at 69–71.

24. *Id.*

25. John Donohue explained the activity-level problem as follows:

A negligence standard puts pressure on injurers to act with due care because it confronts them with potential liability payments that exceed the cost of taking care. The negligence standard, however, does not give injurers a financial incentive to limit their activity level. Because, under a negligence rule, injurers will not be liable for *any* damage as long as they act with due care, they will consider only the individual gains associated with each increment of behavior, not the social costs of such activity. Note, though, that the negligence rule gives victims an incentive to control both their level of care and their activity level: assuming that injurers will be careful (as they will be if they act rationally) victims will pay for all damages that they suffer. Therefore, victims have an incentive to consider all the costs and benefits of extra levels of care and activity. Strict liability with a contributory negligence defense would create the exactly reciprocal pattern: injurers would face the appropriate incentives with respect to care and the activity level, but victims would have no incentive to control their activity level.

John J. Donohue III, *The Law And Economics of Tort Law: The Profound Revolution*, 102 *HARV. L. REV.* 1047, 1058 (1989) (reviewing WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* (1987)).

and excessive activity.²⁶ Following the conventional analysis, this example will employ the standard (though typically not emphasized) assumption that the cost of precaution is the same for each “unit” of activity.²⁷

Hypothetical 1—Negligence and the Risk of Excessive Activity

Imagine that a railroad company operates a train that runs across a farmer’s field. The crossing train emits sparks that may set the crops on fire. Assume that each time fire occurs it inflicts harm of \$200, as some of the farmer’s crops are lost. Assume also that the likelihood of emitting sparks depends exclusively on the train’s speed. If the train runs at its maximum speed, the likelihood of fire is 30%; if it runs only at half speed, this likelihood diminishes to 10%. Limiting speed, however, makes the operation of the train more costly. More specifically, the cost of operation at the maximum speed equals \$1 per ride, as compared to \$2 per ride at the reduced speed. Finally, assume that the railroad company can set the number of rides from zero to ten. The benefit to the company from the first ride is \$100, the benefit from the second ride is \$90, from the third \$80, and so forth, such that the benefit from the tenth ride equals \$10.²⁸

Considering these assumptions, investment in precautions—running the train at a lower speed—is efficient. Limiting speed will increase operation costs by only \$1 per ride (from \$1 to \$2). When a train’s speed is limited, the likelihood of fire and of the resulting \$200 loss is reduced by 20% (from 30% to 10%), thus saving \$40 (20% of \$200) in expected harm per ride. Under a rule of negligence, therefore, a failure to curb the train’s speed would render the company liable. Looking to avoid paying compensation, the company will operate its train at the reduced speed.

This investment in care, while reducing the likelihood of harm, does not entirely eliminate the risk of fire. As a 10% risk still remains, the expected harm per ride equals \$20 (10% of \$200). Nevertheless, taking into account

26. See, e.g., RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* § 6.1–4 (7th ed. 2007) (using railroads and farmers to discuss care and activity levels); Keith N. Hylton, *The Theory of Tort Doctrine and the Restatement (Third) of Torts*, 54 *VAND. L. REV.* 1413, 1417 (2001) (“A railroad that exercises the reasonable level of precaution still lets off sparks that damage the crops of farmers. These sparks are ‘external costs’ or ‘externalities’ associated with the activity of running railroad cars. . . . [Social-utility maximization thus requires] both optimum investment in accident reduction and activity levels.”); Meese, *supra* note 2, at 1210–19 (analyzing railroads’ and farmers’ activity and care levels under various liability regimes).

27. See *infra* text accompanying notes 47–48 (discussing the underlying assumptions of the conventional analysis).

28. Diminishing marginal returns (that is, declining profit for every additional unit of operation) characterizes most behaviors. This generally occurs for two reasons. First, the costs of operation may rise for each additional unit. Second, the benefit from each additional unit is often a decreasing function. See generally HAL R. VARIAN, *INTERMEDIATE MICROECONOMICS: A MODERN APPROACH* 227–80, 329 (7th ed. 2005) (explaining the principle of diminishing marginal returns). For example, in our context, one may assume that the first ride, operated during morning rush hours, enjoys the largest occupancy, and hence the largest revenue; the second ride, operated at a less busy hour, enjoys less occupancy and revenue, and so forth. For algebraic simplicity, the discussed hypothetical involves marginal declining benefits while assuming that operation costs are the same for every ride. The analysis, however, would have been identical if we had assumed that operation costs rise for every additional ride.

courts' exclusive focus on care, the railroad company now faces no risk of liability. Because no other efficient precautions are available, the company will not be required to pay for any damage to crops. Looking to maximize its payoffs, the company will determine its activity level on the basis of only its private revenues and operation costs. Since even the benefit from the tenth ride outweighs operation costs ($\$10 > \2), the company will run all ten trips.

This level of activity, however, exceeds the socially desirable level. As the next table shows, because each ride creates a 10% risk of \$200 harm the actual social costs per ride equal \$22 (\$20 expected harm + \$2 operation costs). Accordingly, from a social perspective, the railroad company should operate the train only eight times rather than ten (given that the benefit from the ninth and tenth rides is only \$20 and \$10, respectively). This excessive activity by the company results in social waste in the amount of \$14 (as the benefits from the ninth and tenth rides equal \$30 (\$20 + \$10) but result in social costs of \$44 ($\$22 \cdot 2$)).

HYPOTHETICAL 1
COSTS, BENEFITS, AND SOCIAL UTILITY (PER RIDE)

	Railroad's Revenues	Operation Costs	Railroad's Net Benefit	Expected Harm	Social Utility
Ride 1	\$100	\$2	\$98	\$20	\$78
Ride 2	\$90	\$2	\$88	\$20	\$68
Ride 3	\$80	\$2	\$78	\$20	\$58
Ride 4	\$70	\$2	\$68	\$20	\$48
Ride 5	\$60	\$2	\$58	\$20	\$38
Ride 6	\$50	\$2	\$48	\$20	\$28
Ride 7	\$40	\$2	\$38	\$20	\$18
Ride 8	\$30	\$2	\$28	\$20	\$8
Ride 9	\$20	\$2	\$18	\$20	-\$2
Ride 10	\$10	\$2	\$8	\$20	-\$12

The previous example focused on the care and activity level of the injurer. In the same vein, tort scholarship has shown that similar inefficiencies occur where the possible loss is contingent on the victim's care and activity levels. Consider again the railroad-farmer hypothetical, but assume this time that the farmer can cost-effectively reduce the expected harm—loss of crops—by spraying a certain fire-retardant chemical at the same cost per acre (care) and by confining the size of the field (activity). Subjecting the farmer to a rule of strict liability with contributory negligence will induce her to invest in efficient precautions. The farmer will spray the chemical so that her behavior will not be considered negligent. Yet, as she is now entitled to compensation in the case of fire, and given that having more crops increases her benefits, the farmer will set the size of her field beyond the socially desirable magnitude.

As this analysis shows, while negligence-based regimes induce optimal investments in precautions, they also allow one of the parties to overengage in her activity. Once taking optimal care, either the injurer or the victim will adopt excessive activity levels.

B. Normative Implications of Excessive Activity Levels

Tort scholarship has proposed two strategies for minimizing the social loss caused by excessive activity levels. First, the legal system may supplement liability with regulation setting a *cap* on the maximum level of activity. Second, where maximum-activity regulation is unfeasible, the tort system may prevent the loss (or at least reduce it) by choosing whether to apply negligence or strict liability with contributory negligence. Since under each regime the risk of excessive activity lies with a different party (the victim or the injurer), opting for the appropriate form of liability can diminish the actual harm.

1. Maximum-Activity Regulation

Litigation usually produces adequate evidence regarding the cost-effectiveness of untaken precautions. The availability of this information thus enables courts to easily determine the optimal level of care.²⁹ By contrast, determinations of activity levels require more complex information. They mandate identifying the costs and benefits of possible changes in the intensity in which activities are carried out, a task courts may not always be able to perform given their lack of relevant information.³⁰ Yet regulators, as opposed to courts, are often capable of collecting extensive data. Scholars have thus claimed that regulatory agencies may induce efficient activity levels by setting limits on the extent to which parties may engage in potentially harmful conduct.³¹ Professors Ulen and Garoupa, for example, have recently

29. Mark Grady explained this benefit thusly:

[The] untaken-precaution approach . . . reduces courts' need for technical information because they no longer have to identify the precautions that produce the global minimum of social cost; they need only examine the costs and benefits of the precautions that the plaintiff has actually alleged that the defendant failed to take. Untaken precautions beyond the efficient set appear cost-beneficial only when the injurer has used less precaution than due care. When the injurer has used the most efficient precautions, as he has an incentive to do, no further precaution will appear cost-beneficial.

Mark F. Grady, *Discontinuities and Information Burdens: A Review of The Economic Structure of Tort Law* by William Landes and Richard Posner, 56 GEO. WASH. L. REV. 658, 661 (1988) (book review); see also Ehud Guttel, *The (Hidden) Risk of Opportunistic Precautions*, 93 VA. L. REV. 1389, 1395–1405 (2007) (discussing the efficiency implication of the untaken-precaution approach).

30. For the possible informational hurdles that courts may face in determining the efficiency of activity levels, see, for example, SHAVELL, ACCIDENT LAW, *supra* note 18, at 25–26. Shavell explains that to determine the efficient activity level in the context of driving, for example, courts must answer the complex questions of how many miles the defendant drives per year as well as what the defendant's subjective benefits are from driving. *Id.*

31. See, e.g., Kyle Logue & Ronen Avraham, *Redistributing Optimally: Of Tax Rules, Legal Rules, and Insurance*, 56 TAX L. REV. 157, 241 n.256 (2003) (“[W]ith respect to some types of

shown that “activity levels in areas such as environmental liability, product liability, consumer policy, and public health are traditionally allocated to state regulation rather than liability.”³² Regulation may thus supplement tort liability. A regime of negligence combined with a regulatory cap that restricts the frequency of the injurer’s conduct will induce the injurer to adopt both optimal care and optimal activity. Similarly, a regime of strict liability and contributory negligence combined with a regulatory cap on the victim’s conduct will provide the victim with incentives for optimal behavior.

While applied in many contexts, maximum-activity regulation cannot entirely resolve the risk of excessive conduct. First, regulators too may lack information for determining the socially desirable level of activity.³³ Second, because regulation requires the government to invest in ongoing monitoring, high enforcement costs may render the use of regulation impractical.³⁴ To the extent that regulation is unfeasible, tort liability is often the only available means for controlling parties’ behavior. Nevertheless, as the next Section explains, tort theory has shown that the legal system can diminish the harm from excessive activity levels by choosing the appropriate liability regime.³⁵

2. *Negligence, Strict Liability, and “The Lesser of Two Evils” Principle*

Tort analysis has shown that choosing correctly between negligence and strict liability can minimize the social loss caused by undesirable activity levels. This analysis has distinguished between three possible types of cases. The first category involves cases in which optimal investment in prevention *entirely* removes the risk of harm. The second category concerns cases in which the risk of excessive activity is unilateral (only one of the parties may engage in excessive activity). In the third category, the risk of excessive conduct is bilateral (both parties’ activity may be excessive). Legal analysis

activities and potential injurers, the activity-level question may be dealt with best through licensing or other types of direct regulation, leaving the care-level regulation . . . to the tort law.”).

32. Nuno Garoupa & Thomas S. Ulen, *The Economics of Activity Levels in Tort Liability and Regulation* 11 (Apr. 22, 2007) (unpublished paper presented at Midwestern Law & Econ. Assoc. Conf., available at http://www.law.umn.edu/uploads/KD/Io/KDIozC78a3gv7JwTDNO5pA/Nuno_Garoupa_Tom_Ulen.pdf).

33. For some concerns about the ability of regulators to collect the necessary information for determining activity levels, see, for example, Steven Shavell, *The Optimal Structure of Law Enforcement*, 36 J.L. & ECON. 255, 285 (1993), who questions regulators’ ability to find the information regarding the costs and benefits of activities in certain contexts.

34. See, e.g., Clifford Rechtschaffen, *Deterrence vs. Cooperation and the Evolving Theory of Environmental Enforcement*, 71 S. CAL. L. REV. 1181, 1214 (1998) (“It is certainly true that government resources are constrained . . . [E]nforcement agencies have never had sufficient staff to inspect more than a fraction of regulated facilities . . .”).

35. Some scholars have claimed that the different effects of negligence and strict liability on parties’ incentives to engage in excessive activity is in fact the most important distinction between these two regimes. See LANDES & POSNER, *supra* note 5, at 66 (“[The] most interesting respect in which negligence and strict liability differ concerns the incentive to avoid accidents by reducing the level of an activity rather than by increasing the care with which the activity is conducted.”).

has provided clear guidelines concerning the selection of liability regimes in each of these categories.

