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ARTICLE

PROPERTY RULES VERSUS LIABILITY RULES:
AN ECONOMIC ANALYSIS

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PROPERTY RULES VERSUS LIABILITY RULES: AN ECONOMIC ANALYSIS

*Louis Kaplow and Steven Shavell**

Should property rights be protected absolutely — by property rules — or instead by the requirement that infringing parties pay for harm done — that is, by liability rules? In this Article, we present a systematic economic analysis of this fundamental question. Our primary object is to explain why liability rules are often employed to protect individuals against harmful externalities (such as pollution and automobile accidents), whereas property rules are generally relied upon to protect individuals from having their possessions taken from them, thereby ensuring a basic incident of ownership.

In the course of our analysis, we suggest that a variety of commonly held beliefs about property and liability rules are in error, and we also derive results bearing on legal policy. Notably, we show that, for controlling some important externalities, liability rules (and pollution taxes) are superior to property rules (including many forms of regulation) even when damages must be set using only limited information about harm.

I. INTRODUCTION

The state has at its disposal two fundamental ways of protecting property rights. On one hand, it may adopt *property rules*, under which it guarantees property right assignments against infringement through the threatened use of its police powers. On the other hand, the state may employ *liability rules*, under which it merely discourages violations by requiring transgressors to pay victims for harms suffered.

In this Article, we offer a systematic economic analysis of the relative desirability of property and liability rules.¹ A major objective of

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¹ The leading article on the subject is Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972). Our Article does not examine rules prohibiting alienation, as did Calabresi and Melamed's, see *id.* at 1111-15, because such rules are not generally employed in the contexts we examine and are usually used for reasons different from those we consider. For a discussion of rules prohibiting alienation, see generally Susan Rose-Ackerman, *Inalienability and the Theory of Property Rights*, 85 COLUM. L. REV. 931 (1985). Other prominent articles that study property and liability rules from an economic perspective include Robert C. Ellickson, *Alternatives to Zoning: Covenants, Nuisance Rules, and Fines as Land Use Controls*, 40 U. CHI. L. REV. 681 (1973); A. Mitchell Polinsky, *Controlling Externalities and Protecting Entitlements: Property Right, Liability*

the Article is to explain why possessory interests in things are generally protected by property rules, whereas interests in not suffering from harmful externalities are often, though not always, protected only by liability rules.²

To amplify, if I have rightful possession of some thing — such as an automobile or a home — another person ordinarily cannot take it without my permission.³ He cannot make a unilateral decision to borrow my automobile and pay me for my trouble, or invite himself into my home and simply pay me for the intrusion. Indeed, the inability of others to appropriate my things lies at the core of the notions of “ownership” and “property.”

If, however, I am exposed to the risk of harm generated by another party’s conduct, I may be protected primarily by a liability rule. Liability rule protection applies to much polluting behavior and to many of the great multitude of acts governed by the law of unintentional torts. We are permitted to engage in such acts — from hunting to driving to construction — even though they create risks of harm and thus constitute probabilistic invasions of property interests, but we are often obligated to pay damages for any harm that we cause. To be sure, not all harmful externalities are regulated by liability rules. Notably, a person’s right to be free from loud noises, noxious odors, and certain other nuisances may be ensured by his power to have harmful

Rule, and Tax-Subsidy Approaches, 8 J. LEGAL STUD. 1 (1979) [hereinafter Polinsky, *Controlling Externalities*]; A. Mitchell Polinsky, *Resolving Nuisance Disputes: The Simple Economics of Injunctive and Damage Remedies*, 32 STAN. L. REV. 1075 (1980) [hereinafter Polinsky, *Resolving Nuisance Disputes*]; and Frank I. Michelman, *Pollution as a Tort: A Non-Accidental Perspective on Calabresi’s Costs*, 80 YALE L.J. 647, 667–83 (1971) (book review). See also Darryl Biggar, *A Model of Punitive Damages in Tort*, 15 INT’L REV. L. & ECON. 1 (1995) (addressing related issues in the context of punitive damages in tort).

Several articles have been written about contract law analogs to the choice between property and liability rules. See, e.g., Anthony T. Kronman, *Specific Performance*, 45 U. CHI. L. REV. 351 (1978) (analyzing the choice between specific performance, a property-like protection of the promisee, and damages for breach, a liability rule); Alan Schwartz, *The Case for Specific Performance*, 89 YALE L.J. 271 (1979) (same); Richard Craswell, *Property Rules and Liability Rules in Unconscionability and Related Doctrines*, 60 U. CHI. L. REV. 1 (1993) (analyzing whether the remedy for unconscionable contracts should be voiding the agreement, affording property-rule-like protection to the “victim,” or supplying terms that a court believes reasonable, a liability-rule-like approach). Our Article does not consider the contractual context (although our analysis may have some bearing on contract law).

² As will become evident, by the protection of possessory interests in things, we refer to the prevention of the unwanted transfer of possession of a physical object to a taker. By harmful externalities, we mean adverse outcomes that occur as a byproduct of an injurer’s activity, a familiar instance being pollution caused by a firm’s operations. We will presume in most of the analysis that the distinction between the taking of things (violation of possessory interests) and harmful externalities is easily made. We discuss in section III.G possible difficulties in making the distinction and why our analysis is still informative when difficulties in classification arise.

³ Of course, possessory rights are in fact often insecure; theft of one sort or another is frequently a serious problem. The social intent, however, is ordinarily for possessory rights to be inviolate, and for ease of exposition, this Article will usually analyze them as such. But see *infra* p. 757 (addressing the incomplete enforcement of property rights).

behavior enjoined (although some nuisances are controlled by liability rules).⁴

Somewhat surprisingly, this pattern of legal protection — definite and uncontroversial use of property rules to guarantee possessory interests, yet frequent, albeit not exclusive, use of liability rules in the domain of harmful externalities — has not been carefully evaluated heretofore.⁵ Moreover, as we will discuss, arguments that commentators have advanced in support of liability rules for the control of externalities would seem to apply as well in the context of possessory interests.⁶ This observation suggests that something is missing from their arguments, assuming that property rule protection of possessory interests is appropriate. We will discuss the problems with these arguments and adduce factors that justify the use of liability rules to regulate harmful externalities but that favor property rules to protect possessory interests.

In the course of our analysis, we will resolve important issues that have received substantial attention in the literature on property and liability rules. For example, when there is only limited information about harm, such as in the case of pollution, prior work emphasizes that liability rules will not function perfectly but does not indicate whether property rules would be superior.⁷ However, we demonstrate

⁴ See, e.g., ROGER A. CUNNINGHAM, WILLIAM B. STOEBUCK & DALE A. WHITMAN, *THE LAW OF PROPERTY* 417-18, 421-22 (2d ed. 1993); JOSEPH W. SINGER, *PROPERTY LAW* § 3.4, at 321-24 (1993); 4 RESTATEMENT (SECOND) OF TORTS §§ 821F, 826 (1977); see also *Boomer v. Atlantic Cement Co.*, 257 N.E.2d 870, 874-75 (N.Y. 1970) (holding that a cement plant producing air pollutants should pay damages instead of being subject to an injunction); Ellickson, *supra* note 1, at 719-22 (suggesting that the historical weakness of nuisance law in confining relief to property rules was partly responsible for the belief that zoning was necessary); Thomas W. Merrill, *Trespass, Nuisance, and the Costs of Determining Property Rights*, 14 J. LEGAL STUD. 13, 14-20 (1985) (discussing the domains of trespass and nuisance, which have different standards of liability and may provide different remedies); Note, *Efficient Land Use and the Internalization of Beneficial Spillovers: An Economic and Legal Analysis*, 31 STAN. L. REV. 457, 464-65 (1979) (describing the historical movement from property rules protecting victims, to property rules protecting injurers, and finally to liability rules).

⁵ Most prior literature (such as that cited in note 1) focuses on harmful externalities. Calabresi and Melamed, however, briefly address the question why property rules are used to guarantee possessory interests. More precisely, they pose the question why the sanction for robbers should not be the value of the thing taken — that is, why a liability rule should not be employed. See Calabresi & Melamed, *supra* note 1, at 1124-25. The main answer they supply, *see id.* at 1126-27, is essentially that described in the text to follow, *see infra* p. 718, which we conclude is erroneous. (We discuss their specific argument further in note 6.)

⁶ For example, the chief argument that Calabresi and Melamed advance in favor of a liability rule for nuisance when bargaining is difficult seems to imply that thieves should be subject to a liability rule for taking things when the owners cannot be contacted. See Calabresi & Melamed, *supra* note 1, at 1125-27. At the same time, the doubts that Calabresi and Melamed express about the efficiency of liability rules for theft — due to the difficulty of evaluating victims' losses, *see id.* at 1125-26 — would seem to be equally serious with respect to nuisances.

⁷ One of the main concerns of a recent article by James Krier and Stewart Schwab is that the existing literature is inadequate because it has not resolved this ambiguity. See James E. Krier & Stewart J. Schwab, *Property Rules and Liability Rules: The Cathedral in Another Light*,

that, even though liability rules perform imperfectly when information about harm is limited, they remain superior to property rules. This conclusion has strong implications for the assessment of current and proposed schemes of environmental regulation.⁸

In addition, we will cast doubt on the belief that property rules are best when transaction costs are low — assertedly because the use of property rules will induce parties to bargain and reach desirable outcomes — whereas liability rules are best when transaction costs are high — supposedly because the use of liability rules will induce injurers to act desirably, mimicking the outcomes that would otherwise have been reached through bargaining.⁹ We find that this belief is often contradicted: when transaction costs are low, parties will tend to bargain under liability rules as well as under property rules and may reach outcomes superior to those reached under property rules;¹⁰ and when transaction costs are high and bargaining is impossible, property rules may lead to better outcomes than do liability rules.¹¹

Our analysis is divided into two Parts: Part II deals with harmful externalities; Part III addresses the taking of things.¹² (We formally prove a number of the arguments made in these Parts in an Appendix to this Article.) Let us begin by briefly describing for each context what we consider to be the present understanding of the virtues of property versus liability rules and how we extend or modify the conventional wisdom.