Consider initially the case where efficient investment in precaution makes parties' behavior entirely safe. To illustrate, imagine in *Hypothetical 1* that once the railroad and farmer take optimal precaution (reduced speed and spraying a chemical) there is no risk of fire. Tort scholarship has shown that in such cases, where parties' behavior generates no risks, activity will be set at the desirable level. Since parties do not externalize any risk of harm, they bear the true costs of their conduct. Parties' private incentives are thus fully aligned with social-welfare maximization. In the railroad example, because the social costs of its conduct now involve only its own operation costs, the company will set its activity (number of rides) at the efficient level. Most importantly, this result has led tort theory to conclude that where optimal precaution entirely removes the risk of harm, *both* negligence and strict liability with contributory negligence are efficient. Since both regimes induce optimal investments in precaution and optimal activity, the legal system can apply either of them to maximize social welfare.³⁶

This equivalence between negligence and strict liability disappears when optimal precaution cannot render parties' behavior entirely safe. As the preceding analysis has shown, parties in such cases may set their activity at excessive levels. Tort theory, however, has claimed that as long as the harm depends on the activity level of only *one* of the parties, opting for the proper liability regime can remove the risk of excessive activity. To illustrate, consider again *Hypothetical 1*. Imagine that parties' precautions (reduced speed and spraying a chemical) can efficiently reduce, but not entirely eliminate, the risk of harm, and that the likelihood of fire is contingent only upon the number of rides (and not on the size of the field). In this case, welfare maximization requires inducing optimal care by both parties *and* controlling the activity level of the *injurer-railroad*. Recall that negligence, while inducing optimal care, fails to provide the injurer with the necessary incentives to avoid excessive activity. In contrast, strict liability (with contributory negligence) encourages both parties to take efficient precautions and the injurer to set her activity at the efficient level. Tort theory has thus advocated choosing strict liability in such cases. Applying a similar analysis, tort theory has recommended the application of negligence in cases in which the risk of excessive activity lies only on the part of victims.³⁷

Finally, in some contexts in which efficient precautions do not entirely remove the risk of accidents, expected harm depends on the activity levels of both the injurer and the victim. Accordingly, neither negligence nor strict liability with contributory negligence can induce optimal behavior. Tort scholarship has thus proposed the principle of "the lesser of two evils."³⁸ To minimize social harm, liability should be imposed such that it induces ex-

36. See, e.g., COOTER & ULEN, *supra* note 18, at 341–48.

37. SHAVELL, ACCIDENT LAW, *supra* note 18, at 21–26.

38. Shavell, *supra* note 3, at 19 ("[T]he choice between strict liability with a defense of contributory negligence and the negligence rule is a choice in favor of the lesser of two evils.").

cessive behavior by the party whose excessive activity is less harmful. More specifically, as scholars have explained:

[T]he preferred liability rule depends on whether it is more important to control the injurer's or the victim's activity level. If the injurer's activity level is of greater concern, then strict liability with a defense of contributory negligence should be used. If the victim's activity level is more important, then negligence is preferable.³⁹

To illustrate, recall that in *Hypothetical 1* the excessive activity of the railroad company—running ten rather than only eight rides—resulted in social waste of \$14. The preferred form of liability in this situation will thus depend on whether the social loss from the farmer's excessive activity (an oversized field) is more or less than \$14. If this loss is greater than \$14, it outweighs the alternative loss that results from the railroad's excessive activity (too many rides). In this case, a rule of negligence—which induces excessive activity on the part of the railroad—is more favorable. If it is less than \$14, a rule of strict liability with contributory negligence—which induces excessive activity on the part of the farmer—is preferable.

As legal analysis has emphasized, deciding whether to apply negligence or strict liability with contributory negligence does not require knowledge about the exact harm from parties' excessive activity. It demands only identifying in a given context which party's excessive activity—either the farmer's or the railroad's—is likely to result in greater social harm.⁴⁰ Controlling the activity of the side whose excessive activity is more harmful reduces the actual social waste.

II. THE OVERLOOKED PARADIGM: SUBOPTIMAL CARE AND INSUFFICIENT ACTIVITY

Conventional legal scholarship, addressing the possible interplay between care and activity levels, has shown that tort law as applied in practice may encourage parties to engage in excessive activity and therefore create socially undesirable risks. This Part, however, suggests that the conventional analysis is incomplete. In contrast to the standard perception, this Part argues that the tort system may encourage parties to engage in activities to an extent that is *below* the efficient level. Because the risk of harm is often a function of the intensity in which an activity is carried out, a low activity level—that reduces the expected harm from the activity—may allow

39. POLINSKY, *supra* note 4, at 54. See also SHAVELL, ACCIDENT LAW, *supra* note 18, at 29 (“[S]trict liability with the defense of contributory negligence will result in higher social welfare if its disadvantage—that victims engage too often in their activity—is not as important as the disadvantage of the negligence rules—that injurers engage too often in their activity.”).

40. See, e.g., COOTER & ULEN, *supra* note 18, at 349 (“Usually one party's activity level affects accidents more than the other party's activity level. Efficiency requires choosing a liability rule so that the party whose activity level most affects accidents bears the residual costs of accidental harm.”).

parties to avoid investments in precautions.⁴¹ Where these investments would enhance social welfare, such behavior involves suboptimal care and insufficient activity. Section II.A first illustrates the risk of suboptimal care and insufficient activity by reconsidering the railroad–farmer hypothetical. Section II.B then provides a general account of the conditions under which parties may strategically restrict their activity to avoid investments in efficient precaution. Finally, Section II.C demonstrates the risk of insufficient activity in practice.

A. *The Risk of Insufficient Activity—An Illustration*

Low activity levels can affect parties' payoffs in two different ways. First, low activity levels usually decrease parties' benefits. Because more train rides allow the railroad company to collect more money, restricting the number of rides results in lost revenues. Second, low activity levels also minimize the risk that parties who engage in the activity will inflict harm on others. The fewer the number of rides, the smaller the likelihood of setting the farmer's crops on fire. Maintaining a low level of activity may therefore enable parties to avoid their duty to invest in precautions. Most importantly, in cases in which the precautions cost more than the revenues forgone from operating at a reduced level, a party can maximize her payoffs by restricting her activity level. As the next example shows, however, such behavior might result in social waste.⁴²

41. Several scholars have shown that in some contexts the efficiency of possible precautions might depend on parties' actual levels of activity. Because different activity levels might affect the marginal cost or the marginal benefit of taking care, courts might not be able to determine the cost-effectiveness of precautions without first identifying the intensity in which a party engages in an activity. In the context of traffic safety, for example, Professor Donohue has offered the following explanation:

A trucker will presumably find it more difficult to stay alert—that is, more costly to take care—if he has to drive all night as opposed to only a few hours. Furthermore, if the trucker keeps driving through rush-hour traffic, the benefits from heightened care will escalate because of the higher accident risk posed by the greater congestion.

Donohue, *supra* note 25, at 1062; *see also* Jacob Nussim & Avraham D. Tabbach, *A revised model of unilateral accidents*, 29 INT'L REV. L. & ECON 169 (2009) (discussing medical malpractice and arguing that because doctors' activity levels in urban areas are higher than those of doctors who work in rural areas, courts deciding whether defendant–doctors are negligent in not taking certain precautions must distinguish between urban and rural doctors). These examples, while emphasizing the possible interdependence between activity and care levels, assume that where courts can determine the actual activity levels, parties will be induced to take optimal care. This assumption, however, overlooks the risk of insufficient activity levels exposed in this Article. For example, even if a trucker takes precaution appropriate to his *actual* level of activity, a negligence rule may induce him to set his activity below the socially desirable level.

42. Our analysis involves examples in which parties decide whether to invest in a single precaution (such as elevating the smokestack). As shown in the Appendix, however, the problem of insufficient activity may also arise in situations where there is a continuum of investment in care (investment of an additional dollar in precaution further reduces the expected harm).

Hypothetical 2—Negligence and the Risk of Insufficient Activity

Consider again the railroad–farmer hypothetical. Recall that the harm to the farmer’s crops in the case of fire is \$200, and that the railroad company can set the number of rides at any number from zero to ten (where the benefit to the company from the first ride is \$100, the second \$90, and so forth). Assume now that speed does not affect the likelihood of fire—the company will therefore run its train at full speed (such that operation costs are only \$1 per ride). Imagine, however, that the company can reduce the likelihood of fire from 30% to 10% per ride if it installs a spark arrester at a cost of \$201. Note that the cost of the spark arrester differs from the cost of reducing the train’s speed—while the installation of a spark arrester is a fixed-cost investment that is not affected by the number of rides, the total cost of reducing the train’s speed increases at a constant rate with every additional ride.

From a social perspective, given these assumptions, it is desirable to install the spark arrester and then run the train 8 times. With the spark arrester installed, the expected harm from each ride is \$20 (10% of \$200). Since the operation cost per ride is \$1, the overall social cost per ride equals \$21 (\$20 expected harm + \$1 operation cost). This social cost is lower than the benefit from each of the rides up to the eighth ride (the benefit for the eighth ride is \$30, while the benefit for the ninth ride is \$20 and only \$10 for the tenth ride). Because the spark arrester diminishes by 20% (from 30% to 10%) the risk that a train ride will cause a loss of \$200, it saves \$40 in expected harm per ride. With 8 rides, the spark arrester prevents harm of \$320 ($8 \cdot \40), a benefit that outweighs its cost ($\$320 > \201). With the spark arrester installed, running the train 8 times yields the following results: On the benefit side, the train’s operation provides revenues in the amount of \$520 ($\$100 + \$90 + \$80 + \$70 + \$60 + \$50 + \$40 + \$30 = \520). On the cost side, each of the rides involves a cost (expected harm + operation cost) of \$21, for a total of \$168 ($8 \cdot \$21$), and the installation of the spark arrester requires a single-time fixed investment of \$201. Therefore, in the final tally, the net social benefit of running the train 8 times equals \$151 ($\$520 - \$168 - \$201 = \151).⁴³ The following table summarizes the overall costs and benefits for all activity levels (number of rides) assuming a spark arrester is installed. As it shows, social utility is maximized when the railroad runs the train 8 times.

43. Similar analysis shows that the net social benefit would be smaller where the spark arrester is not installed. Recall that without the spark arrester the expected harm per ride is \$60, since the likelihood of fire (a loss of \$200) is 30 percent. Avoiding the installment of the spark arrester thus increases the social cost per ride to \$61 (\$60 expected harm + \$1 operation cost). Because the revenues from the fifth ride are only \$60, it would be desirable in this case to run only four rides. Given the operation of four rides without a spark arrester, the overall revenues would be \$340 ($\$100 + \$90 + \$80 + \70) and the overall cost would be \$244 ($4 \cdot \61), for a net social benefit of only \$96.

HYPOTHETICAL 2
 COSTS, BENEFITS, AND SOCIAL UTILITY WITH SPARK
 ARRESTER (FIXED INSTALLATION COST OF \$201)

	Overall Revenues	Overall Operation Costs	Railroad's Overall Net Benefit	Overall Expected Harm	Overall Social Utility
1 Ride	\$100	\$1 + \$201	-\$102	\$20	-\$122
2 Rides	\$190	\$2 + \$201	-\$13	\$40	-\$53
3 Rides	\$270	\$3 + \$201	\$66	\$60	\$6
4 Rides	\$340	\$4 + \$201	\$135	\$80	\$55
5 Rides	\$400	\$5 + \$201	\$194	\$100	\$94
6 Rides	\$450	\$6 + \$201	\$243	\$120	\$123
7 Rides	\$490	\$7 + \$201	\$282	\$140	\$142
8 Rides	\$520	\$8 + \$201	\$311	\$160	\$151
9 Rides	\$540	\$9 + \$201	\$330	\$180	\$150
10 Rides	\$550	\$10 + \$201	\$339	\$200	\$139

Although social utility is maximized if the company installs the spark arrester and runs the train 8 times, a negligence regime would induce the company to limit the train's activity to only 5 rides and avoid installing the spark arrester. To see why, let's examine the company's profits from 8 rides (high activity level) and 5 rides (low activity level). As this comparison shows, assuming that courts focus on the efficiency of precautions (and disregard activity levels) in determining negligent behavior, the company would earn higher profits if it sets its activity level at only five rides and refrains from installing the spark arrester.

As noted, if the company installs a spark arrester, it reduces the expected harm by \$40 per ride. Where the company runs the train 8 times, the social benefit from the spark arrester ($8 \times \$40 = \320) is *higher* than its costs (\$201). If the company runs the train eight times—as social maximization mandates—it would therefore be required to make an investment of \$201 to avoid liability. Such investment—while increasing social welfare—comes out of the company's pockets and thus decreases its private net benefit. Specifically, if the company runs the train 8 times, it would collect revenues of \$520 ($\$100 + \$90 + \$80 + \$70 + \$60 + \$50 + \$40 + \$30 = \520) but also incur, in addition to operation costs of \$8 ($8 \cdot \1), a cost of \$201 (the cost of the spark arrester). Its net profits would therefore amount to \$311 ($\$520 - \$8 - \201).

In contrast, if the company limits the train's activity to only 5 rides, it would not be required to install the spark arrester. In this case, the social benefit from the spark arrester in the reduction of the expected harm ($5 \cdot \$40 = \200) is *lower* than its cost ($\$200 < \201). If the company runs the train only 5 times, it can thus save the need to install the spark arrester while still avoiding liability. With 5 rides, the revenues of the company are \$400 ($\$100 + \$90 + \$80 + \$70 + \60) and operation costs are \$5 ($5 \cdot \1). Because there are no precautions that could cost-effectively reduce the risk to the crops,

the company does not bear any additional costs. The company's net benefit with 5 rides thus equals \$395 ($\$400 - \5), as compared to only \$311 where the train runs 8 times and is equipped with a spark arrester.⁴⁴ These results are summarized in the following table, which contrasts the railroad's profits and social utility for different activity levels. Recall that under negligence, the railroad is required to install the spark arrester (at a cost of \$201) only if it runs the train more than 5 times.

HYPOTHETICAL 2
COSTS, BENEFITS, AND SOCIAL UTILITY UNDER NEGLIGENCE

	Overall Revenues	Overall Operation Costs	Railroad's Overall Net Benefit	Overall Expected Harm	Overall Social Utility
1 Ride	\$100	\$1	\$99	\$60	\$39
2 Rides	\$190	\$2	\$188	\$120	\$68
3 Rides	\$270	\$3	\$267	\$180	\$87
4 Rides	\$340	\$4	\$336	\$240	\$96
5 Rides	\$400	\$5	\$395	\$300	\$95
6 Rides	\$450	\$6+\$201	\$243	\$120	\$123
7 Rides	\$490	\$7+\$201	\$282	\$140	\$142
8 Rides	\$520	\$8+\$201	\$311	\$160	\$151
9 Rides	\$540	\$9+\$201	\$330	\$180	\$150
10 Rides	\$550	\$10+\$201	\$339	\$200	\$139

The company's expected insufficient activity level (5 rides) and suboptimal care (no spark arrester) results in social waste. As indicated, when it operates the train only 5 times, the company gains a profit of \$395. Because the spark arrester is not installed, the expected harm from each ride is \$60 (30 percent of \$200); with 5 rides, the overall expected harm to the farmer's crops is thus \$300 ($5 \cdot \60). In total, therefore, the net social utility with 5 rides is only \$95 ($\$395 - \300). Had the company installed the spark arrester and operated the train 8 times, as is socially optimal, social benefit would have been higher by \$56 ($\$151 - \95).

The risk of insufficient activity and suboptimal care is not limited to injurers. Similar analysis shows that victims may also adopt such a strategy. Assume, for example, that the farmer may decrease the likelihood of fire by maintaining a firebreak at a fixed cost (care) and by restricting the size of the field (activity). Note again that the cost of the firebreak differs from the cost of spraying a fire-retardant chemical in *Hypothetical 1*—while a firebreak is a fixed-cost investment, the total cost of spraying chemicals increases at a constant rate with every additional acre. Imagine that it is socially desirable that the farmer invest in the firebreak and set the size of the

44. Note also that the company's net benefit from operating at the low activity level (five rides) also exceeds the profit it could gain by installing the spark arrester and then operating at excessively high levels (ten rides).

field at X acres. The farmer, however, may nevertheless find it in her best interest to set the size of the field *below* X . If the farmer is subject to a negligence-based standard (i.e., contributory negligence), she will be liable for failures to invest in efficient precautions. Keeping the size of the field small enough—and hence reducing the possible loss—can render the firebreak not cost justified. To the extent that the cost of the firebreak outweighs the possible profits from additional crops, restricting the size of the field below X allows the farmer to maximize her payoff.

The preceding analysis, therefore, shows that parties can avoid investment in desirable precautions and thus increase their net private benefit by restricting the risk of harm. The possibility of such conduct can arise in cases in which the likelihood of harm depends either on the behavior of the injurer (railroad), the victim (farmer), or both; it can evolve whether precautions prevent harm entirely (as in the polluting-plant hypothetical) or in part (as in the railroad-farmer hypothetical); and it can emerge under various liability regimes applying reasonable-behavior standards.⁴⁵ The next Section, elaborating on the results of *Hypotheticals 1* and *2*, describes in more detail the conditions under which parties are likely to pursue such behavior.

B. *The Prerequisites for Insufficient Activity*

When are negligence-based standards most likely to induce a party to restrict her activity level in a socially harmful way? In what cases would a party prefer a low activity level and no precautions while social-welfare maximization dictates that precautions be taken and activity set at a higher level? As shown below, this result would require two conditions. First, the precaution must be of the sort that is not cost justified at the low activity level but is cost justified at the high activity level. That is, the cost of care must exceed the harm prevented by such care at low activity levels, while being smaller than the harm such care prevents at high activity levels. An important (though not the only) case that can often satisfy the first condition is where the cost of care is fixed such that it is unaffected by the party's level of activity.⁴⁶ A second condition is that the cost of precaution in the

45. This result of suboptimal care (and insufficient activity) casts doubt on another widely shared convention in tort scholarship. Under the rule of negligence, a party who fails to meet the standard of care risks being liable for the harm that results from her behavior. Because even a small departure below the standard is sufficient to render the behavior negligent, scholars have claimed that parties who face some uncertainty as to whether they comply with the standard of care will often prefer to err on the side of over-, rather than under-, investments in precaution. *See, e.g.*, Johnston, *supra* note 12, at 1392–1401. Yet, as the analysis of this Article shows, another strategy to avoid liability is reducing one's level of activity. Thus, negligence might induce parties who are uncertain about the standard of care to reduce their activity level and underinvest (rather than overinvest) in precautions. *See also* John E. Calfee & Richard Craswell, *Some Effects of Uncertainty on Compliance with Legal Standards*, 70 VA. L. REV. 965 (1984) (exploring the effects of uncertainty on parties' incentives to invest in precautions but overlooking the risk of insufficient activity).

46. Tort scholarship has explored the case of fixed-cost precautions (i.e., precautions the costs of which are unaffected by the activity level). This literature, however, has overlooked the risk of insufficient activity and suboptimal care. *See* Mark F. Grady, *Why Are People Negligent? Technology, Nondurable Precautions, and the Medical Malpractice Explosion*, 82 NW. U. L. REV. 293,

high activity level must be intermediate—it must be neither too “low” nor too “high” but rather lie within a certain range: On the low end, it must exceed the private benefit that the party may derive from increasing her level of activity; on the high end, it must be less than the social gain from the additional activity and the diminished risk of harm.

Consider the first condition that the precaution is *not cost-effective in the low activity level but becomes cost justified in the high activity level*. The result of this condition is that the party faces no duty of care at the low level but is required to invest in precautions at the high level. To illustrate, recall that the cost of installing a spark arrester in *Hypothetical 2* was unaffected by the number of train rides. By contrast, because each ride augmented the risk of setting the crops on fire, the social benefit from installing the spark arrester increased with every additional ride. This was the driving force behind the railroad’s decision to restrict its activity to five rides, below the socially desirable level. The operation of only five rides resulted in a lower magnitude of harm that made the investment in the spark arrester inefficient. Keeping the number of rides small enough, the company was able to save the cost of precaution. In such cases, as demonstrated above, the overlooked *suboptimal care and insufficient activity* paradigm may evolve. As the party enhances its activity level, the expected harm prevented by taking care may reach a point where investing in the precaution becomes warranted. This party may thus prefer sacrificing the extra benefit of further raising its activity level to save the costs of taking care.

As noted above, the literature’s standard prediction of optimal care and excessive conduct is driven by the (often implicit) assumption that the cost of care is the same per unit of activity.⁴⁷ Recall that in *Hypothetical 1*—illustrating the conventional account—the railroad’s precaution did not involve a single-time investment (as in the case of the spark arrester in *Hypothetical 2*). Rather, the railroad was able to efficiently diminish the expected harm by limiting speed at a cost of \$1 *per ride*. Accordingly, in

302 n.38 (1988) (discussing the distinction between fixed-cost precautions and non-fixed-cost precautions and arguing that courts tend to underestimate the costs of the latter type); Nussim & Tabbach, *supra* note 41, at 171–72 (showing that with fixed-cost precautions, a negligence rule cannot be optimally applied without simultaneously determining the efficient activity and care levels; modeling that the court sets the correct standard of care, but may not be able to observe the injurer’s activity level, inducing the injurer to engage in socially excessive activity levels); Steven Shavell, *On Optimal Legal Change, Past Behavior, and Grandfathering*, 37 J. LEGAL STUD. 37 (2008) (proving that when precaution is durable, it could be socially desirable to employ a grandfathering policy under which parties who have already invested in precautions are exempt from additional investment).

47. See, e.g., COOTER & ULEN, *supra* note 18, at 348 (demonstrating the risk of excessive activity levels using the example of drivers who may take optimal care and then drive too many miles, and implicitly assuming that the cost of driving carefully is the same per each mile); see also Robert D. Cooter & Ariel Porat, *Liability Externalities and Mandatory Choices: Should Doctors Pay Less?*, 1 J. TORT L. 1, 4 (2006) (explaining the risk of excessive activity levels in the context of car accidents while implicitly assuming that the cost of care is increasing with activity at a constant rate). This assumption is sometimes explicit. See, e.g., LANDES & POSNER, *supra* note 5, at 61, 66, 69 (assuming costs of care are the same per “unit” of activity); A. Mitchell Polinsky & William P. Rogerson, *Products Liability, Consumer Misperceptions, and Market Power*, 14 BELL J. ECON 581, 582 (1983) (discussing parties’ incentives to excessively engage in activities where the costs of precautions are the same for each “unit” of activity).

Hypothetical 1, restricting the actual number of rides could not relieve the railroad of its duty to invest in precautions. Regardless of the total number of rides, a failure to reduce the speed of any particular ride would require the railroad to pay for the harm this train ride caused the farmer's crops. In this case, where the cost of care is the same per unit, only excessive, rather than insufficient, activity is possible. As shown, the railroad will always reduce speed to avoid liability, but then disregard any remaining undesirable risks. It will increase its level of activity (the number of rides) even when its private benefit from such an increase is lower than the harm it inflicts on the farmer.⁴⁸ Put differently, when the costs of care are the same per unit of activity, the first condition cannot be satisfied: such precautions cannot be unjustified for low activity but become cost-effective for high activity.

Consider now the second condition of *intermediate costs*. Insufficient activity may occur only when the cost of the precaution in the high activity level is neither "too high" nor "too low." Suppose first that this cost is "too low"—in the sense that the cost of taking care is lower than the party's extra benefit from engaging in the high activity level. In this case, it is in the party's own interest to set her activity at the high level and invest in the efficient precaution. To illustrate, consider again *Hypothetical 2*. Suppose that the cost of installing the spark arrester is only \$1. This cost is obviously lower than the benefit to the railroad of running ten (rather than five) rides. Operating rides six through ten increases the railroad's net benefit by \$145 ($\$50 + \$40 + \$30 + \$20 + \$10 - \$5 = \145, the revenues from these rides, minus the cost of \$1 to operate each). The railroad company would therefore install the spark arrester and run ten rides, rather than taking no precautions and operating just five rides. Here, where the cost of precaution is sufficiently low, the conventional literature's paradigm of *optimal care and excessive activity* reemerges. The company takes due care (it installs the spark arrester, which costs only \$1) but engages in a socially excessive activity level. Although it is socially desirable to operate only eight rides, the company will run all ten rides.⁴⁹

Now consider the situation where the cost of taking care in the high activity level is "too high"—in the sense that it is higher than the total social benefit from more activity and care. In such a case, the precaution is too expensive to render activity at the high level socially desirable. To illustrate,

48. Precautions requiring a fixed-cost investment, as noted, usually satisfy the first condition, but certainly are not the only precautions that may give rise to the risk of insufficient activity. Even if the overall cost of care increases with more activity, parties may deliberately restrict their activity level. To illustrate, consider again the polluting-factory hypothetical. Imagine that the cost of elevating the smokestack is \$120 in the low level (as it is in the original example) but increases to \$125 in the high activity level. It is still desirable in this case to have more activity and investment in precaution than low activity and no precaution ($\$1100 - \$125 > \$1000 - \110). Yet from the factory's perspective it is better to operate in the low level (and gain \$1000) rather than in the high level (where the benefit increases by \$100 but requires investment of \$125 in care). More generally, the first condition could be satisfied as long as the costs of care do not increase at the same rate as the level of activity.