70 N.Y.U. L. REV. 440, 447-64 (1995). They correctly observe that Calabresi and Melamed's article, cited above in note 1, is difficult to interpret on the issue, and that Polinsky's writing, cited above in note 1, calls into question the desirability of liability rules when harm is difficult to evaluate, but that much subsequent work seems to assume the desirability of liability rules without addressing the problem of imperfect information about harm.

⁸ See *infra* section II.E.1.

⁹ See, e.g., RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* § 3.7, at 56-57, § 3.9, at 70 (4th ed. 1992); Calabresi & Melamed, *supra* note 1, at 1125-27 (discussed in note 6); Krier & Schwab, *supra* note 7, at 447-53 (presenting the conventional wisdom for purposes of subsequent criticism); see also Craswell, *supra* note 1, at 1-15 (adopting the conventional view on transaction costs and liability rules in the contract context, and noting the acceptance of the view by others); David D. Haddock, Fred S. McChesney & Menahem Spiegel, *An Ordinary Economic Rationale for Extraordinary Legal Sanctions*, 78 CAL. L. REV. 1, 13-36 (1990) (arguing for the "extraordinary" sanction of punitive damages in tort actions and liquidated damages beyond actual loss in contract claims — property rule protection — to force bargaining in certain circumstances); Merrill, *supra* note 4, at 14, 25-26 (arguing that a legal system seeking efficiency will tend to use the law of trespass when transaction costs are low and the law of nuisance, with a balancing test to assign the entitlement — which sometimes implies only a right to the payment of damages — when transaction costs are high).

¹⁰ See *infra* section II.B.2. This general point is also a theme of Polinsky, *Resolving Nuisance Disputes*, cited above in note 1, at 1090-91, 1093-95, 1101-02, 1104-05, and of an article written contemporaneously, but independently, of ours, Ian Ayres & Eric Talley, *Solomonic Bargaining: Dividing a Legal Entitlement to Facilitate Coasean Trade*, 104 YALE L.J. 1027 (1995). See *infra* note 19 (discussing Polinsky's and Ayres and Talley's conclusions).

¹¹ See *infra* section III.A.2.

¹² On the distinction between the two contexts, see note 2 and section III.G.

Harmful Externalities. When the problem of harmful externalities arises, it is often the case that the involved parties cannot practically bargain with one another, so that the resolution of difficulties will be determined directly by the choice of legal rules. In this context, the commonly held view in the literature is that liability rules are superior to property rules, assuming that courts can accurately determine the extent of harm.¹³ In a classic example, a firm that is liable for pollution-caused harm will behave desirably: it will prevent pollution if and only if its prevention cost is less than the harm caused, simply because the firm will have to pay for any harm done. By contrast, if victims are protected by a property rule, firms will be forced to prevent pollution even when their prevention costs exceed the harms that would result — an undesirable outcome.¹⁴

However, some of the literature suggests that liability rules may be inferior to property rules if courts would have difficulty ascertaining the actual level of harm.¹⁵ If courts underestimate harm, a liable firm might pollute even though its prevention cost is less than the true level of harm, whereas under a property rule protecting victims, the firm would not pollute.

This latter belief we believe to be mistaken. We demonstrate that *even when courts are uncertain about the magnitude of harm, liability rules are superior to property rules*. Specifically, we show that if a court sets damages equal to its best estimate of harm — the average harm for cases characterized by the facts the court observes¹⁶ — the outcome under the liability rule will be superior, on average, to the outcome under property rules. To explain, let us compare the liability rule to a property rule protecting victims.¹⁷ These two rules result in the same outcome — no pollution — when prevention costs are below average harm, for then firms will be induced to prevent pollution under the liability rule. The rules differ when prevention costs are high — in excess of average harm — for then firms will pollute under the liability rule. But in this case, it is desirable for firms not to prevent pollution because harm, *on average*, is lower than the high prevention costs. (To be sure, it will *sometimes* be true that actual harm

¹³ See, e.g., POSNER, *supra* note 9, § 3.9, at 70 & n.5; Calabresi & Melamed, *supra* note 1, at 1108, 1119–21; Krier & Schwab, *supra* note 7, at 452–53 & n.44 (describing this view — without the caveat that harm can be accurately determined — as “virtual dogma” and citing authorities); Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1076 & n.7 (noting several commentators’ views).

¹⁴ Or, if firms’ rights to pollute are protected by a property rule — that is, if they are freely permitted to pollute — they will generate pollution even when their prevention costs are less than the harm caused by their activity.

¹⁵ See, e.g., POSNER, *supra* note 9, § 3.9, at 70 n.5; Calabresi & Melamed, *supra* note 1, at 1125–27; Krier & Schwab, *supra* note 7, at 453–64.

¹⁶ We discuss possible difficulties in estimating average harm in sections II.A.2 and II.A.3.

¹⁷ Analysis of a property rule protecting injurers is analogous.

is greater than a firm's high prevention costs, but on average that will not be so.)

Our conclusion about the superiority of the liability rule might not follow, though, if courts were systematically to underestimate harm in setting damages, rather than to use estimates of harm that are correct on average. We discuss grounds for such an assumption but suggest that courts should be able to take corrective steps, so that a liability rule will retain its superiority.

We next compare property and liability rules when transaction costs are low, in which case parties can bargain with each other about potential externalities. As Coase emphasized, if there are no obstacles to the consummation of mutually beneficial bargains, it will make no difference what the legal regime is; thus, it will be irrelevant whether property rules or liability rules apply.¹⁸ For instance, even if a firm cannot choose to pollute and pay court-ordered damages because victims are protected by a property rule, the firm will pay victims for permission to pollute when its prevention cost is high. But what if bargaining is not always successful because parties sometimes misgauge what each other is willing to pay or accept? In this case, no unambiguous conclusion can be drawn: either property rules or liability rules could be better, depending on rather subtle particulars of the situation.¹⁹

We then examine several factors — apart from the ability to bargain — that are of possible relevance to the choice between property and liability rules. One is victim behavior, specifically concerning victims' ability to mitigate harm.²⁰ Although the state can provide victims some incentives to reduce harm by using liability rules accompanied by defenses, the factor of victim behavior lends appeal to the property rule entitling injurers to cause harm or to modified liability rules under which injurers pay compensation to the state. Under these rules, victims are left uncompensated for injuries they suffer,

¹⁸ See R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 2-15 (1960). The application of Coase's general conclusions to the context of property rules and liability rules is made, for example, in Polinsky, *Resolving Nuisance Disputes*, cited above in note 1, at 1088-92, which shows that property rules and liability rules each lead to efficient outcomes when bargaining is perfect.

¹⁹ Polinsky also reached the conclusion that it is indeterminate whether property or liability rules are superior when bargaining is imperfect (although he did not analyze a formal model of bargaining with asymmetric information). See, e.g., Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1079-80. Ayres and Talley devote much of their article to exploring the relative performance of property and liability rules when bargaining is imperfect. See Ayres & Talley, *supra* note 10. They do not emphasize the theoretical ambiguity about the relative performance of property versus liability rules. Instead, they stress that under liability rules, problems of asymmetric information are likely to be less severe than under property rules. We believe their view to be misleading. For further discussion, see note 71 and Appendix section I.B.2, comment c, below.

²⁰ The point that victims as well as injurers may be able to prevent harm was emphasized by Coase. See Coase, *supra* note 18, at 2, 12-13.

thereby creating incentives to avoid harm. Another factor that we investigate is the judgment-proof problem: injurers may not have enough wealth to pay for the harm done. When wealth is inadequate, a liability rule may be ineffective in inducing injurers to prevent harm, such as when a company whose assets are under a million dollars operates a highly dangerous chemical process that could kill thousands. In the face of this problem, we indicate that property rule protection of victims may become desirable. An additional factor that we discuss is administrative costs. We do not find that this factor leads to a systematic preference for either type of rule, although in particular circumstances it may be determinative. Finally, we consider risk aversion, effects on the distribution of income, and notions of entitlement, and we suggest that these factors have little relevance for the choice between property and liability rules.

The overall conclusion that we draw from our analysis is that *there is a prima facie case favoring liability rules over property rules for controlling harmful externalities, but property rule protection may become desirable on account of one or more of the factors mentioned above*. We illustrate our analysis by considering briefly the problems of industrial pollution, automobile accidents, and nuisance. We also explain that our analysis applies in important respects to the choice among conventional private remedies, regulation, corrective taxes, and marketable pollution rights.

The Taking of Things. Part III of the Article concerns the question whether things that an individual has in his or her possession should be protected by means of a liability rule rather than a property rule. That is, we ask: what would be wrong with a regime under which a person would be free to take a thing away from its possessor and pay an amount equal to a court's assessment of its value?

This basic question has not been considered by other writers in a sustained manner. One does, however, often find summary expression of the belief that use of a property rule to bar outright appropriation of things is desirable because it forces a person who wants something to bargain for it with its possessor.²¹ The belief derives from the idea that, through the requirement of bargaining, we can be reasonably confident that property will change hands when and only when the change is efficient. For example, bargaining can ensure that my car will be transferred to another person when and only when he values it more highly than I do. This argument, however, is *not* one that supports property rules over liability rules in any obvious way. If we believe that bargaining will result in the achievement of mutually beneficial transfers when they exist, that will be so under a liability rule as well as under a property rule. If Jack can take my car if he

²¹ See, e.g., POSNER, *supra* note 9, § 3.9, at 70; Calabresi & Melamed, *supra* note 1, at 1124-27 (discussed in note 6).

pays damages of \$10,000, but in fact I value the car more highly than he does, I could still bargain with Jack, paying him to refrain. (This is, of course, an application of the Coase Theorem.²²)

How then can one justify the use of property rules for protection of property rights in things? We develop a number of arguments that rationalize this fundamental characteristic of property law.²³ First, we explain that under a liability rule, bargaining might be rendered effectively impossible. Under a liability rule, we presume that *anyone* would enjoy the right to take my car. Thus, even though I would be willing to pay Jack not to take my car if it were inadequately valued by the courts, there would be no point in paying him to desist — for Jill, or someone else, could come along and take it the next day. Consequently, I would not pay Jack to forbear, and not being paid, he would in fact take my car.