49. Recall that once the spark arrester is installed, the social cost per ride is \$21 (\$20 expected harm + \$1 operation cost). Because the revenue from the ninth and tenth rides (\$20 and \$10, respectively) is below \$21, the operation of these rides diminishes social welfare.

assume that the cost of the spark arrester in *Hypothetical 2* is not \$201 but rather \$500. Assume further that the spark arrester can reduce the probability of fire to zero. For ease of exposition, suppose the railroad can run either five rides (low activity level) or ten rides (high activity level). At the high activity level, with ten rides, the expected harm is \$600 ($10 \cdot \60). With ten rides, therefore, the spark arrester becomes cost-effective ($\$600 > \500). Nevertheless, investment in the spark arrester and the operation of ten rides would not maximize social utility. While the spark arrester is cost-effective at the high activity level, its cost (\$500) outweighs the social benefit derived from additional activity and reduced harm. Recall that with five rides and absent a spark arrester, the expected harm is \$300 ($5 \cdot \60). Installing the spark arrester thus saves \$300 in the prevention of damage to crops. Recall also that the railroad's benefit from running ten rather than five rides is \$145 ($50 + 40 + 30 + 20 + 10 - 5$, the railroad's revenue from these five rides minus their operation costs). Thus, the total social benefit from installing the spark arrester and running the train ten rather than five times is \$445 ($\$300 + \145), which is smaller than the cost of installing the spark arrester ($\$445 < \500). As this example demonstrates, when the cost of the precaution is too high, the risk of insufficient activity and suboptimal care does not exist. Setting the activity at the low level (five rides) and avoiding investment in prevention (spark arrester) are socially desirable.

Determining whether the circumstances of a given case give rise to the risk of insufficient activity might appear somewhat complicated. Yet, according to an interesting corollary of the second condition, it is possible to provide a simple and useful rule of thumb that facilitates the identification of cases with the risk of such behavior. According to this rule of thumb, in all insufficient-activity cases, it must be that the harm caused by operating at the high level of activity (with the precaution) is smaller than the harm caused in the lower activity level (without the precaution). Recall that according to the second condition, the cost of the precaution at the high activity level must not be "too low." As explained, this cost must not be lower than the party's extra benefit from increasing her activity level. This means that from the *private* perspective of the party, increasing the level of activity and investing in the precaution is undesirable. For increased activity and caretaking to be nevertheless *socially* desirable, it must be that the harm caused by the high activity level (with the precaution) is smaller than the harm caused by the low activity level (without the precaution).⁵⁰ Only when

50. To illustrate, consider the result in *Hypothetical 2*, in which the optimal level of activity was operating 8 rides while installing the spark arrester. In this case, the expected harm was \$20 per ride (10 percent of \$200). Thus, at the higher level of activity of eight rides, the total expected harm equaled \$160 ($8 \cdot \20). Under the railroad company's actual lower activity level, however, expected harm was larger: the company operated only 5 rides without installing the spark arrester. Here, the expected harm per ride was \$60 (30 percent of \$200). With five rides, then, total expected harm equaled \$300 ($5 \cdot \60), as compared to only \$160 at the higher level of activity. Similarly, in the polluting-factory hypothetical, the discrepancy in the size of the harm was even more pronounced. In the high activity level with the precaution taken (a higher smokestack) there was no harm. In the low activity level, however, when the factory avoided elevating its smokestack, harm equaled \$110.

this condition is fulfilled will the party's low activity level be socially inefficient.⁵¹

C. *The Risk of Insufficient Activity in Practice*

This Section expands upon the actual risk of insufficient activity that exists under negligence-based regimes. It demonstrates how courts ignore the risk of insufficient activity when applying the Hand formula, and provides evidence from a related harm-prevention context to illustrate how parties limit their activity to escape a duty of care.

1. *Cost-Benefit Analysis in Negligence Cases*

Although courts often apply economic reasoning to determine liability, they have nevertheless overlooked parties' possible incentives to restrict their activity below the socially desirable level. This disregard is particularly evident in contexts where the costs of precaution are fixed. As the above analysis has shown, because fixed-cost precautions are often inefficient at low activity levels but cost-effective at high activity levels, a likely scenario where the problem of insufficient activity levels may develop is when the costs of care include a fixed-cost investment. The following cases, all of which involve fixed-cost precautions, demonstrate courts' lack of appreciation of the risk of insufficient activity.

In *Donovan v. Castle & Cooke Foods*,⁵² the defendant—a producer of cans—was sued for failing to properly protect its employees from exposure to harmful noise levels.⁵³ Specifically, the defendant merely provided its employees with ear plugs, while the plaintiff claimed that noise insulation of the factory's equipment would have been more effective in protecting the

51. To see more formally how this conclusion is derived, denote the extra benefit the party makes when preferring the high rather than the low level of activity as U , the cost of the precaution required at the high activity level as F , the harm in the low activity level without the precaution as $H(low)$ and the harm in the high activity level with the precaution as $H(high)$. In order for the party to prefer engaging in the low activity level without taking care to engaging in the high activity level and taking care, it must be that $U < F$ (the party's extra benefit from engaging in the high activity level is smaller than the cost of taking care). This corresponds to the first prong of the second condition, that the cost of taking care not be "too low." On the other hand, for such behavior to be socially inferior it must be that social welfare in the high activity level (with the precaution) is higher than social welfare in the low activity level (without the precaution), that is: $U - H(high) - F > [-H(low)]$. This corresponds to the second prong of the second condition, namely, that the cost of taking care not be "too high." Combining these two conditions and rearranging terms gives: $U < F < U + H(low) - H(high)$. If this condition is satisfied, it must be the case that its right hand side is larger than its left hand side. This, in turn, implies that $H(low) - H(high) > 0$; that is, the harm in the low level of activity (without the precaution) is larger than the harm in the high level of activity (with the precaution).

52. 692 F.2d 641 (9th Cir. 1982).

53. The regulations in question—requiring "employers to install feasible engineering or administrative controls to protect employees from exposure to harmful noise levels"—had been promulgated pursuant to the Occupational Safety and Health Act, 29 U.S.C. §§ 651–678 (1982) quoted in *Donovan*, 692 F.2d at 643.

workers.⁵⁴ After conducting a thorough cost-benefit analysis, the Ninth Circuit ruled in favor of the defendant. It concluded that given the large investment required for noise insulation as compared to the benefit it could provide to the factory's existing workforce, such investment was not cost justified.⁵⁵

In *Spagnulo v. Commonwealth Department of Environmental Management*,⁵⁶ the plaintiff had been injured when falling off a set of bleachers located at a hockey rink owned by the defendants. The plaintiff claimed that defendants were reckless in failing to install safety railings around the bleachers.⁵⁷ Applying the Hand formula, the court compared the costs and benefits of such precaution and accepted defendants' motion for summary judgment.⁵⁸ As the court explained, the expected harm did not justify investment in the railings.

The plaintiff in *Manning v. Nobile*⁵⁹—a driver who consumed a substantial amount of alcohol at a party in a Marriott hotel—was injured after his car struck a tree. The plaintiff claimed that Marriott was reckless in failing to assign a bartender to the party.⁶⁰ The court dismissed this claim, holding that the party did not involve a “‘high degree of probability . . . [of] substantial harm’ required to prove wilful, wanton, or reckless conduct.”⁶¹ Although a bartender would have probably prevented the excessive consumption of alcohol, the court was not convinced that assigning a bartender to the party was cost justified.⁶²

In these decisions, the courts assessed the reasonableness of the injurer's behavior according to a cost-benefit analysis that ignores the risk of insufficient activity. The courts examined whether the injurer's omitted fixed-cost precaution was efficient in light of the expected harm resulting from the party's actual level of activity. They failed to consider, however, whether an increase in the injurer's activity level coupled with caretaking would have been socially superior.⁶³ By focusing only on the existing activity level, courts may allow parties to avoid desirable precaution by restricting the intensity of their conduct. For example, the hotel in the *Manning* case might have limited the size of parties taking place on its premises so as to avoid the increased chances of an accident and therefore the attendant need to hire

54. *Id.* at 643–44.

55. *Id.* at 650.

56. No. 2003191, 2006 WL 1238671 (Mass. Super. Ct., Mar. 15, 2006).

57. *Spagnulo*, 2006 WL 1238671, at *1.

58. *See id.* at *6.

59. 582 N.E.2d 942 (Mass. 1991).

60. *Manning*, 582 N.E.2d at 945–46.

61. *Id.* at 947 (quoting *Desmond v. Boston Elevated Ry. Co.*, 64 N.E.2d 357, 359 (Mass. 1946)).

62. *See id.* at 948–49.

63. For discussion concerning courts' ability to determine whether parties' activity is at the socially desirable level, see *infra* text accompanying notes 69–79.

bartenders. Yet larger parties with bartenders may well be more socially desirable (involving a lower risk of harm) than small parties in which alcohol is consumed without control. Similarly, in both the *Donovan* and *Spagnulo* cases, social-welfare maximization might have required the injurer to increase its activity as well as its care level. In *Donovan*, insulating the factory's equipment could have become efficient had the number of the factory's employees been larger. Likewise, the efficiency of railings in *Spagnulo* was dependent on the number of spectators. Determining liability in these cases on the basis of the defendants' actual activity could thus encourage inefficient behavior. Factories may limit their workforce to avoid precaution, even when a larger workforce accompanied by more extensive care is socially desirable. In the same vein, the owners of hockey rinks may undesirably restrict the number of spectators (by limiting the size of the rink and the number of shows)—to escape the duty to invest in efficient safety measures.

2. Regulatory Thresholds and Strategic Activity Levels

Are parties—subject to a negligence standard—likely to strategically limit their activity levels? While tort scholarship has generally disregarded this possibility, evidence of parties' behavior in a related harm-prevention context suggests that this risk is real. Studies have shown that parties faced with threshold-based regulation often limit their activity to the threshold to avoid making investments in precaution. As these studies demonstrate, parties strategically adjust their activity levels to reduce the costs of care.

Safety and environmental regulations often condition the imposition of duties to invest in precaution on whether parties' activity exceeds a certain threshold.⁶⁴ Consider, for example, regulation that requires installation of sprinklers if the number of seats in a classroom is greater than ten. As opposed to tort liability, which depends on courts' *ex post* evaluation of whether parties' conduct was reasonable, regulatory thresholds allow policy makers to provide clear requirements concerning investments in care. By setting this ten-seat minimum, the regulator determines the circumstances that make investments in sprinklers socially desirable.⁶⁵ Most importantly, such regulation is not intended to induce parties to set their activity at any particular level. In our example, the regulation is not designed to induce schools to favor small classrooms (fewer than ten seats) over large classrooms (more than ten seats) but rather it serves as a guideline as to whether sprinklers should be installed.

Empirical studies, however, have shown that the existence of such thresholds nevertheless affects parties' choices regarding their activity levels. Because investments in care are costly and can outweigh the profits

64. See, e.g., John Watts, Comment, *Reconciling Environmental Protection with the Need for Certainty: Significance Thresholds for CEQA*, 22 *ECOLOGICAL L.Q.* 213, 254–58 (1995).

65. See *id.* (discussing the advantage of threshold-based regulation in providing clear guidance and reducing the costs of compliance).

from greater activity, self-interested parties have responded to such regulation by limiting their activity to a level below the threshold. For example, a recent report regarding the use of hazardous materials in Massachusetts concluded “that firms appear to be strategically reducing toxic chemical use below threshold amounts rather than reducing releases overall.”⁶⁶ As this study suggests, firms have limited their activity levels to avoid application of the relevant regulation. Researchers have documented such behavior in other areas as well. For example, studies covering several U.S. states have shown that safety and environmental regulation of construction projects involving acreage-based thresholds has induced similar strategic conduct and “projects are frequently designed so as to just barely avoid the threshold.”⁶⁷

At first blush, a negligence-based standard appears to overcome the risk of such strategic conduct, as it does not involve any fixed thresholds. The Hand formula weighs the costs and benefits of the contested conduct without presupposing a certain minimum activity level above which precaution becomes desirable. However, as the preceding analysis has demonstrated, the risk of strategic reduction of activity levels also exists when the applicable rule is negligence. The evidence regarding parties’ deliberate curtailment of activity levels in the context of regulatory thresholds demonstrates how parties are likely to apply a similar strategy when subject to negligence. By reducing their activity below the optimal level, parties would be able to avoid socially desirable investments in care.