Another problem with a regime of liability rules is what we call reciprocal takings: if Jack takes my car and the liability award is less than the car's value to me, I would want to take my car back from Jack. In a regime of liability for takings,²⁴ I could do this. The inevitable result would be tugs-of-war, altercations, frictions of some type. A pure system of liability rule protection would become unworkable.

If the problems of reciprocal takings and the effective impossibility of bargaining are put to the side, it might seem that the liability rule with damages equal to the average value of a thing taken would be attractive, by the logic we offer in favor of liability rules in the case of harmful externalities. But that logic, it turns out, does not extend to the case at hand, for reasons that are subtle and best deferred.²⁵

Still another problem affecting the performance of liability rules concerns *ex ante* incentives: the behavior of parties prior to takings. To the degree that things might be undervalued by courts, potential victims of takings may take measures to protect their things (such as installing special locks on their cars) or may curtail productive activities, and potential acquirers may make investments to accomplish takings (such as obtaining devices to counter the locks). Such effects on behavior are socially counterproductive, akin to those engendered by the problem of theft. This waste is a further disadvantage of liability rules.

After discussing these arguments and considering administrative costs and several other factors, we conclude that *there is a strong theo-*

²² See Coase, *supra* note 18, at 2–15.

²³ The order in which we consider the arguments here is somewhat different from that in Part III.

²⁴ A pure regime of liability for the taking of things provides that anyone may take another's thing, subject to the payment of damages. Once Jack takes my car, he becomes the possessor and I become a prospective taker, who is permitted under a liability rule to take what is now Jack's car. We discuss this issue further in section III.D.

²⁵ See *infra* section III.A.2.

retical case favoring the use of property rules for protection of possessory rights in things, in contrast to our more qualified conclusion favoring liability rules with regard to harmful externalities.

II. HARMFUL EXTERNALITIES

Our task here is to compare property rules and liability rules as methods of controlling harmful externalities. To do this, we make several simplifying assumptions in our basic analysis: that there is a single potential injurer and a single potential victim, and that the injurer can prevent harm by making an expenditure (such as installing a smoke arrester).²⁶

We will suppose that a *property rule* involves two elements: the grant of an entitlement to either the victim or the injurer and absolute protection of that entitlement. Specifically, if the victim has the entitlement to be free from harm, the injurer is precluded from causing harm. We might imagine, for instance, that an injurer would suffer such a stringent sanction if he caused harm that he would not dare to cause it, or that the state would directly prevent the injurer from acting to cause harm (for example, by closing down a plant that did not stop polluting). Similarly, if the injurer possesses the entitlement to cause harm, the victim cannot stop him from doing so.²⁷

We will presume that under a *liability rule*, the injurer is permitted to cause harm but must compensate the victim for the harm, or the court's²⁸ best estimate of it.²⁹ That the measure of damages under

²⁶ Our conclusions, and the logic behind them, would not be altered in an essential way if we were to assume that the injurer only reduced, rather than eliminated, the risk of harm or its magnitude by taking a precaution, or if the injurer could alter harm by changing his level of activity. However, our conclusions are affected by consideration of *victims'* behavior. See *infra* section II.C.

²⁷ The characterization of a property rule as a choice of who should enjoy an entitlement, coupled with its absolute protection, is emphasized in Calabresi and Melamed, cited above in note 1, at 1090-93.

In the analysis here, we take an entitlement to be complete. More generally, an entitlement could be partial; for example, the victim could have the right to be free from more than x units of harm. Partial entitlements are emphasized in Polinsky, *Controlling Externalities*, cited above in note 1. We discuss partial entitlements below at pages 749-50 and 753-54.

²⁸ Throughout the article, we will use the word "court" as shorthand for a decisionmaker. Thus, by the "court's" estimate, we mean to include the possibilities that damages are determined by a jury, an arbitrator, an expert agency, and so forth.

²⁹ We assume for simplicity that liability is strict, but discuss the negligence rule in section II.E.2. Also, we do not consider in the text Calabresi and Melamed's "fourth rule," now commonly referred to as the "reverse" liability rule, under which the victim has the right to prevent harm, but must pay the injurer his cost of doing so. See Calabresi & Melamed, *supra* note 1, at 1116-17; *Spur Indus. v. Del E. Webb Dev. Co.*, 494 P.2d 700, 708 (Ariz. 1972). The analysis of a reverse liability rule would be similar to that of a conventional liability rule. We briefly comment on reverse liability rules below in notes 37, 89, 92, 93, and 142, and in Appendix section I.A.2, comment c. Finally, we note that what is sometimes referred to as a conditional injunction, see Edward Rabin, *Nuisance Law: Rethinking Fundamental Assumptions*, 63 VA. L. REV. 1299, 1300 (1977) — an injunction that the injurer can dissolve upon the payment of damages — is tanta-

the liability rule is assumed to equal harm or its approximation is consistent with practice and makes our exposition easier. Also, were we to allow damages to be any quantum, then "liability" rules and property rules would no longer be distinct: a liability rule with very high damages is equivalent to property rule protection of victims, and a liability rule with damages of zero is equivalent to property rule protection of injurers. Later, however, we do discuss the class of liability rules in which damages may be set at any level.³⁰

Finally, in most of the analysis, we take the social goal to be the minimization of the sum of harm and prevention costs. In section II.D, though, we also discuss administrative costs, the bearing of risk by the risk averse, distributional objectives, and notions of entitlement.

Let us now proceed to the analysis, beginning with the case in which parties do not bargain with one another, then addressing the situation in which they do, and subsequently examining the various other factors relevant to the performance of property and liability rules. Finally, we apply our analysis in a number of important legal domains.

A. *Parties Do Not Bargain with Each Other*³¹

Victims and injurers often will not bargain with each other because of the costs of doing so, their ignorance of each others' identities, or other familiar reasons.³² The case in which bargaining is unlikely is of great practical significance, as it describes most settings in which industrial pollution is generated as well as the context of automobile accidents.

If parties do not bargain with each other, the legal rule will directly determine whether or not harm occurs. Under a property rule, there will be harm when the injurer has the entitlement to cause harm,³³ whereas under the liability rule, there will be harm when the injurer chooses to cause it and pay damages. We now consider whether the liability rule or a property rule is better.

1. *State's Information Is Perfect.* — Suppose initially that the state has perfect information about harm and prevention costs. Then

mount to a liability rule (except for the way it addresses the judgment-proof problem, *see infra* section II.D.1).

³⁰ *See infra* section II.E.4.

³¹ Many of the arguments in this section and the next are developed formally in our Appendix.

³² *See, e.g.,* Coase, *supra* note 18, at 15–18.

³³ It might be asked how property rights are enforced given our assumption that parties do not bargain. If a victim enjoys property rule protection but cannot bargain with an injurer because the two are not in contact with each other, how do we imagine that the victim's property rights are enforced? The answer is that we envision that the state would impose such a severe sanction on the injurer were he to cause harm without permission that the injurer would be deterred from doing so.

it is clear that property rules and the liability rule are equivalent because, under each, the optimal outcome is achieved.³⁴ Under property rules, the state can assign the entitlement to obtain the optimal result: the state grants the entitlement to the victim if harm exceeds prevention cost and to the injurer otherwise. Under the liability rule, the state sets damages equal to the harm; thus the injurer causes harm if and only if prevention cost exceeds harm.

2. *State's Information Is Imperfect.* — Next, suppose that the state's information is imperfect. In particular, assume first that the state does not know the injurer's prevention cost but can determine harm to the victim. In this case, the liability rule is superior to property rules. Under property rules, the state will not know to whom to assign the entitlement because it will not know whether the prevention cost exceeds harm. If harm is \$1000 but the state does not know whether the prevention cost is \$800 or \$1200, the state may make one of two mistakes: giving the victim the right to be free from harm when in fact the prevention cost is \$1200 (so that it would be socially desirable for harm to occur), or giving the injurer the right to cause harm when the prevention cost is only \$800 (so that it would be desirable for the injurer to prevent harm). Inevitably, the state will make mistakes in assigning entitlements to parties when its information about the injurer's prevention cost is imperfect.

Under the liability rule, however, the socially optimal outcome will always occur.³⁵ Faced with damages of \$1000 for harm, the injurer will cause harm if and only if his prevention cost (which he knows³⁶) is \$1200; if his prevention cost is \$800, he will prevent rather than cause harm. In other words, *the virtue of the liability rule is that it allows the state to harness the information that the injurer naturally possesses about his prevention cost.* When the state does not have that information, this virtue is important.³⁷

The foregoing argument in favor of the liability rule — that the state can harness injurers' knowledge about their prevention costs —

³⁴ When we state that such outcomes are equivalent, keep in mind that we are examining the social objective of maximizing value (efficiency). The outcomes obviously may differ with respect to what the parties pay or receive, an issue that we consider in section II.D.4.

³⁵ See, e.g., Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1100-02, 1111-12.

³⁶ We assume throughout that injurers know their own prevention costs. Although this is certainly a plausible assumption, we note that injurers will sometimes be unaware of prevention costs, particularly with regard to the development or use of new technology. Even here, however, injurers' information will usually be better than the state's — in which case the benefit we identify with the use of the liability rule (that it takes advantage of injurers' superior knowledge about prevention costs) will still exist.