The risk of parties intentionally setting their activity level just below the prescribed limit has led policymakers to question the desirability of fixed-threshold regulation.⁶⁸ The next Part shows that in the context of negligence, the legal system can successfully reduce the risk of such strategic conduct.

III. INDUCING OPTIMAL PREVENTION AND MINIMIZING THE LOSS FROM INSUFFICIENT ACTIVITY LEVELS

This Part discusses three strategies that courts, regulators, and legislatures—depending on the level of information available to them—can apply in addressing this risk. The following discussion shows that extension of the accepted basis of liability for negligent behavior, the implementation of certain forms of regulation, and the proper selection of liability regimes can effectively remove parties’ incentives to restrict their engagement in desirable activities.

66. Michael P. Vandenbergh, *The Private Life of Public Law*, 105 COLUM. L. REV. 2029, 2061 n.141 (2005); see also Richard B. Stewart, *Environmental Regulation and International Competitiveness*, 102 YALE L.J. 2039, 2063 n.103 (1993) (“[C]orporate officials have told this author that, given air pollution control and other environmental requirements and liabilities . . . a steel galvanizing line at a steel plant was reconfigured solely in order to bring emissions just below the level that would trigger new source review under the Clean Air Act.”).

67. Watts, *supra* note 64, at 245.

68. *Id.* at 244–50 (describing the risk of strategic behavior and states’ attempts to eliminate it).

A. Applying the Negligence Standard to Insufficient Activity

Tort law may discourage parties from undesirably restricting their activity levels by imposing liability for insufficient activity. Section III.A.1 makes the case for the introduction of such liability. It demonstrates that in cases where courts possess sufficient information regarding precautions' efficiency they can deter parties from strategically limiting their activity. Section III.A.2 addresses possible objections.

1. Liability for Insufficient Activity

Under the current application of the Hand formula, parties are liable only for failures to invest in cost-justified precautions. This practice, however, allows self-interested parties to avoid efficient investments in prevention by restricting their activity. To discourage such behavior, where parties strategically limit their activity level, negligence liability should be extended to failures to invest in precautions whose cost is higher than their benefit in reducing the expected harm. More specifically, such liability is required when the previously discussed conditions are met, namely, that parties' untaken precautions are inefficient at low activity levels but become cost justified and socially optimal at higher levels. Making parties liable in such cases would eliminate the benefits they may derive from engaging insufficiently in the activity. Once liable for the harm, parties' payoff under the low activity level would be smaller than their payoff under the high activity level. For example, consider again the polluting-factory hypothetical. Recall that in the low activity level, the factory's profit and neighbors' harm equal \$1000 and \$110, respectively, compared to a profit of \$1100 and \$130 harm in the high activity level. Finding the factory negligent for failing to elevate the smokestack at a cost of \$120—irrespective of the factory's actual activity level—will remove its incentives to undesirably restrict production. Under this new form of negligence, operating at the low activity level without elevating the smokestack will provide the factory a net benefit of \$890 (\$1000 – \$110), since it would be liable for the harm of \$110. In contrast, producing at the high level with optimal precaution (a higher smokestack) allows the factory a net benefit of \$980. The factory would thus be induced to adopt efficient levels of both care and activity.

Determining liability for insufficient activity mandates that courts investigate whether higher activity levels are socially desirable. As already noted, the costs required for obtaining the information necessary for such an inquiry might be prohibitive. Nevertheless, in some areas courts appear to be able to make such decisions at a reasonable cost. As scholars have shown, “[d]espite [the] distinction between activity levels and due care, there are cases in which courts do take the costs and benefits of the activity into consideration.”⁶⁹ For example, in negligence and nuisance disputes involving

69. Howard Latin, *Activity Levels, Due Care, and Selective Realism in Economic Analysis of Tort Law*, 39 RUTGERS L. REV. 487, 505 (1987); see also Stephen G. Gilles, *Rule-based Negligence*

claims for unreasonable interference with the use and enjoyment of land, judges often examine not only parties' investments in care but also whether changes in their activity levels could cost-effectively reduce the expected harm.⁷⁰ Such cases indicate that, at least with certain types of behavior, courts may determine the efficiency of parties' activity levels.

Consider, for illustration, the recent decision in *Esposito v. New Britain Baseball Club, Inc.*⁷¹ In this case, the plaintiffs resided near a baseball field in which fireworks displays were conducted each Friday night throughout the spring and summer. The residents suffered from the noise, smell, and smoke of the fireworks.⁷² The court acknowledged that the organizers of the fireworks had taken all of the possible cost-effective precautions.⁷³ Nevertheless, the court continued to examine the reasonableness of the defendants' level of activity. As the court put it, "[t]he one feasible precaution to avoid unnecessary interference that the defendants have not embraced is a reduction of shows."⁷⁴ In deciding on the reasonable number of shows, the court conducted a cost-benefit analysis of the defendant's level of activity:

Balancing the interests involved under the circumstances of the present case, the court concludes that the severity of the interference, as it currently exists, outweighs the benefits of the interfering use which is, fundamentally, a profitmaking enterprise that provides entertainment. While the court recognizes and applauds the social utility of that business to the city, it is not sufficient to justify the extent to which these individual plaintiffs have suffered and will suffer the loss of the use and enjoyment of their property during the baseball season if the fireworks proceed as planned.⁷⁵

Accordingly, as the court ordered, "[A]ssuming that . . . the other precautions . . . remain in effect, the defendants are hereby ordered to reduce the number of shows during the season to one time each month [rather than once a week]."⁷⁶

The *Esposito* case and similar decisions thus demonstrate how courts are sometimes capable of identifying the costs and benefits of parties' different

and the Regulation of Activity Levels, 21 J. LEGAL STUD. 319, 334 (1992) (arguing that where parties' activity level is clearly above the norm, courts would probably apply the negligence standard).

70. See, e.g., LANDES & POSNER, *supra* note 5, at 70–71 ("The nuisance standard illustrates the common law's awareness that when the . . . amount of activity is an important factor in bringing about the right level of damage, it should be part of the legal standard."); Gilles, *supra* note 69, at 334 ("Certainly this is true in nuisance law, where courts frequently consider whether a defendant should be ordered to reduce the scale or frequency of his or her activities to abate the nuisance.").

71. 895 A.2d 291 (Conn. Super. Ct. 2005).

72. *Esposito*, 895 A.2d at 300–01.

73. *Id.*

74. *Id.* at 301.

75. *Id.* at 302.

76. *Id.* at 303. The court also awarded the plaintiffs damages of \$100 per resident. *Id.* at 304.

activity levels.⁷⁷ In this respect, the conventional assumption that courts tend to disregard activity levels when evaluating reasonable behavior has important exceptions. Yet, cases in which courts currently explore the efficiency of activity levels focus only on the risk of *excessive* activity. As in the *Esposito* case, courts usually compare the defendant's expected costs in reducing the intensity of his activity with the plaintiff's benefits from such reduction. Courts' decisions in favor of victims reflect a determination that the injurers' actual level of activity is beyond the socially desirable level.

Courts' rulings regarding excessive activity levels suggest they could also identify harms that result from *insufficient* activity levels. Such identification requires courts to apply the same type of analysis they have long been applying in *Esposito*-like cases, only in the opposite direction. In those contexts where evaluation of activity levels is feasible, courts should inquire not only if less activity is desirable but also whether more activity (along with additional precaution) could cost-effectively mitigate the alleged harm. The preceding discussion concerning the conditions under which the risk of insufficient activity levels may emerge indicates where this inquiry is most relevant. Courts should especially look for insufficient activity levels when parties' untaken precautions are inefficient for low activity but become cost-effective for high activity. Within such cases, courts should follow the above-mentioned rule of thumb and focus on instances in which higher activity and care would reduce expected harm.

In fact, cases involving liability for insufficient activity are in some important respects easier to litigate than excessive-activity cases. A victim seeking a remedy for negligent behavior must prove not only that the injurer's behavior was socially undesirable but also the existence of cause-in-fact. In the context of excessive activity levels, showing factual causation between the injurer's negligent behavior and the harm is often complicated. Thus parties who suffer harm from injurers' excessive conduct avoid filing claims even where courts could determine the inefficiency of injurers' level of activity. In contrast, in claims of insufficient activity the demonstration of causation would usually be easier. Accordingly, claims based on the suggested new doctrine would generally be more likely to succeed in court.

To illustrate the complexity of the causation requirement in excessive-activity claims, imagine a pedestrian who is hit by a train. Assume that the train was operated with due care and that the pedestrian seeks compensation, claiming that the railroad's activity level (the number of trains) is excessive. Scholars have explained thusly:

77. See, e.g., *Pestey v. Cushman*, 788 A.2d 496, 507 (Conn. 2002) ("Whether the interference is unreasonable depends upon a balancing of the interests involved under the circumstances of each individual case . . . including the nature of both the interfering use and the use and enjoyment invaded, the nature, extent and duration of the interference . . ." (emphasis added)); John L. Giesser, Comment, *The National Park Service and External Development: Addressing Park Boundary-Area Threats Through Public Nuisance*, 20 B.C. ENVTL. AFF. L. REV. 761, 781 (1993) ("Another important component of unreasonableness is a defendant's failure to mitigate harm. Courts might expect defendants to reduce the possibility of injury by . . . reducing their activity's level of interference.").

Even if the plaintiff thought the court could be convinced that the railroad was running too many trains, the plaintiff would gain nothing unless he or she could also show that the train that did the damage was one of those that should have been eliminated, rather than one of those that should have been retained. That will be difficult (sometimes impossible) to do.⁷⁸

The difficulties in identifying the exact harms that result from the excessive part of the behavior (rather than from the legitimate part of the behavior) thus usually make lawsuits for excessive activity levels especially costly.

Determining causation in the case of insufficient-activity claims would often involve no such complication. Like in conventional tort lawsuits, such claims require investigating whether investment in untaken precautions by the alleged negligent party (the party whose activity level is claimed to be too low) would have likely prevented the harm. In this respect, the activity level of the alleged negligent party is important only to determine whether his behavior is unreasonable. Once this element is proven, however, it has no bearing on the question of cause-in-fact. Consider, for example, the polluting-factory hypothetical. Proving the factory's negligence requires exploring the costs and benefits of different activity levels and the efficiency of raising the smokestack. Yet, once the neighbors show that higher production by the factory and investment in elevating the smokestack are socially desirable, the question of causation is straightforward. It requires deciding whether the harm (pollution) would not have occurred if precaution (a higher smokestack) were taken. Because no pollution would have occurred with the elevated smokestack in place, the cause-in-fact requirement is clearly satisfied.⁷⁹

2. *Objections: Liability for Nonfeasance and Parties' Autonomy*

Finding parties negligent for failing to increase their activity levels might nevertheless appear objectionable for two related reasons. First, from a doctrinal perspective, one may argue that parties' decision not to further engage in their activity constitutes *nonfeasance* (inaction), and as a general

78. Gilles, *supra* note 69, at 333; see also Mark Geistfeld, *Should Enterprise Liability Replace the Rule of Strict Liability for Abnormally Dangerous Activities?*, 45 UCLA L. REV. 611, 634 n.82 (1998) ("Even if the plaintiff could prove that the . . . delivery trucks were driven for too many miles, the cause-in-fact problem would be insurmountable, as the plaintiff could not show that the injury would have been avoided had the truck driven less miles over the course of a year.").

79. To be sure, in cases where optimal investment in precaution does not *entirely* remove the risk of harm, proving causation may present some difficulty in either excessive- or insufficient-activity claims (and in fact in any tort claim where optimal precaution does not reduce the risk of harm to zero). In such cases, the victim cannot *conclusively* show that her injury would not have occurred had the injurer invested in efficient precaution given that some harm materializes even under optimal caretaking. In the farmer-railroad context, for example, recall that even with the spark arrester installed, a 10 percent risk of fire still exists. Consequently, when fire occurs absent a spark arrester, it may be difficult for the farmer to show that fire would not have occurred to his particular field if a spark arrester were in place. Yet, while this causation problem plagues excessive-activity claims, it does not arise in insufficient-activity claims in which additional activity and care would have eliminated the risk of harm (as in the polluting-plant hypothetical).

rule, liability is primarily reserved for *misfeasance* (action).⁸⁰ Second, as a matter of principle, requiring parties to increase their activity would undermine their autonomy. According to this claim, parties should be free in determining the degree to which they wish to engage in their conduct.