³⁷ An analogous argument shows the desirability of the reverse liability rule when the state lacks information about harm but possesses information about prevention cost. Under the reverse liability rule, a victim who wants to be free from harm pays the injurer's prevention cost (which the court knows). Thus, the victim will elect to be free from harm if and only if harm exceeds prevention cost, and the state thereby harnesses the victim's information about harm.

also applies in the general case in which the state's information about harm as well as about prevention cost is imperfect. Typically, a court will observe some information about actual harm, but this information will be incomplete: there will be more than one possible level of harm that could give rise to the facts that the court observes. Suppose that the court sets damages equal to its best estimate of harm — that is, equal to the average harm for the class of cases consistent with what is observed. For example, damages might be set at \$1000, even though in fact there are three equally probable levels of harm: \$500, \$1000, and \$1500.³⁸ We now show that this liability rule — with damages equal to the average level of harm — is superior on average to property rules.

Under the liability rule, if the prevention cost is \$800, the injurer would prevent harm to avoid paying damages of \$1000. This result is desirable because the average harm is \$1000. (On average, \$200 is saved by preventing harm.) If the prevention cost is \$1200, the injurer would cause harm, which is the desirable result because only \$1000 of harm is generated on average.

By contrast, under property rules, outcomes will involve greater social cost on average. Suppose first that the state awards the entitlement to victims,³⁹ so that no harm occurs. The outcome will differ from that reached under the liability rule only when the prevention cost is \$1200. In this case, under the liability rule, harm occurs, and on average it is \$1000 — the average of \$500, \$1000, and \$1500. But under the property rule, the injurer spends \$1200 in all events. Because \$1200 exceeds \$1000, average social costs are higher under the property rule. Of course, social costs *sometimes* would be higher under the liability rule than under the property rule. This would occur if the true harm were \$1500. On average, however, social costs are higher under the property rule, because the average harm is \$1000. Thus, the liability rule is superior on average.

Now suppose that the state confers the entitlement on injurers. They will cause harm, so the outcome will differ from that reached under the liability rule only when the prevention cost is \$800. Average harm under the property rule will be \$1000, which exceeds the \$800 spent by injurers to avoid the harm under the liability rule, so again the liability rule will be superior.

If the reader reflects on this example, he or she will see that the inherent advantage of the liability rule in the situation in which the state can ascertain harm continues to apply when the state must estimate harm. Namely, under the liability rule, the state is able to make

³⁸ At the end of this subsection, we comment on how damages would be set if the court did not have all the data necessary to compute the mean level of harm.

³⁹ The choice of entitlement must be the same in all cases because the state is assumed not to know the prevention cost or the harm in any particular case.

implicit use of injurers' information about prevention costs, because injurers know their *actual* prevention cost,⁴⁰ which they compare to average harm. By contrast, under property rules, the state does not compare actual prevention cost to average harm on a case-by-case basis because the state does not know actual prevention cost. Rather, the state makes the decision whether harm should be prevented using information only about *average* prevention cost, and its decision applies on a uniform basis.

The argument we have made is not particular to the example: we prove the general superiority of liability rules in the mathematical Appendix to this Article.⁴¹ Specifically, we show the following conclusion:⁴² in the case of harmful externalities in which parties do not bargain with each other, *the rule of liability, with damages equal to average harm, is superior on average to property rules, regardless of how imperfect the state's information is about harm or prevention cost.*⁴³ This conclusion may appear to depend upon the assumption that the court knows the full distribution of harm so that it can compute the average, as in our example, whereas in reality the court's information often will be insufficient for it to do so. But as long as the court sets damages equal to its best estimate of the average, the logic of our argument favoring liability rules is essentially unaffected.⁴⁴

⁴⁰ See *supra* note 36.

⁴¹ See *infra* Appendix section I.A.2.

⁴² Some readers may wonder how our argument that a liability rule is necessarily superior can be reconciled with arguments such as Martin Weitzman's claim that it is indeterminate whether pollution taxes (a form of liability rule) or regulation of the amount of pollution (a form of property rule) will prove to be more efficient. See Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477 (1974). As we explain in the Appendix in section I.A.2, comment e, Weitzman assumes what we believe to be unreasonable limits on how pollution taxes are implemented, limits that entail knowingly using taxes unequal to average harm.

⁴³ In demonstrating this result, we suppose that the distribution of harm is statistically independent of the distribution of prevention costs. This assumption seems natural to make because, for example, one would not expect a firm's cost of controlling emissions per unit to be correlated with a victim's susceptibility to disease. It is true, though, that a firm's *total* prevention cost and a victim's *total* harm will be correlated because both will rise with the quantity of the firm's emissions. But if, as seems reasonable, the quantity of emissions is assumed to be observable by courts, see *infra* section II.E.1, courts can vary the legal rule and damages with the quantity of emissions. Hence, what is relevant is the distributions of harm and of prevention costs given a particular quantity, and these distributions are plausibly independent.

In any case, if the assumption of independence is relaxed, it is possible that a property rule would be superior to a liability rule. See section III.A.2 and Appendix Part II for further discussion. Finally, we note that, if the quantity of emissions were not observable, the only feasible property regime of a conventional type would involve banning or permitting all pollution, both of which are likely to be very inefficient outcomes. (It may be possible to impose some direct limits, however, such as by forbidding factories to operate in an area or requiring the use of a particular technology. See Weitzman, *supra* note 42, at 479 n.3.)

⁴⁴ To amplify, suppose that a court does not know the distribution of harm that applies in a particular context — which in our example in the text is \$500, \$1000, and \$1500. Nonetheless, the court's less precise knowledge will always be reflected by *some* probability distribution. See HOWARD RAIFFA, *DECISION ANALYSIS* 104-05 (1968). For instance, consider a case in which the

In fact, the conclusion we demonstrate in the Appendix is even stronger. We show that under the liability rule, *the optimal magnitude of damages is average harm*.⁴⁵ In other words, not only is the liability rule with damages set equal to average harm superior to property rules, but also there is no measure of damages — such as a higher level — that would make the liability rule function better. The explanation for this result is that it is socially desirable for the injurer to weigh the average social harm caused by failing to prevent harm when making his decision about a precaution.⁴⁶

3. *Concerns About the Use of Liability Rules When the State's Information Is Imperfect.* — With the above conclusions in mind, let us turn to the suggestions that we mentioned in the Introduction, to the effect that when harm is uncertain, liability rules might not function well, and property rules, particularly a rule providing protection to the victim, may be superior. In subsection (a), we consider the difficulty in estimating harm in the absence of systematic bias, and in subsection (b), we allow for the possibility of systematic underestimation of harm.

(a) *The Possibility That Difficulty in Estimating Harm Favors Property Rule Protection of Victims.* — One frequently heard argument favoring property rule protection of victims is exemplified by the following: "We don't know how injurious the effect of pollution ultimately will be. It might cause only an occasional rash, but it might also be strongly carcinogenic. Because we don't want to face the risk of great harm, we should not employ the liability rule — we should be

court is unsure whether the situation it confronts is of one type or another. The court imagines that there are two possibilities: one is described by the \$500, \$1000, \$1500 distribution (the mean is \$1000); the other is described by an \$800, \$1600, \$2400 distribution (again, with each outcome equally likely, so the mean is \$1600). Further, suppose that the court's best guess is that each of these descriptions is equally likely to be accurate. In this case, the situation is equivalent to one in which the distribution of possible harms is \$500, \$800, \$1000, \$1500, \$1600, \$2400, each with probability 1/6. Because the mean of this distribution is \$1300, our argument implies that the liability rule with damages equal to \$1300 is superior to either property rule. The sense behind the optimality of damages of \$1300 is that, when there are two possible, equally likely distributions of harm, the average taken over all possible outcomes is indeed \$1300.

⁴⁵ See *infra* Appendix section I.A.2. Were other factors admitted, like litigation costs, optimal damages would differ. See A. Mitchell Polinsky & Daniel L. Rubinfeld, *The Welfare Implications of Costly Litigation for the Level of Liability*, 17 J. LEGAL STUD. 151 (1988); A. Mitchell Polinsky & Steven Shavell, *Enforcement Costs and the Optimal Magnitude and Probability of Fines*, 35 J.L. & ECON. 133 (1992).

⁴⁶ The reader should bear in mind that we are assuming that the court cannot observe the actual harm in particular cases, so it must use a single, fixed number as the measure of damages. Subject to this constraint, we are saying that the best number for it to use is average harm. For further discussion of liability rules with the level of damages considered to be a variable, see section II.E.4.

conservative and accord victims property rule protection, the right to clean air."⁴⁷

This argument overlooks the important point that, under the liability rule, there will not tend to be much pollution if the risk of cancer is serious, for damages will then be high precisely because average harm will be high.⁴⁸ Thus, a property rule protecting victims will result in a different outcome from that reached under the liability rule only when the cost of preventing pollution is so great that it surpasses even the high average harm. This, however, is a circumstance in which prevention of pollution would be socially undesirable.

The foregoing point might be criticized on the ground that a court may not possess all the data necessary to estimate average harm, so that the court cannot even formulate a proper damage award. In this case, the use of property rules appears to have the virtue that courts need not estimate harm. But this view is specious. It ignores the fact that a court must make some estimate of harm in selecting which property rule to apply: to decide whether it is victims or injurers who are to be accorded property rule protection, courts must determine whether the harm or the prevention cost is greater, which requires that the court estimate both.⁴⁹ Whatever the court's estimate of harm is, the same estimate can be used to set damages under a liability rule. And, as we have explained at length, this rule will be superior to a property rule based on the same information (essentially because errors in estimating harm plague both rules but errors in estimating prevention costs hinder only property rules).

One could nevertheless object that it would appear arbitrary for courts to award damages on the basis of rough judgments and intuiti-

⁴⁷ This argument, which we believe to be part of the folk wisdom on the subject, is one we have heard often, including in response to our preceding analysis.