Regarding the first argument, classifying a failure to set an activity at the socially desirable level as *nonfeasance* is conceptually wrong. As courts and scholars have emphasized, the benchmark regarding the nonfeasance–misfeasance distinction is “defendant’s participation [or lack thereof] in the creation of the risk.”⁸¹ If the risk of harm was formed without the injurer’s participation, a failure on the part of the injurer to neutralize this risk constitutes *nonfeasance*; in contrast, if the injurer took part in the creation of the risk, his behavior constitutes *misfeasance*. This distinction highlights the difference between a defendant who failed to extend help to a drowning swimmer (defendant is not liable), and a defendant who drove at a reasonable speed but neglected to apply the car’s brakes (defendant is liable).⁸² While in both cases the injurer failed to take a positive measure (assisting the swimmer/pressing down on the brakes), only the former is considered a negligent inaction. In the car accident case, since the injurer was involved in the creation of the risk (driving the car), his neglect to prevent the harm constitutes a negligent *action*.⁸³ Applying this analysis to our polluting-factory example (as well as to the railroad–farmer hypothetical), the defendant directly participated in the formation of the risk, as it is the plant’s production process that exposed its neighbors to pollution. Therefore, from a doctrinal perspective, the plant’s failure to eliminate the harm constitutes misfeasance rather than nonfeasance.

As for the second claim, a duty mandating adjustment of one’s activity level is not qualitatively different than a duty mandating greater precautions. Both duties restrict defendants’ autonomy by requiring them to make investments aimed at reducing the expected loss when harm prevention is desirable. Furthermore, the imposition of liability for insufficient activity does not compel injurers to perform their activity at a certain level. Injurers are still free to engage in their activity to the extent that they wish; rather,

80. See generally W. PAGE KEETON ET AL., PROSSER AND KEETON ON TORTS § 56, at 373 (5th ed. 1984) (discussing the different treatment of actions and inactions under negligence); Jean Elting Rowe & Theodore Silver, *The Jurisprudence of Action and Inaction in the Law of Tort: Solving the Puzzle of Nonfeasance and Misfeasance from the Fifteenth Through the Twentieth Centuries*, 33 DUQ. L. REV. 807, 807–49 (1995) (presenting the implications of the nonfeasance–misfeasance distinction in the common law and in modern torts adjudication).

81. Ernest J. Weinrib, *The Case for a Duty to Rescue*, 90 YALE L.J. 247, 255 (1980) (emphasis added); see also RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL HARM § 37 cmt. a (Proposed Final Draft No. 1, 2005) (explaining that the difference between nonfeasance and misfeasance is the distinction between “active risk creation and passive failure to act in the face of a danger that was not the doing of the actor”). For a line of cases applying this benchmark, see *id.* § 37, Reporters’ Note, cmt. a.

82. Weinrib, *supra* note 81, at 253; see also, e.g., Harold F. McNiece & John V. Thornton, *Affirmative Duties in Tort*, 58 YALE L.J. 1272, 1272–73 (1949) (discussing the case of a driver’s neglect to apply the brakes in his car and other cases that may appear as inaction rather than action).

83. McNiece & Thornton, *supra* note 82, at 1272–73 (describing the failure of a driver to apply his car’s brakes as a negligent action); Weinrib, *supra* note 81, at 253 (same).

this form of liability only makes injurers bear the true costs of their conduct. The standard of reasonable behavior (the Hand formula) allows injurers to inflict harm on victims without compensation as long as their activity provides greater social benefits than social costs.⁸⁴ When parties limit their activity to avoid a duty to invest in cost-justified precautions, it is precisely the idea of negligence (enhancement of social welfare) that calls for the imposition of liability.⁸⁵

By extending the conventional basis of negligence, tort law may thus decrease the risk of suboptimal care and insufficient activity levels. Given the absence of the cause-in-fact obstacle, and by focusing on cases involving the conditions under which the risk is most likely, courts may discourage parties from reducing their activity level to avoid investments in efficient precautions. Still, because of the limited information they may have, courts are likely to provide only a partial solution. As the next Section shows, regulation of parties' behavior can supplement the tort system and provide incentives for optimal prevention.

B. Regulations and Efficient Activity Levels

Regulation often imposes substantial constraints on the extent to which parties may engage in certain behavior.⁸⁶ Such regulation-based constraints may involve several forms, many of which result in placing a cap on parties' level of activity. For example, in the context of potential nuisance activities, regulation often controls the expected harm by imposing limits that restrict the duration and frequency of such activities.⁸⁷ Regulations addressing the extent to which parties may engage in harm-inflicting activities are com-

84. See *supra*, notes 13–14 and accompanying text (presenting the Hand formula and its focus on social-welfare maximization).

85. The Proposed Final Draft of the Restatement endorses the balancing approach, stating that “[t]he balancing approach [endorsed by the negligence standard] rests on and expresses a simple idea. Conduct is negligent if its disadvantages outweigh its advantages, while conduct is not negligent if its advantages outweigh its disadvantages.” RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL HARM § 3 (Proposed Final Draft No. 1, 2005).

86. See, e.g., Lee Anne Fennell, *Property and Half-Torts*, 116 YALE L.J. 1400, 1462 (2007) (“[R]egulation” is often equated with a command-and-control approach that operates directly to . . . limit activities . . .”). Concrete illustrations of this include proposed federal legislation allowing regulatory agencies to limit the activity of coal mines, see Tyler L. Weidlich, Note, *The Mining Law Continuum—Is There a Contemporary Prospect for Reform?*, 44 BRANDEIS L.J. 951, 974–75 (2006); and regulations that limit timber production, see Thane D. Somerville, Comment, *King County, Washington Ordinance 15053: Is “The Most Restrictive Land-Use Law In The Nation” Constitutional?*, 36 ENVTL. L. 257, 282 n.177 (2006).

87. See, e.g., Stuart A. Laven, *Turn Down the Volume: The Constitutionality of Ohio’s Municipal Ordinances Regulating Sound from Car Stereo Systems*, 51 CLEV. ST. L. REV. 1, 38 (2004) (describing an unconstitutional ordinance that limited the hours a facility may make noise); Betsy H. Sochar, Comment, *Shining the Light on Greyfields: A Wal-Mart Case Study on Preventing Abandonment of Big Box Stores Through Land Use Regulations*, 71 ALB. L. REV. 697, 725–27 (2008) (describing zoning regulations that limit the number and size of abandoned retail stores, restrict store size, promote reuse of older stores, and limit their hours of operation).

monly set in addition to tort liability.⁸⁸ As noted, legal scholarship has argued that this combination of liability and regulation creates an effective division of labor.⁸⁹ Courts, through the rules of tort law, impose liability for failures to invest in cost-effective precaution. Legislatures, by setting regulations that restrict the extent to which parties could engage in their conduct, induce efficient levels of activity.

This division of labor, however, is likely to result in efficient harm prevention only if one focuses on the conventional concern regarding excessive activity levels. It assumes that negligence regimes create incentives for optimal precautions and that regulation assures that, once such precautions are taken, parties will not overengage in their activities. Yet, as the preceding analysis has shown, parties subject to negligence standards may strategically limit their activity and avoid efficient investments in care. In such cases, the combination of reasonable-behavior standards and maximum-activity regulation cannot induce efficient prevention. More specifically, the overlooked paradigm of insufficient activity sheds new light both on the proper use of regulation and on its desirable format.

Consider initially the question of when regulation is required. Tort scholarship's conventional theory for the use of regulation in the context of activity levels has highlighted the risk that parties may set their activity beyond the socially desirable level. Most importantly, it has assumed that where excessive activity levels are unlikely, the tort system in and of itself is sufficient to induce parties to efficiently minimize the expected harm.⁹⁰ Yet, as shown above, this assumption is false. Even in contexts where the risk of excessive activity does not exist, tort liability may encourage parties to adopt insufficient activity levels. This overlooked risk therefore provides a new justification for the application of regulation in cases in which it has been so far perceived as unnecessary. Subjecting parties to regulation might be required to discourage not only excessive but also insufficient activity.

The risk of insufficient activity similarly bears on the proper design of regulations addressing activity levels. As noted, such regulations often impose restrictions aimed at limiting parties' activity. Maximum-activity regulations, however, are effective only if parties' possible incentives are to

88. Patrick W. Schmitz, *On the joint use of liability and safety regulation*, 20 INT'L REV. L. & ECON. 371, 371 (2000) ("[T]he phenomenon of complementary use of liability and regulation is widespread in practice.").

89. See *supra* notes 31–32. Besides the care-activity context, scholars have shown that the combination of liability and regulation can provide additional benefits. See, e.g., Paul Burrows, *Combining Regulation and Legal Liability for the Control of External Costs*, 19 INT'L REV. L. & ECON. 227 (1999) (examining the efficiency of the simultaneous application of regulation and liability); Charles D. Kolstad et al., *Ex Post Liability for Harm vs. Ex Ante Safety Regulation: Substitutes or Complements?*, 80 AM. ECON. REV. 888 (1990) (proposing as optimal a mix of ex ante regulation and ex post liability). For a more general analysis of the relation between ex ante regulation and ex post liability rules, see Steven Shavell, *Liability for Harm versus Regulation of Safety*, 13 J. LEGAL STUD. 357 (1984), who analyzes the general economic determinants of the relative advantageousness of liability and regulation and argues that observed use of the two is generally desirable. See also Susan Rose-Ackerman, *Regulation and the Law of Torts*, 81 AM. ECON. REV. 54, 55 (1991) (arguing that tort liability can serve as a complement to statutory regulation).

90. See *supra* text accompanying note 36.

overengage in their activity. By contrast, such regulations cannot resolve the opposite incentives that parties may have to restrict their activity and avoid desirable precaution. To discourage insufficient activity, rather than limiting parties' activity levels, regulation can require compliance with prespecified safety standards. This type of regulation could induce not only optimal care-taking but also efficient levels of activity. For example, in the context of pollution, maximum-activity regulation will avoid overproduction but not underproduction. As the polluting-plant hypothetical demonstrates, possible inefficient behavior may involve not too much, but rather too little activity. Maximum-activity regulation will thus not be effective in removing the factory's incentives to underproduce. By contrast, regulation requiring the installation of elevated smokestacks would render production at the low level unprofitable for the plant. Since the factory must invest \$120 in prevention (an elevated smokestack), it is better off producing at the high activity level (profit of \$1100) than at the low level (profit of only \$1000). The insufficient-activity paradigm therefore could justify the imposition of safety standards on a party even when their costs seem unjustifiable by their benefits (given the party's existing activity level).

A second way regulation could address the problem of insufficient activity is a limitation on the *harm* caused by potential injurers. Returning to the polluting-plant hypothetical, suppose a regulator requires the plant to eliminate the pollution it causes to nearby residents. To abide by such regulation, the plant has no choice but to elevate its smokestack. Once it had already invested in elevating the smokestack, strategic reduction of its production would no longer be profitable to the plant.

This virtue of maximum-harm regulation can justify a highly contested interpretation the Supreme Court has given in the context of environmental protection. In *American Textile Manufacturers Institute, Inc. v. Donovan*,⁹¹ the Supreme Court held that employers in the cotton industry must invest in precautions ensuring "that no employee will suffer material impairment of health" due to cotton dust.⁹² It was held that an employer could not be relieved from investing in a precaution that reduces potential harm to these prespecified levels even if it showed that its costs of taking care outweigh the benefit to employees (given the plant's level of activity).⁹³ The cost-benefit analysis, it was held, had already been made by Congress when it defined the maximum-harm standard.⁹⁴ This decision has been heavily criticized on account of its alleged lack of economic reasoning.⁹⁵ Over the last

91. 452 U.S. 490 (1981).

92. *Donovan*, 452 U.S. at 509.

93. *Id.*

94. *See id.* at 509, 530 n.55 ("The agency concluded that its Standard is feasible because 'compliance with [it] is well within the financial capability of the covered industries.' . . . We take these findings to mean . . . that '[a]t bottom, the Secretary must [and did] determine that the industry will maintain long-term profitability and competitiveness.'" (citation omitted)).