⁴⁸ Moreover, it should be realized that it is always possible to raise the level of protection of victims under a liability rule by setting damages above average harm, but this is not socially desirable on average — recall our conclusion at page 727 that the optimal level of damages equals average harm.

Additionally, note that our premise is that the courts cannot accurately determine harm in particular cases. When courts can ascertain harm on a case-specific basis (for example, because suits are brought only after cases of cancer eventuate), the liability rule will automatically result in damages equal to harm and in behavior superior to that under a property rule.

⁴⁹ In some contexts (for example, comparing the height of adjacent trees), it is possible to determine which of two things is larger without having to quantify either separately. But the harm caused by externalities (say, the seriousness of a disease caused by an emission) and the costs of reducing it (for example, changing production technology) are not immediately comparable, so it is necessary to quantify each. (How precise an estimate is appropriate is a subject we explore further in the text and notes that follow.)

It also would not be necessary to quantify harm and prevention costs separately if the two were directly correlated. In this Part, however, we assume that there is no correlation. See *supra* note 43. We later show that, when there is a correlation, property rules might indeed be better. See *infra* section III.A.2.

tion. But all findings of fact, to varying degrees, involve guesswork.⁵⁰ Moreover, as just noted, recourse to property rules hardly enables courts to avoid estimating harm. At most, the use of property rules enables courts to shield their guesswork about harm from view. Even further, the use of property rules requires courts to make some estimate of prevention costs, so the actual guesswork involved is necessarily greater than under liability rules.

Another reason why the use of rough estimates under a liability rule should not be disturbing is that property rules can be understood as liability rules that use inferior estimates. Recall that under property rules the court implicitly sets damages equal either to zero (when the rule permits injurers to act freely) or to infinity (when the rule protects victims).⁵¹ These levels of damages — zero or infinity — may be regarded as guesses about harm, and are ones that are, by definition, worse than the court's best estimate of actual harm, however rough and uncertain that estimate may be.⁵²

(b) *The Possibility That Systematic Underestimation of Harm Favors Property Rule Protection of Victims.* — A different criticism of liability rules concerns the possibility that a court might set damages systematically below average harm. The liability rule might then be inferior to property rule protection of victims because excessive harm will occur under the liability rule.⁵³ (We say "might" for two reasons: (1) the underestimation must be large for the liability rule to be inferior; and (2) a court that significantly underestimates harm might mistakenly assign a property right entitlement to the injurer, an even worse outcome than that reached under a liability rule with damages that are too low.) This possibility leads us to consider why in fact damages might be too low.

We do suspect that damages are too low when there are components of loss that are hard to estimate, including idiosyncratic elements

⁵⁰ Our argument assumes that guesses are not systematically biased even if imprecise. (For example, the height of a single, randomly selected American is an unbiased estimate of the average height of Americans, even though it would not be a very reliable estimate.) We consider systematic bias below in subsection (b).

⁵¹ See *supra* pp. 723–24.

⁵² There remains the question of how accurate damages *should* be under liability rules. Although the need to state a specific figure may motivate courts to expend more effort to achieve greater precision, our argument in the text is that courts will do better under liability rules than under property rules even if they do not expend additional effort. Moreover, additional precision will often be of little value with regard to affecting behavior, particularly when injurers cannot predict courts' errors in advance. See Louis Kaplow & Steven Shavell, *Accuracy in the Assessment of Damages*, 39 J.L. & ECON. (forthcoming April 1996) (on file with the Harvard Law School Library).

⁵³ Cf. Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1103–06 (discussing the problem for the case in which bargaining is possible, but imperfect).

of harm.⁵⁴ For example, when a person's home is destroyed, courts normally limit damages to market value even though the person might have attached special additional value to the home. When individuals are killed, courts ordinarily base damages on lost income, even though this determination ignores the value of individuals to themselves as well as to family and friends. When environmental harms involve losses that are hard to measure from market data (such as the death of animals, like sea otters, without clear commercial value), damages calculated under standard tort principles may understate true social losses. If damages understate average harm significantly, then a property rule protecting victims might be superior to a liability rule. We might, for example, want to protect an environmentally important area by forbidding factories from operating nearby if this activity would expose the area to a substantial risk of harm.

But such a proposal raises the allied question: if damages do not approximate average harm, can the legal system remedy this problem? In principle, we believe that the problem can be solved, but perhaps only if the process by which damages are calculated is altered. To amplify, the reason that courts exclude certain components of loss is that, in contrast to market-related losses, they are "speculative" and thus cannot be "objectively determined."⁵⁵ Further, we presume that were these categories of loss allowed in damage calculations, much dispute between the parties would ensue because damages would have an open-ended quality. This contest would tend to consume the courts' and the parties' time and resources. One might therefore attempt to explain the exclusion of such categories of loss from damage calculations as being the lesser of two evils — an inadequate level of damages (implying inadequate deterrence) being better than excessive administrative costs.

Yet if the administrative costs of fully determining harm according to customary procedures would be problematic for our legal system, courts could employ streamlined methods — for example, disallowing introduction of all but the most limited evidence — to arrive at estimates of harm including now-omitted components. As long as these estimates are not systematically biased, average damages will equal average harm, and our argument about the superiority of the liability rule will remain valid.⁵⁶ (Recall our observation that courts could set

⁵⁴ See Calabresi & Melamed, *supra* note 1, at 1108; Ellickson, *supra* note 1, at 735–37; Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1103 & n.48. Damages also may be systematically low if not all victims sue. Note, however, that imperfect enforcement may also pose problems for property rules.

⁵⁵ See, e.g., *Bigelow v. RKO Radio Pictures, Inc.*, 327 U.S. 251, 264 (1946) ("[T]he jury may not render a verdict based on speculation or guesswork."); Krier & Schwab, *supra* note 7, at 457–58; sources cited *supra* note 54.

⁵⁶ See Kaplow & Shavell, *supra* note 52.

damages using the same crude estimate of harm that they would have employed in assigning the entitlement under a property rule.)

Going further, courts could employ predetermined tables for estimating losses (for example, so much for a sea otter, so much for a life). The table entries might be calculated on some reasonable basis with information furnished by experts. The use of tables would reduce, potentially to nothing, the cost on a per-case basis of including a presently excluded component of loss.⁵⁷ The argument that there is a systematic tendency to underestimate loss would then not apply, and the argument in favor of liability rules would be strengthened.⁵⁸

B. *Parties Bargain with Each Other*

In some situations, victims and injurers will have an opportunity to bargain with each other relatively cheaply, such as when a single injurer and a single victim are neighbors. To understand this case, we will suppose that parties can bargain costlessly with each other before the injurer decides whether to cause harm.⁵⁹ In this situation, the choice between property and liability rules should diminish in importance because, if the rule chosen would lead to a suboptimal result, the parties could in principle make a mutually desirable agreement incorporating the optimal result, harm or no harm, as the case may be. This observation is an application of the Coase Theorem.⁶⁰

To elaborate, we must make an explicit assumption about the nature of bargaining. We consider a simple model of bargaining: one party makes a take-it-or-leave-it offer or demand to the other. In this model (as well as in more general models), mutually beneficial agreements are always made if parties have perfect information about each other. But if parties do not have perfect information about each other, a party may misgauge another and make a demand or offer that

⁵⁷ See Randall R. Bovbjerg, Frank A. Sloan & James F. Blumstein, *Valuing Life and Limb in Tort: Scheduling "Pain and Suffering,"* 83 NW. U. L. REV. 908, 928-30 (1989); Ellickson, *supra* note 1, at 736-37, 739-40 (advocating schedules for the subjective value of homes in the nuisance context to avoid undervaluation while limiting administrative costs); Kaplow & Shavell, *supra* note 52 (manuscript at 16-18); Frederick S. Levin, *Pain and Suffering Guidelines: A Cure for Damages Measurement "Anomie,"* 22 U. MICH. J.L. REFORM 303, 319-22 (1989).

⁵⁸ In the latter part of this subsection, we have discussed how courts can remedy the problem of systematic underestimation of harm by altering their methods of damage assessment. But it might be objected that this is for some reason infeasible and, as a consequence, that the legislature should protect victims through use of a property rule. If the legislature could do that, however, we wonder why it could not instead require that courts employ damage tables. (Fear that courts would circumvent the legislature's damage tables is no more plausible than a concern that courts would be unfaithful in enforcing the legislature's property rule.)

⁵⁹ For discussion of costly bargaining, see section II.D.2.

⁶⁰ See Coase, *supra* note 18, at 2-15.

would be refused, so that mutually beneficial agreements might not be made.⁶¹

1. *Bargaining Is Always Successful.* — Consider first the case in which parties always strike mutually beneficial bargains because they have perfect information about each other.⁶² In this case, *there is no difference between property and liability rules*: bargains leading to an optimal result will always be made. If, under either type of rule, an optimal outcome otherwise would not occur, it must be possible to lower total costs by agreeing to the optimal outcome; thus, with an appropriate payment by one side to the other, both sides can be made better off.

For example, suppose that a property rule under which the victim has the right to be free from harm applies but that this allocation is suboptimal because harm would be \$1000 and prevention cost would be \$1200. Then a mutually beneficial agreement by which the injurer would be allowed to cause harm exists: any payment by the injurer to the victim between \$1000 and \$1200 would be acceptable to both the injurer and the victim. If, for concreteness, we assume that the victim makes a demand, then he would ask for an amount between these two figures, and an agreement would be made; in fact, he would ask for (just under) the maximum amount, \$1200.⁶³ The victim would not ask for more than \$1200 (to avoid preventing an agreement) because, by assumption, he knows the injurer's prevention cost.