95. *See* John H. Bruno II, Comment, *American Textile Manufacturers Institute, Inc. v. Donovan: Cost Benefit Will Survive Exposure to Cotton Dust*, 17 NEW ENG. L. REV. 1345, 1370 (1981) ("Indeed, the holding in *American Textile* could produce a series of economically unsound

two decades, repeated attempts to overturn this ruling have been made so that firms could be relieved of the duty to invest in a precaution if its cost outweighs its benefits.⁹⁶

A new case recently decided by the Supreme Court, *Entergy Corporation v. Riverkeeper*, has reinforced this ongoing debate.⁹⁷ The controversy in *Entergy* surrounded a provision of the Clean Water Act that applies to power plants' use of "cooling water" (water drawn from rivers or lakes and used to absorb heat generated by power plants). Both the intake of the water and its outflow can cause environmental harm. Section 316(b) of the Act provides that the design of structures used for cooling water must "reflect the best technology available for minimizing adverse environmental impact."⁹⁸ While the Environmental Protection Agency has been of the view that a plant could be relieved from investing in a precaution if its cost was significantly greater than the environmental benefits, the Court of Appeals for the Second Circuit ruled that the statute barred the agency from engaging in this type of a cost-benefit analysis.⁹⁹ On appeal, the Solicitor General criticized this decision and supported the industry's claim for a plant-specific cost-benefit determination.¹⁰⁰ In their amicus curiae brief, some of the nation's top economists and legal academics have backed the Solicitor General's appeal.¹⁰¹ In a divided opinion, the Supreme Court eventually reversed the Second Circuit's ruling and held that the EPA may conduct a site-specific cost-benefit analysis.¹⁰²

This Article shows that the Supreme Court in *American Textile* and the dissenting opinion in *Riverkeeper*, which support regulation imposing maximum-harm standards, may actually have it right. A plant-specific cost-benefit evaluation could produce socially inefficient outcomes, as plants might reduce their level of activity to socially inefficient levels so as to avoid the need to invest in efficient precautions. To this extent, to support their argument, the proponents of a site-specific cost-benefit analysis must show that in the contexts of the conduct under consideration, insufficient activity levels are unlikely.

regulations through OSHA rulemaking."); Sandra Salmans, *Cotton Industry Upset by Ruling*, N.Y. TIMES, June 18, 1981, at D5 (quoting industry representatives and Reagan Administration officials, who defended the application of plant-specific cost-benefit analysis as "an important element in achieving rational and cost-effective rulemaking").

96. See Linda Greenhouse, *Court Sets Fall Debate on Standards of Water Act*, N.Y. TIMES, April 15, 2008, at A14.

97. *Riverkeeper, Inc. v. U.S. EPA*, 475 F.3d 83 (2d Cir. 2007), *rev'd sub nom.* *Entergy Corp. v. Riverkeeper, Inc.*, 129 S. Ct. 1498 (2009).

98. Clean Water Act § 316(b), 33 U.S.C. § 1326(b) (2006).

99. *Riverkeeper, Inc.*, 475 F.3d at 102.

100. See Greenhouse, *supra* note 96.

101. See Brief for AEI Center for Regulatory and Market Studies and 33 Individual Economists as Amici Curiae Supporting Petitioners, *Entergy Corp.*, 129 S. Ct. 1498 (No. 07-588) (supporting EPA's case-by-case cost-benefit analysis). The brief argued that "[a]s economists, we believe that the Second Circuit's ruling . . . is economically unsound." *Id.* at *5.

102. 129 S. Ct. at 1510.

These two alternatives—regulations imposing prespecified safety standards and maximum-harm regulations—allow legislatures flexibility in tailoring the form of regulation according to the characteristics of the particular circumstance.¹⁰³ In some cases, it is easier for the regulator to monitor parties' caretaking, while in other cases monitoring the harm they inflict is more feasible. Enforcement of safety standards, for example, could be particularly costly when the regulated activity involves a large number of production lines and processes that need to be inspected.¹⁰⁴ In such cases, monitoring of the harm inflicted by the plant could be more feasible. Conversely, when a plant utilizes only a single production line but inflicts harm through numerous outlets, monitoring of safety measures could be easier than constantly measuring the level of harm.¹⁰⁵

Inducing optimal activity through regulation—whether of safety standards or in the form of maximum-harm requirements—mandates knowledge concerning the efficiency of activity levels and possible precautions. Although legislatures are often better at collecting data than the courts, budgetary constraints limit their information-gathering capabilities. Therefore, while regulation can serve to induce optimal harm prevention in various contexts, it cannot entirely resolve the problem of insufficient activity and suboptimal care.

C. Insufficient Activity: Negligence v. Strict Liability Reconsidered

Tort scholarship has claimed that even absent detailed information, the legal system can diminish the loss from inefficient activity by appropriately choosing between the various forms of liability. This scholarship, focusing on the risk of excessive activity, has proposed policy guidelines as to the choice between negligence and strict liability. This Section extends the traditional analysis to address the risk of insufficient activity and reassesses these guidelines. It shows that once the problem of insufficient activity is

103. While both types of regulation can eliminate the risk of insufficient activity, both involve relative advantages and shortcomings. Consider initially maximum-harm regulations. First, if the permissible level of harm is high, parties would still be able to limit their activity—keeping harm below the threshold—and avoid investment in desirable precaution. Second, if it applies too broadly, it may prevent parties from engaging in risky activity even when such activity is socially desirable. Maximum-harm regulation, however, has two advantages that are absent in safety standards. First, maximum-harm regulation—which grants potential injurers discretion concerning what precaution to apply—harnesses firms' superior information regarding the types of technologies that could effectively reduce harm and stimulates them to invest in improving such technologies. Second, with safety standards, the risk of *excessive* activity remains intact, whereas it does not exist with maximum-harm regulation.

104. See Robert J. Jackson, Jr. & David Rosenberg, *A New Model of Administrative Enforcement*, 93 VA. L. REV. 1983, 1983–84 (2007) (stressing that with “a firm that operates multiple sources of risk, such as air-polluting smokestacks . . . [t]he expense of individually monitoring such sources . . . may consume a large share of an agency’s enforcement budget”).

105. See, e.g., Carol M. Rose, *Expanding the Choices for the Global Commons: Comparing Newfangled Tradable Allowance Schemes to Old-Fashioned Common Property Regimes*, 10 DUKE ENVTL. L. & POL'Y F. 45, 61 n.69 (1999) (“Command-and-control regulation . . . often focuses on things that can be measured and monitored [such as compliance with safety standards], rather than on direct harms . . .”).

considered, the conventional policy recommendations regarding the choice between negligence and strict liability may be flipped.

As explained earlier, the conventional paradigm of optimal care and excessive activity has brought tort scholarship to propose three policy recommendations concerning the choice between negligence and strict liability.¹⁰⁶ First, when harm can be avoided by being careful, because both negligence and strict liability with contributory negligence incentivize optimal care and activity, the application of either regime would result in welfare maximization. Second, where some harm is inescapable, strict liability with contributory negligence is efficient where the risk of excessive activity lies on the part of the injurer, whereas negligence is efficient if this risk lies on the side of the victim. Last, if excessive activity is possible on both sides, the legal system should follow the principle of the lesser of two evils. It should opt for the liability regime that induces excessive activity by the party whose conduct results in less social harm. Scholars have claimed that these recommendations provide “a useful guide for lawmakers to choose among liability rules.”¹⁰⁷ As the subsequent analysis suggests, however, once the overlooked risk of insufficient activity is acknowledged, these recommendations might lead to inefficient results.

Judge Posner’s influential decision in *Indiana Harbor Belt Railroad Co. v. American Cyanamid Co.*¹⁰⁸ can illustrate the possible deficiency of the first of these guidelines. The well-known facts of the case involved a suit brought after a large amount of toxic material spilled from the tank car of the defendant, a chemical manufacturer. The contamination occurred on the property of the plaintiff, a small railroad company. The plaintiff sued the manufacturer to recover the costs of decontamination measures it was ordered to take by the local environmental protection agency. The original claim was based on both negligence and strict liability, yet the case reached Judge Posner on the strict liability count alone.¹⁰⁹ In his decision to reject the claim, Judge Posner referred to the conventional theory concerning the relative advantage of strict liability in regulating the defendant’s level of activity:

The baseline common law regime of tort liability is negligence. When it is a workable regime, because the hazards of an activity can be avoided by being careful . . . there is no need to switch to strict liability. Sometimes, however, a particular type of accident cannot be prevented by taking care but can be avoided, or its consequences minimized . . . by reducing the scale of the activity in order to minimize the number of accidents caused by it. . . . By making the actor strictly liable—by denying him in other words an excuse based on his inability to avoid accidents by being more

106. See *supra* Section I.B.

107. COOTER & ULEN, *supra* note 18, at 349.

108. 916 F.2d 1174 (7th Cir. 1990). This decision has drawn wide attention. See, e.g., Sykes, *supra* note 10, at 1912 (“Judge Posner’s opinion [in *Indiana Harbor*] is now standard teaching fare in torts courses around the country . . .”).

109. *American Cyanamid*, 916 F.2d at 1175.

careful—we give him an incentive, missing in a negligence regime, to experiment with methods of preventing accidents that involve not greater exertions of care, assumed to be futile, but instead . . . reducing . . . the activity giving rise to the accident.¹¹⁰

Turning to the facts of the case, Judge Posner held that since reasonable precautions by the manufacturer could *entirely* eliminate the risk of harm, no social benefit would be provided by controlling its activity level.¹¹¹ Since the standard of negligence would be sufficient to induce optimal investment, plaintiff's claim is "not an apt case for strict liability."¹¹²

The risk of *insufficient* activity, however, might have justified a different conclusion. Judge Posner's assumption concerning the efficiency of negligence disregards the possible incentives of potential injurers to strategically set their activity below the efficient level. Precautions might be cost-effective when deliveries are frequent (and thus the risk of harm is substantial), but inefficient if the car tank is used only occasionally (where the risk is small). Subjecting manufactures to the standard of negligence could therefore induce them to inefficiently limit their use of car tanks so as to avoid socially desirable investments in prevention. Stated more generally, even when injurers' efficient precaution would entirely prevent the risk of harm, imposing strict liability might be necessary to discourage them from attempting to escape the duty of care by maintaining an inefficiently low level of activity. In cases like *Indiana Harbor*, where precaution appears to require investments on the part of the potential injurer (the manufacturer), strict liability is thus superior. Conversely, in contexts where optimal precaution mandates investment by the victim, only negligence (that makes the victim bear all the harm) would remove the risk of insufficient activity and suboptimal care.

The risk of insufficient activity may also require reassessment of the conventional recommendations concerning cases in which precautions cannot entirely eliminate the risk of harm. Recall that tort theory has stressed that in such circumstances—where optimal precaution does not render parties' conduct entirely safe—parties might choose to engage *excessively* in their activities. Aiming to minimize the risk of such behavior, tort theory has proposed policy recommendations concerning the choice of liability regimes. Yet, as the preceding analysis has shown, parties may in fact pursue the opposite strategy of *insufficient* activity. The selection of the appropriate liability regime might thus be necessary to discourage not only excessive but also insufficient activity levels.

110. *Id.* at 1177 (citations omitted).

111. *Id.* at 1180–81 ("It is easy to see how the accident in this case might have been prevented at reasonable cost by greater care on the part of those who handled the tank car of acrylonitrile. It is difficult to see how it might have been prevented at reasonable cost by a change in the activity of transporting the chemical."). While concluding that reasonable precaution could have eliminated the risk of harm, the case was remanded, as it remained unclear whether the accident occurred due to the injurer's negligence or rather due to unreasonable behavior on the part of the victim. *Id.* at 1183.

112. *Id.* at 1181.

A recent illustrative example can be found in the proposed new Restatement of Torts. The Restatement establishes negligence as the general standard of liability, but provides that “abnormally dangerous” activities are governed by the standard of strict liability.¹¹³ The application of strict liability in the context of abnormally dangerous activities is attributed to the risk that the conventional rule of negligence might be ineffective in discouraging excessive conduct by injurers. As the drafters explain:

[C]ertain choices the defendant makes in the course of the activity in fact may be negligent, yet may lurk so far in the background as to elude the attention of courts in negligence cases. Among these are the choices as to the exact level at which the activity is conducted.¹¹⁴

Consequently, “under negligence law standing alone it is possible that a defendant who unreasonably engages in an activity will escape liability.”¹¹⁵ The Restatement thus concludes that in contexts in which excessive activity by the injurers involves a risk of substantial harm—such as abnormally dangerous activities—strict liability (with the defense of contributory negligence) should be preferred over negligence.

The Restatement, while highlighting the risk of excessive conduct, does not address the alternative danger of insufficient activity. In contexts in which injurers may elect insufficient activity, only the application of strict liability will incentivize them to adopt optimal levels of care and activity. Abnormally dangerous activities therefore constitute only one category of cases where it is appropriate to depart from the conventional standard of negligence. With such activities, the application of strict liability is grounded in the need to discourage excessive conduct. In other contexts, strict liability might be required to discourage injurers from adopting insufficient activity levels and investing in suboptimal care.

Finally, consider the third guideline of the conventional literature, addressing the case where the care and activity levels of both the injurer and the victim affect potential harm. Recall that both negligence and strict liability with contributory negligence induce optimal precautions but encourage an efficient activity level by only one of the parties. Tort theory has thus recommended applying the principle of the lesser of two evils; according to this principle, the legal system should opt for the regime that induces excessive activity by the party whose conduct results in less social waste.¹¹⁶ This conclusion is based on the literature’s assumption that excessive activity is the only possible distortion. It overlooks, however, the risk of insufficient activity. Given the latter possibility, minimization of social waste in fact requires a comparison not merely of *two* evils, but rather of *four* evils: the possible loss from both parties’ excessive as well as insufficient activity lev-

113. RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL HARM §§ 20–25 (Proposed Final Draft No. 1, 2005).

114. *Id.* § 20 cmt. b.