Let us consider one more example, in which harm is \$1500, the prevention cost is \$1200, and a liability rule in which damages are incorrectly estimated to be \$1000 applies. The injurer would choose to cause harm in the absence of bargaining. With bargaining, the victim would make an offer to induce the injurer not to cause harm; any

⁶¹ See, e.g., Joseph Farrell, *Information and the Coase Theorem*, 1 ECON. PERSP. 113, 115 (1987) (discussing how the applicability of the Coase Theorem depends upon the nature of bargaining).

⁶² See Alvin E. Roth & J. Keith Murnighan, *The Role of Information in Bargaining: An Experimental Study*, 50 ECONOMETRICA 1123, 1124-37 (1982) (offering evidence that parties usually come to an agreement when each knows the other's willingness to pay).

⁶³ If the victim asked for \$1200, the injurer would be indifferent about whether to make an agreement, so the victim might demand slightly less, say \$1199.99. In the discussion to follow, we assume for convenience that injurers who are indifferent will accept victims' offers.

We note, however, the existence of studies suggesting that, in contexts such as the present one, the party receiving the offer might reject it, against his own self-interest, if the offeror insists on too large a share of the surplus. See, e.g., Lawrence M. Kahn & J. Keith Murnighan, *A General Experiment on Bargaining in Demand Games with Outside Options*, 83 AM. ECON. REV. 1260 (1993); Richard H. Thaler, *Anomalies: The Ultimatum Game*, J. ECON. PERSP., Fall 1988, at 195. The implication is that gains might be shared differently, but this does not directly influence our argument. An insistence on the sharing of gains may, however, introduce asymmetric information into the bargaining process (because the offeror may be unsure of when the offeree would reject an offer), which would make the analysis of the next subsection relevant.

offer between \$200 and \$500 would be mutually beneficial to them,⁶⁴ and the victim would choose \$200.

These examples illustrate that when bargaining always succeeds, the outcome reached will always be optimal. Consequently, the choice between property and liability rules does not affect the achievement of optimality.

2. *Bargaining Is Not Always Successful.* — Now let us examine the case in which bargaining does not always lead to a mutually beneficial outcome. As we said, this problem occurs when a party, misconceiving the other's true position, offers too little or asks for too much, in which case his offer or demand will be rejected. For example, consider again the case in which the victim enjoys the property right not to be injured and harm would be \$1000. Now assume that the victim is uncertain about the injurer's prevention cost: some injurers' costs are \$1200, others' costs are \$2000, and the victim does not know which type of injurer he confronts. In this case, if the victim demands \$2000 for allowing the injurer to cause harm and the injurer happens to be one whose prevention cost is \$1200, the injurer will refuse the demand. Further, the victim would find it rational to ask for \$2000 if the probability that the injurer's prevention cost is \$2000 is sufficiently high (over 20%): the extra \$800 he obtains from those willing to pay \$2000 rather than \$1200 will more than compensate for the rejections and loss of \$200 (receipt of \$1200 net of harm of \$1000) from those only willing to pay \$1200.⁶⁵ More generally, parties will often find it rational to ask for an amount exceeding the maximum the other party might be willing to pay, even though that strategy will lead to some rejected offers.⁶⁶

⁶⁴ The victim would be willing to pay up to \$500, for if the injurer caused harm, then the victim's net loss, after collecting damages of \$1000, would be \$500. The injurer would want at least \$200 because this amount would reduce his cost to \$1000 after he bears the prevention cost of \$1200, and \$1000 is what he would pay if he caused harm.

⁶⁵ If the fraction of injurers whose prevention cost is \$2000 is f and the victim asks for \$2000, then the likelihood of acceptance will be f , and the victim's expected gain will be $(\$2000 - \$1000)f = \$1000f$. (The \$1000 is subtracted because the victim suffers harm if and only if his demand is accepted.) If the victim demands \$1200, then both types of injurers will accept, so the expected gain will be $\$1200 - \$1000 = \$200$. Therefore, a \$2000 demand is profitable for the victim if and only if $\$1000f > \200 , which is to say, if and only if f exceeds .2.

⁶⁶ This proposition is true independently of the particular model of bargaining. For example, in models with repeated rounds of bargaining, the problem of failure to make a mutually beneficial agreement remains, because during such rounds parties can bluff, dissimulate, and engage in other strategies through their offers, demands, and statements. As long as there is uncertainty about some factor affecting the other party's willingness to make an agreement, a rational party may make a demand or offer that the other will turn out to refuse. See Roger B. Myerson & Mark A. Satterthwaite, *Efficient Mechanisms for Bilateral Trading*, 29 J. ECON. THEORY 265 (1983); John Sutton, *Non-Cooperative Bargaining Theory: An Introduction*, 53 REV. ECON. STUD. 709 (1986) (literature survey).

However, William Samuelson emphasizes that, if an entitlement is auctioned in a particular way between the parties rather than allocated through bargaining, the problems associated with

How does the chance that bargaining may not lead to mutually beneficial agreements bear on the comparison between property and liability rules? When parties bargain in the face of asymmetric information, does the liability rule remain superior to property rules — or does it become equivalent or inferior? *There is no unambiguous conclusion: examples can be constructed in which either the liability rule is superior to property rules or the reverse is true.*⁶⁷

We present such examples in the Appendix,⁶⁸ but it is useful for us to state here our assumptions and exactly what we show. We assume that there is a population of injurers whose prevention costs vary and a population of victims who differ in the harms they might suffer. Each injurer knows only the distribution of harms among victims, each victim knows only the distribution of prevention costs among injurers, and courts know only the distributions of prevention costs and of harms. Given the legal rule, the victim makes a single offer or demand, which the injurer either accepts or rejects. The offer or demand is that which maximizes the expected gain of the victim. To evaluate a legal rule, we compute the average social costs under the rule. Our examples demonstrate that these average social costs could be lower either under a liability rule with damages equal to average harm or under a property rule.⁶⁹

Although we cannot say that the liability rule is necessarily superior to property rules when imperfect bargaining occurs, there is an argument suggesting that the liability rule tends to be superior. This argument is based upon the liability rule's superiority in the absence of bargaining. That is, before any bargaining occurs, at the beginning of the "race" between the two types of rule, the liability rule is ahead of the property rules. Hence, one might expect that, after imperfect bargaining occurs, the liability rule will remain ahead of the property rules, although not as far ahead. (More precisely, one might expect this outcome because, when bargaining is entirely successful, liability

asymmetric information and bargaining can be overcome. See William Samuelson, *A Comment on the Coase Theorem*, in *GAME-THEORETIC MODELS OF BARGAINING* 321, 331-35 (Alvin E. Roth ed., 1985). Yet, as Samuelson acknowledges, the auctions he discusses are often not useful because they would require the initial holder of an entitlement to share too much of the auction proceeds with others. Holders of entitlements might therefore not agree to participate in the auctions (and, if the law required participation, incentives to acquire and improve property would be adversely affected). See *id.* at 336-37.

⁶⁷ This indeterminacy was first shown in Steven Shavell, *Property Rights and the Rule of Liability in a Simple Bargaining Model* (July 1988) (unpublished manuscript, on file with the Harvard Law School Library).

⁶⁸ See *infra* Appendix section I.B.2, cmts. a, b.

⁶⁹ Ayres and Talley consider a model similar to ours. The main difference in their model concerns the bargaining regime that they choose to study. They assume that the victim does not make a single offer or demand; instead, he makes a preliminary statement about his willingness to pay or his demand, and then the injurer replies with a single offer or demand. See Ayres & Talley, *supra* note 10, at 1047-50. For further discussion of their model, see Appendix section I.B.2, comment c.

and property rules are equivalent.) The liability rule will remain ahead of property rules unless bargaining is, for some reason, substantially more successful under property rules than under the liability rule (a possibility to which we will return).⁷⁰

Another way to express the foregoing point is to observe that the advantage of the liability rule over property rules in the absence of bargaining rests upon two elements: that an efficient outcome is more likely under the liability rule and that, when the outcome is inefficient, the extent of inefficiency tends to be less. Because an efficient outcome is more likely under the liability rule, bargaining need not take place as often, so the prospect that bargaining will fail is irrelevant in a greater range of cases. And because the extent of initial inefficiency tends to be less under the liability rule, the failure of bargaining will be less serious when it does occur. Both factors lend credence to the conjecture that the liability rule will tend to be superior to property rules when bargaining is not always successful.⁷¹

⁷⁰ We remind the reader that, under the liability rule we have been discussing, damages equal average harm. It should be observed, however, that the optimal liability rule is likely to involve a different level of damages. Whereas the optimal level of damages in the absence of bargaining is the average harm, *see supra* p. 727; *infra* Appendix section I.A.2, we would not suppose that the optimal level of damages in the presence of bargaining, given its complexities, would remain equal to average harm. We have no reason to believe, however, that the optimal level of damages would systematically be either above or below the average harm.

We note that it is possible for fairly extreme damages to be optimal. This is demonstrated by our examples in Appendix section I.B.2, comments a and b. When fairly extreme damages (for example, damages of \$.01) are optimal, we would interpret the liability rule to be a property rule (for example, to be a rule protecting the injurer if optimal damages are \$.01).

⁷¹ Ayres and Talley, cited above in note 10, suggest that liability rules are likely to be superior to property rules when there is imperfect bargaining. But the reason they furnish for this conclusion is different from that given here. They believe that *the liability rule facilitates bargaining* as compared to property rules. We see no systematic reason for this to be so; indeed, the numerical example they examine supports our view, not theirs! (For further discussion of their argument, see Appendix section I.B.2, comment c, and Louis Kaplow & Steven Shavell, *Do Liability Rules Facilitate Bargaining? A Reply to Ayres and Talley*, 105 YALE L.J. 221 (1995).) The argument in the text is that the liability rule may tend to be superior to property rules mainly because, *under the liability rule, there is less need for parties to engage in bargaining, and inefficiency in the absence of bargaining will tend to be only moderate*. We do not argue (as they do) that the liability rule is superior because, *when parties engage in bargaining, they are systematically more likely to achieve an agreement than under property rules*. (Indeed, as discussed in the text to follow, the opposite tendency is plausible.)

Ayres and Talley also make a separate point: that bargaining under the liability rule actually will be impeded if courts assess harm accurately because this accuracy effectively introduces asymmetry of information between victims and injurers. *See* Ayres & Talley, *supra* note 10, at 1065-69. This general point is correct and was initially developed in similar contexts by Kathryn E. Spier, *Settlement Bargaining and the Design of Damage Awards*, 10 J.L. ECON. & ORGANIZATION 84 (1994) [hereinafter Spier, *Settlement Bargaining*], and JASON S. JOHNSTON, BARGAINING UNDER RULES VERSUS STANDARDS (University of Pa. Inst. for Law and Economics Discussion Paper No. 165, 1994). *Cf.* Kathryn E. Spier, *Incomplete Contracts and Signalling*, 23 RAND J. ECON. 432 (1992) (concerning contract renegotiation). In the present context, suppose that victims know their levels of harm and anticipate receiving damages equal to true harm from courts, but that injurers do not know victims' levels of harm. Then bargains will tend not to be struck

In light of this advantage of the liability rule, the reader may wonder why we conclude that it is formally indeterminate which type of rule is superior given imperfect bargaining and why we were able to construct examples illustrating this point.⁷² The reason that the liability rule does not necessarily perform better is that bargaining may not be equally successful under the two types of rules. Indeed, just because property rules are behind in the race with the liability rule before any bargaining occurs — that is, just because the parties have more to gain from bargaining successfully — they will be more likely to conclude beneficial bargains. In addition, because imperfect bargaining involves subtle and complex elements, it is hard to predict the effect of this or that starting point for bargaining — here, a property rule or a liability rule. (For example, if most inefficiency may be eliminated under both rules when bargaining occurs, it may be a matter of happenstance whether slightly more inefficiency remains under one type of rule or another.) The only conclusion that can safely be offered is that the choice between property and liability rules is less likely to be important when parties can bargain than when they cannot.⁷³

between victims and injurers: the only offer a victim would accept would be for more than his true loss, yet injurers would know that victims would accept only such offers and thus would not want to make offers that victims would accept. (We do note, however, that victims may have an incentive and the ability to reveal their true harm to injurers, which would eliminate the problem of asymmetric information.) By contrast, if courts only estimate harm, then both victims and injurers may have similar knowledge of the damage amount in advance, thus reducing the asymmetry of information and allowing for the conclusion of some bargains.

We also mention that, aside from the foregoing point, courts should not seek to ascertain harm with accuracy if (as was just assumed) injurers do not know the harm victims would suffer. In that circumstance, accuracy will not improve injurers' incentives to reduce harm but will involve added costs for the legal system. On this theme, see Kaplow and Shavell, cited above in note 52, and, for a qualification, see Spier, *Settlement Bargaining*, cited above.

⁷² See *infra* Appendix section I.B.2, cmts. a, b. In a separate paper, Eric Talley demonstrates that a liability rule with a properly chosen level of damages is always superior to property rules. See ERIC L. TALLEY, PROPERTY RIGHTS, LIABILITY RULES, AND COASEAN BARGAINING UNDER INCOMPLETE INFORMATION 17–26 (John M. Olin Program in Law and Economics, Stanford Law School, Working Paper No. 114, 1994). This result might appear to be inconsistent with our conclusion that whether a property rule or the liability rule is superior is indeterminate, but it is not, because it is derived under a particular set of assumptions. Among other things, Talley's demonstration assumes that an "optimal mechanism" (which need not be the bargaining process that the parties actually would employ) governs the outcome of bargaining. See *infra* note 219. Moreover, Talley shows only that there exists *some level of damages* such that the liability rule with these damages will be superior to a property rule, not that a liability rule with damages equal to or near the average harm will be superior. Thus, according to his analysis, the liability rule that is superior to a property rule might be a liability rule with damages of \$.01, but we would view that rule as tantamount to a property rule (favoring injurers). See *supra* note 70.

⁷³ In the numerical examples we report in Appendix section I.B.2, comments a and b, the difference between the inefficiencies resulting under property and liability rules in the case of imperfect bargaining is usually quite small relative to the difference in the case without bargaining.

C. Victims' Behavior

Until this point in our analysis, we have not mentioned the important role victims may play with respect to harmful externalities. Victims sometimes make choices that expose themselves to harm, such as electing to locate near a polluter. And, if exposed to harm, victims also are frequently able to mitigate or prevent it, for instance by installing air purifiers to temper the ill effects of pollution. Victims' ability to reduce or avoid harm means that it may be socially advantageous for them to do so. If victims can cheaply locate away from a factory, the factory need not undertake expensive precautions to prevent harm; if victims can install air purifiers at lower expense than the factory would bear for smoke scrubbers, then victims should do so.

The role of victim behavior in preventing harms suggests three implications for our conclusions. (For simplicity, we confine our consideration here to the situation in which bargaining is not possible.⁷⁴) First, the liability rule loses some of its appeal because, by compensating victims for their losses, it dulls their incentives to avoid or prevent harm.⁷⁵ Courts can ameliorate this problem by denying or limiting payments to victims who fail to take action to avoid or mitigate harm, as is accomplished through the defense of contributory negligence and the principle of mitigation of damages. Arguably, these are imperfect tools for controlling victims' behavior because courts' information about what victims could have done and what various actions would have cost will often be inadequate.⁷⁶ However, a legal rule compelling injurers to make payments to the state rather than to victims would solve the problem of inadequate victim incentives.⁷⁷

Second, the case for property rule protection of victims (such as it is) also becomes weaker because it similarly dilutes victims' incen-

⁷⁴ If bargaining occurs and is always successful, it may involve agreements about victim as well as injurer behavior. Then, as before, the choice of legal rule will not affect social welfare. If bargaining is imperfect, the effects to be noted in the text will be relevant but less important than in the absence of bargaining because of the possibility of successful bargaining. We note, however, that the likelihood of successful bargaining, especially about victims' location decisions, may be small because it may require injurers to identify and bargain with all potential victims before they make their location decisions.

⁷⁵ See, e.g., Coase, *supra* note 18, at 42.

⁷⁶ The problem, in part, is that defenses will only incorporate variables that the court can observe; this is the argument in Steven Shavell, *Strict Liability Versus Negligence*, 9 J. LEGAL STUD. 1 (1980), that defenses typically take into account levels of "care" but not levels of "activity."

⁷⁷ Examples include fines, pollution taxes, see *infra* note 121, and "decoupling," under which a portion of what injurers pay goes to the government rather than to victims, see A. Mitchell Polinsky & Yeon-Koo Che, *Decoupling Liability: Optimal Incentives for Care and Litigation*, 22 RAND J. ECON. 562 (1991).

tives.⁷⁸ Again, as with liability rules, the law may seek to circumvent the incentive problem in the property rule context, notably through the doctrine of "coming to the nuisance"⁷⁹ and by limiting the right to an injunction to those circumstances in which the victim could not have prevented the harm.⁸⁰ However, these approaches are not cure-alls.

Third, property rule protection of injurers' right to cause harm may become appealing: under this regime, victims will plainly have strong incentives to avoid exposure to harm and to reduce harm if exposed. (We say "may" because the improvement in victims' incentives comes at the price of a dilution of injurers' incentives.)

In sum, consideration of victims' incentives to avoid or reduce harm diminishes the attractiveness of the conventional liability rule, lends no support to property rule protection of victims, and may enhance the appeal of both property rule protection of injurers and modification of liability rules to require that damages be paid to the state rather than to victims.

D. Additional Considerations

1. *Judgment-Proof Injurers.* — In evaluating the liability rule, we have assumed that injurers are able to pay damages for harm done. In reality, however, their ability to pay may not be sufficient to cover a court award. For example, a firm that causes many deaths through the release of toxic substances may not have the assets necessary to pay damages.

Under a liability rule, a general consequence of a party's limited wealth is the dilution of its incentive to reduce harm.⁸¹ For example,

⁷⁸ In the absence of bargaining (as is assumed in the text), victims do not suffer losses under the property rule because injurers are prevented from causing harm. Thus, victims do nothing to reduce harm. Victims also do nothing to reduce harm under the liability rule (in the absence of defenses concerning victims' behavior), for they are fully compensated for any losses suffered. Thus, victims' behavior under both rules is the same.

When there is bargaining, however, the situation is more complicated, and the property rule and the liability rule are not generally equivalent with regard to victims' behavior. A case of interest, *see supra* note 74, is the one in which victims have already made their location decisions (or other decisions affecting exposure to harm), so that bargaining concerns only injurers' behavior. Here, under property rule protection, victims can generally extract some part of any surplus to be had from agreements with injurers allowing them to cause harm. By contrast, under the liability rule, injurers do not surrender any surplus when they cause harm; injurers merely compensate victims for their losses. Victims' ability under property rule protection to extract surplus from injurers when they suffer harm does two things: it creates incentives for them to expose themselves to harm *ex ante* (relative to their incentives under the liability rule), but it also creates some incentives for them to reduce the magnitude of harm because doing so would increase the surplus they can later obtain through bargaining.

⁷⁹ See Donald Wittman, *First Come, First Served: An Economic Analysis of "Coming to the Nuisance,"* 9 J. LEGAL STUD. 557 (1980).

⁸⁰ See Ellickson, *supra* note 1, at 758-61 (criticizing nuisance doctrine for failing to allow sufficient defenses addressed to plaintiffs' failure to minimize damages).