115. *Id.*

116. *See supra* text accompanying notes 38–40.

els. Three possible scenarios may thus arise. First, if the only relevant concern is excessive activity by both the injurer and the victim, then the social waste caused by these two distortions should be compared when deciding on the desirable regime. Second, if the fear is from *insufficient* activity by both parties, the relative expected harm caused by the insufficient activity of each party is to be balanced. Finally, when the expectation is that one of the parties would engage in excessive activity and the other would prefer insufficient activity, the damage from the first party's excessive activity should be compared with the harm caused by the second party's insufficient activity.

The possible combinations of excessive and insufficient activity levels can be illustrated by reconsidering the railroad-farmer hypothetical. In *Hypothetical 1*, where the cost of parties' precaution is the same per unit, the only possible risk is of excessive activity levels. In this case, as tort scholarship has recommended, determining the efficient liability regime requires balancing the expected loss from each of the parties' excessive activity. If the railroad's excessive activity is less harmful than excessive activity by the farmer, negligence should be preferred. If, on the other hand, the railroad's excessive activity is believed to be more socially wasteful, strict liability with contributory negligence ought to be preferred. But this conclusion may be wrong if one of the parties (or both) prefers insufficient, rather than excessive, activity. Imagine that the cost of the farmer's precaution is the same per each unit of activity (such as the fire-resistant spray in *Hypothetical 1*) but the railroad's precaution requires a fixed-cost investment (as the spark arrester in *Hypothetical 2*). In this case, while the farmer's conduct can be excessive, the railroad might actually prefer insufficient activity. To minimize social waste, it is necessary to compare the loss from the farmer's excessive activity with the harm from the railroad's insufficient activity. Similarly, suppose that both parties' precautions involve fixed-cost investment (as in *Hypothetical 2*). Here, both parties might prefer insufficient rather than excessive activity. Accordingly, the decision maker should apply the regime that induces the less harmful insufficient activity.

Legal scholarship has explored the wide implications that excessive activity levels may have on the creation of inefficient risks across many tort-related contexts. Accordingly, rich literature has demonstrated the importance of the differences between strict liability and negligence in regulating parties' behavior. Yet, socially undesirable risks can also be created by insufficient activity levels. The preceding analysis thus suggests that the appropriate selection of liability regimes has even greater practical importance than traditionally perceived.

CONCLUSION

Conventional wisdom in tort law maintains that the prevention of undesirable risks mandates restriction of potentially harmful conduct.¹¹⁷ Against

117. See, e.g., *supra* note 1.

this widely held conviction, this Article shows that undesirable risks often stem from insufficient activity. When subject to negligence-based regimes, parties might strategically underengage in their harmful behavior so as to avoid efficient investment in precautions. In such cases, social waste results not from the excessive, but rather from the limited intensity in which harmful activities are carried out.

The preceding analysis demonstrates that the legal system may discourage parties from setting their conduct below the desirable level either through the imposition of liability or the use of regulation. Under the former possibility, courts can provide incentives for optimal prevention by extending the conventional negligence standard. This extension involves the imposition of a new form of liability—liability for harm stemming from insufficient activity.¹¹⁸ When the imposition of such liability is unfeasible, legislatures may minimize social waste by applying negligence in cases in which traditional analysis has assumed strict liability to be superior (and vice versa).¹¹⁹ Alternatively, the legal system may induce optimal prevention by setting appropriate regulation. Whereas the conventional account has often endorsed the application of maximum-activity regulation to control parties' activity levels, the overlooked paradigm of insufficient activity commands the application of two other regulatory frameworks. To remove parties' incentives to undesirably restrict their activity, regulation can either dictate investment in prespecified safety measures or impose ceilings regarding the maximum level of harm.¹²⁰ Furthermore, the overlooked paradigm indicates that the scope of regulation advocated by the conventional account is too restrictive. Regulation might be needed not only because parties may engage excessively in their conduct, but also to ensure that parties will engage in their activity to a sufficient extent.¹²¹

While this Article focuses on liability and regulation, its insights bear on other legal mechanisms similarly designed to guide behavior. Liability and regulation both constitute “sticks” that impose limitations on parties' actions. Yet the legal system may influence behavior also by granting “carrots,” in the form of direct and indirect subsidies. Under the conventional approach, subsidies should be granted primarily to support activities that result in positive externalities, that is, “whenever the behavior of one party makes another party better off but the first party does not receive the benefits of doing so”¹²² The suboptimal-care-and-insufficient-activity

118. See *supra* text accompanying notes 69–79.

119. See *supra* text accompanying notes 107–112.

120. For the discussion concerning the inefficiency of maximum-activity regulation and the advantages of safety standards and maximum-harm regulation in solving the risk of insufficient activity levels, see *supra* text accompanying notes 92–105.

121. See *supra* text accompanying note 90.

122. Lily L. Batchelder et al., *Efficiency and Tax Incentives: The Case for Refundable Tax Credits*, 59 STAN. L. REV. 23, 44 (2006); see also Christopher J. Coyne & Peter T. Leeson, *Who's to Protect Cyberspace?*, 1 J.L. ECON. & POL'Y 473, 479 (2005) (“In the case of negative externalities, government usually penalizes the behavior, while in the case of positive externalities it usually encourages the behavior through subsidies or other incentives.”); Note, *Functional Analysis, Subsidies*,

paradigm shows, however, that this perception might be too narrow. In appropriate cases, it may be desirable to encourage parties through subsidies to increase the level of their activity even if such activity does not involve any positive externalities but instead inflicts harm on others. Inducing parties to increase their level of activity may render investment in precautions cost-effective. By granting subsidies, it is thus possible to stimulate parties not only to produce more but also to take greater care. The social benefit derived from the combination of these two effects may be well beyond the benefit derived from subsidizing activities with high positive externalities.¹²³

Be it with carrots (subsidies) or with sticks (liability and regulation), the legal system must account for the overlooked paradigm of suboptimal care and insufficient activity. By applying any of the suggested policy tools, the legal system will increase the overall level of socially beneficial activities while also providing potential victims with better protection.

and the Dormant Commerce Clause, 110 HARV. L. REV. 1537, 1547 (1997) (arguing that subsidies are justified only when a firm produces a positive externality, and not when it produces an offsetting negative externality).

123. Imagine, for example, two plants: *X* and *Y*. Assume that plant *X*'s production is harmless. Assume further that the production of plant *X* provides the plant a private benefit of \$300 and also results in a positive externality of \$200, for a total social benefit of \$500. In contrast, suppose the production of plant *Y* is not harm free and does not provide any positive externality: While it provides the plant a private benefit of \$1000, it inflicts harm of \$800 on its neighbors. Finally, suppose that plant *Y* may prevent harm by investing in a higher smokestack at a cost of \$1050. Since a higher smokestack is not cost justified ($\$1050 > \800), the plant has no duty to invest in precaution; plant *Y*'s production thus results in net social benefit of only \$200 ($\$1000 - \800). Imagine that a subsidy in the amount of \$75 may be given to either plant conditioned upon the recipient plant doubling its production. At first blush, given its positive externality and the higher net value of its activity ($\$500 > \200), it appears more desirable to provide such support to plant *X*. This conclusion, however, is false. Doubling the production of plant *X* will increase social welfare by \$500. Doubling the production of plant *Y* will increase its benefit from \$1000 to \$2000 and the harm it inflicts from \$800 to \$1600. Under this higher level of production, a higher smokestack becomes cost effective ($\$1600 > \1050), and plant *Y* will have to prevent the harm to avoid liability. Given these higher levels of activity and care, the net social benefit from plant *Y*'s production increases to \$950 ($\$2000 - \1050). Therefore, although plant *X*'s production is harmless and provides a positive externality, it is socially more desirable to grant the subsidy to plant *Y*. Subsidizing plant *X* involves an increase of only \$500 in social benefit, whereas granting the subsidy to plant *Y* enables an increase of \$750 (raising social utility from \$200 to \$950). Note that without the subsidy, although it is socially desirable, plant *Y* would not increase its production. In the lower activity level (where it is not required to elevate the smokestack) its profits amount to \$1000. In the higher activity level, where it must elevate the smokestack, its profits amount to only \$950 ($\$2000 - \1050). A subsidy in the amount of \$75 increases the plant's profits from higher activity to \$1025 and thus induces the plant to operate at the socially optimal level.

APPENDIX

Suppose the level of harm inflicted by an injurer is $H(z,x)$, where z is the injurer's level of activity and $x(z)$ is his expenditure on care. In addition,

$$\frac{\partial H}{\partial z} > 0, \frac{\partial^2 H}{\partial z^2} \geq 0, \frac{\partial H}{\partial x} < 0, \frac{\partial^2 H}{\partial x^2} > 0, \frac{dx}{dz} \geq 0, \frac{\partial^2 x}{\partial z^2} \geq 0$$

The injurer is considered negligent if, given his level of activity z , he did not choose x so as to minimize:

$$H(z,x) + x(z).$$

That is, given the injurer's activity, the standard of care that meets the negligence standard is defined by x^* , which satisfies:

$$x^*: \frac{\partial}{\partial x} (H(z, x) + x) = 0 \quad (\text{A1})$$

Accordingly, the injurer will spend x^* on care and will not be found negligent.¹²⁴ The injurer's profit is therefore:

$$U(z, x) \equiv u(z) - x^*(z)$$

Where $u(z)$ is the injurer's profit (ignoring the costs of precaution), and

$$\frac{\partial u}{\partial z} > 0, \frac{\partial^2 u}{\partial z^2} < 0,$$

social welfare equals:

$$W(z, x) \equiv u(z) - x^*(z) - H(x, z)$$

The activity level z^{opt} that maximizes welfare is derived by:

$$\frac{dW(z, x)}{dz} = \frac{du(z)}{dz} - \frac{dx^*(z)}{dz} - \frac{dH(x^*, z)}{dz} = 0 \quad (\text{A2})$$

124. To see why, note that for any level of z , the injurer can earn more profits by taking due care and making $u(z) - x^*(z)$ than taking less than due care and making $u(z) - x(z) - H(z, x)$. Any cost savings the injurer could make by taking less care would be more than offset by the additional harm that would result, since by definition, $x^*(z)$ minimizes $x(z) + H(z, x)$.

The injurer will prefer socially excessive activity (activity exceeding z^{opt}) if and only if at activity z^{opt} and care of $x^*(z^{opt})$:

$$\frac{du(z)}{dz} - \frac{dx^*(z)}{dz} > 0 \quad (\text{i.e., the injurer would increase his profits by raising } z \text{ above } z^{opt}).^{125}$$

Due to equation A2, this occurs if and only if at the point $(z^{opt}, x^*(z^{opt}))$:

$$\frac{dH(x^*, z)}{d(z)} > 0. \quad \text{That is, excessive activity occurs if and only if at the point}$$

of optimal activity and care, raising activity above the socially optimal level (and taking the appropriate additional care warranted by the increase in activity) causes an increase in the level of harm.

Conversely, the injurer will prefer socially insufficient activity (activity below z^{opt}) if and only if at the point $(z^{opt}, x^*(z^{opt}))$:

$$\frac{du(z)}{dz} - \frac{dx^*(z)}{dz} < 0 \quad (\text{i.e., the injurer would increase his profits by setting } z \text{ below } z^{opt})$$

Due to equation A2, this occurs if and only if at the point $(z^{opt}, x^*(z^{opt}))$

$$\frac{dH(x^*, z)}{dz} < 0. \quad \text{That is, insufficient activity occurs if and only if at the}$$

socially optimal activity level, an increase in activity *reduces* the level of harm, due to the additional precautions mandated by increased activity.

Note that:

$$\frac{dH(x^*, z)}{d(z)} = \frac{\partial H(x^*, z)}{\partial(z)} + \frac{\partial H(x^*, z)}{\partial(x^*)} \frac{dx^*}{dz} \quad (\text{A3})$$

That is, an increase in activity affects the level of harm in two opposite ways. On the one hand, the first term in equation A3 shows how, keeping the injurer's level of care fixed, an increase in activity raises harm (given $x^*(z)$,

$\frac{\partial H(x^*, z)}{\partial z} > 0$). On the other hand, the second term in equation A3 dem-

onstrates how an increase in activity also raises the injurer's required expenditure on care, and this, in and of itself, reduces harm (given z ,

$\frac{\partial H(x^*, z)}{\partial x^*} \frac{dx^*}{dz} < 0$).

125. Note that because the injurer would engage in socially excessive activity, he also elects socially excessive care (the x^* required by $z > z^{opt}$ is above $x^*(z^{opt})$).