⁸¹ See Steven Shavell, *The Judgment Proof Problem*, 6 INT'L REV. L. & ECON. 45 (1986).

a firm with assets of only \$1 million might well decide against spending \$200,000 to reduce the risk of a \$20 million accident by 10%: such an expenditure would reduce the firm's expected pay-out by only $10\% \times \$1 \text{ million}$, or \$100,000. But the expenditure would be eminently desirable from a social standpoint because it reduces expected harm by $10\% \times \$20 \text{ million}$, or \$2 million. More generally, the greater the difference between the assets of a party and the harm it could cause, the more its liability-related incentives to take precautions will be compromised.

An answer to these incentive problems under the liability rule is for the state to employ property rule protection of victims.⁸² If victims enjoy this protection, then in principle they can prevent harm regardless of how little wealth the injurer may have. A potential victim of a \$20 million accident can enjoin the firm with assets of only \$1 million from continuing its dangerous operations.⁸³ Property rule protection of victims will be superior to the use of the liability rule when the drawback of the liability rule — the inadequacy of injurer incentives due to the judgment-proof problem — is more important than the disadvantage of property rule protection — the possibility that injurers will be forced to spend excessively to prevent harm.

Alternatively, it may be possible to retain the advantages of the liability rule in some contexts by requiring injurers to pay in advance for *expected* harm rather than to pay for *actual* harm after it occurs. Because the expected harm — the harm discounted by the probability that it will occur — will often be much lower than the actual harm, it may be within the capacity of an otherwise judgment-proof injurer to pay.⁸⁴ Another response to the judgment-proof problem would be to retain the liability rule while requiring potential injurers to demon-

⁸² One may interpret property rule protection of victims to include not only granting victims the right to enjoin harmful operations of firms, but also imposing common safety regulations. A requirement that a firm install a safety device is a species of guarantee against harm for the victim. The general point that safety regulation becomes attractive relative to liability rules when the judgment-proof problem is important is advanced in Steven Shavell, *Liability for Harm Versus Regulation of Safety*, 13 J. LEGAL STUD. 357, 360 (1984).

⁸³ A qualification to this statement is that the legal system sometimes employs monetary sanctions (such as criminal fines) to enforce property rules. In such cases, a party's lack of assets might hamper enforcement. In this situation, however, the state could also use its police powers to enforce property rule protection (for example, by closing down a firm). Also, the state might resort to imprisonment as a further sanction.

⁸⁴ Consider a firm with assets of \$1 million that could cause a \$10 million accident, and assume that the cost of a safety device that would reduce the risk of the accident from 5% to 4% is \$60,000. The device is socially worthwhile because it reduces expected accident losses by $1\% \times \$10 \text{ million} = \$100,000$. If the firm must pay in advance for expected harm, its bill would fall from \$500,000 to \$400,000 if it installs the device, so it will do so, saving \$40,000. The judgment-proof problem does not affect the firm because it has sufficient assets to pay in advance for expected harm. But if the firm faces liability only when harm occurs, it will not spend \$60,000 to install the device: if it does so, its expected liability will drop from $5\% \times \$1 \text{ million} = \$50,000$ to $4\% \times \$1 \text{ million} = \$40,000$, or by only \$10,000.

strate their ability to pay prior to causing harm (for example, by posting bonds or acquiring insurance).⁸⁵

2. *Administrative Costs.*— Now let us consider the issue of the administrative costs surrounding the use of property and liability rules. These costs consist of the public and private costs associated with settled or litigated lawsuits and the costs of bargaining to avoid the suboptimal outcome a rule would produce.

(a) *Litigation and Settlement.*⁸⁶ — Suppose that courts were able to apply property and liability rules perfectly and that parties were able to predict exactly what courts would do. Then, under property rules, no litigation would arise — and consequently no administrative costs would be incurred — because parties would know who possesses the entitlement. By contrast, the liability rule would generate positive administrative costs because all injurers would have to pay damages to victims. Even though all such cases would be settled immediately because parties would know the amounts of damages that courts would eventually award, effecting the transfers would involve some expenses. Hence, the liability rule would involve greater administrative costs than property rules.⁸⁷

In reality, legal outcomes are uncertain. In this case, it is unclear whether property rules or the liability rule is administratively cheaper. Uncertainty implies that, under both types of rule, some litigation will arise (because parties may disagree about possible trial outcomes) and that settlement will involve positive costs (which will mirror trial costs to some degree).⁸⁸ Would trial and settlement costs be higher under property rules or under the liability rule? Under property rules, courts

⁸⁵ See Ellickson, *supra* note 1, at 741 (noting that the judgment-proof problem could be addressed by requiring plaintiffs to demonstrate defendants' inability to pay as a condition to injunctive relief; in many nuisance cases, the defendant is a landowner who, by definition, has assets).

⁸⁶ A more complete analysis than that contained in this subsection would account for the effect of litigation and settlement costs on behavior (and bargaining) and would explain how the optimal level of damages under a liability rule should reflect such costs. For more information, refer to the sources cited above in note 45.

⁸⁷ But see Ellickson, *supra* note 1, at 762–71 (suggesting that specialized nuisance boards could reduce the administrative costs of damages assessment under a liability rule); *id.* at 772 (indicating that collective systems, such as fines and regulatory taxes, would be administratively more efficient for pervasive harms).

⁸⁸ See *id.* at 739 (arguing that the task of assigning property entitlements under nuisance law is expensive and introduces uncertainty). Ellickson makes the interesting observation that bargaining costs may be higher under property rules because, due to asymmetric information, parties will invest resources in determining each other's reservation prices, whereas, under a liability rule, the "collective rules on damages would establish targets for appropriate settlements and would considerably narrow the range of disagreements to be negotiated." *Id.* at 744. With liability rules, however, there will remain an incentive (albeit less of an incentive) to determine the other party's reservation price when damage awards do not equal actual harm, as in asymmetric information settings. Ellickson's observation is also applicable to bargaining in instances in which no lawsuit will be brought.

need to consider two variables — prevention cost and harm — whereas under the liability rule, only harm is relevant.⁸⁹ Property rules might appear to have an offsetting benefit because, to apply them, courts need only rank the variables to ascertain who ought to have the entitlement,⁹⁰ whereas under the liability rule, courts are compelled to derive a specific estimate of harm. But, as we have discussed in section II.A.3.(a), courts may in principle use the same estimate of harm employed under a property rule (in deciding whether the victim or injurer should have the entitlement) to set damages under a liability rule; a more accurate estimate of harm under a liability rule would be appropriate only if the further benefit with regard to behavior were greater than the incremental administrative cost.⁹¹

In sum, taking into account both the problem of effecting transfers and that of resolving uncertainty, we cannot determine a priori whether property or liability rules would involve lower litigation and settlement costs.

(b) *Bargaining to Avoid Undesirable Outcomes.* — Bargaining costs will tend to be higher under property rules than under the liability rule. The reason is that the liability rule tends to produce the efficient result more often than property rules do (assuming that the state's information is imperfect). As a result, bargaining to avoid a suboptimal result will occur less often under the liability rule.

(c) *Overall comparison.* — It is apparent from the preceding discussion that the administrative cost comparison depends upon the particulars of the situation. Nonetheless, we can indicate circumstances in which each type of rule has an administrative cost advantage.

The liability rule will probably generate lower administrative costs than will property rules if it is difficult to determine an injurer's prevention cost but the extent of harm is readily apparent.⁹² In this instance, little bargaining will occur under the liability rule, and cases that arise when injurers cause harm — whenever prevention cost exceeds harm — will be settled quickly. By contrast, under property rule protection of, say, victims, injurers will need to bargain for permission to cause harm whenever prevention cost exceeds harm. To complete the argument, we observe that bargaining expenses under the property rule plausibly exceed settlement expenses under the liability rule. (Under the liability rule, the only issue before the parties is the

⁸⁹ If courts employed a reverse liability rule instead, they would have to determine prevention cost rather than harm. In some instances, this may be cheaper. See Calabresi & Melamed, *supra* note 1, at 1120-21.

⁹⁰ However, if the property rule entitlement were intermediate — permitting some level of pollution rather than permitting or prohibiting all pollution — the precise values of prevention cost and harm would be relevant.

⁹¹ See *supra* pp. 729-30 & note 52.

⁹² If prevention cost but not harm is easily estimated, both rules would entail significant bargaining and litigation costs. But a reverse liability rule would be administratively cheaper.

extent of harm, which we are assuming to be apparent. Under the property rule, the parties need to agree on the division of the surplus — the difference between prevention cost and harm — which in these circumstances may be difficult.) We also note that, when ascertaining prevention cost is difficult, the parties may be uncertain about who would receive the property rule entitlement. This uncertainty might compound bargaining costs and also produce costly litigation.

In other circumstances, property rules can be cheaper than the liability rule. For instance, suppose that the state can easily assign property rights to injurers because prevention costs are usually very high relative to harm. In this case, under the property rule, neither litigation nor bargaining will be likely to occur. Under the liability rule,⁹³ however, there will be many cases and associated costs (at least those associated with settlement) because prevention cost usually exceeds harm.⁹⁴

3. *Risk Aversion.* — We have not yet commented on the protection of risk-averse parties (mainly individuals and small businesses⁹⁵) against risk. We do not believe, however, that issues of risk-bearing are of much importance to the choice between property and liability rules, due to the widespread availability of insurance on reasonably competitive terms. Risk-averse victims should often be able to insure against inadequate liability awards, or against harms they would suffer when injurers enjoy the property rule entitlement to cause harm. Furthermore, the fact that parties do not insure — because they are not

⁹³ The text refers to the ordinary liability rule, under which injurers pay damages to victims. In the instance described in the text, in which committing the harmful act is almost always efficient, a reverse liability rule might be attractive. Administrative costs would be incurred only when victims were willing to pay injurers not to act; this would be infrequent and, when it occurred, would involve a more efficient outcome.

⁹⁴ A property rule may have an administrative cost advantage even if property rights cannot be cheaply assigned in a manner that is usually correct. Consider a more general case in which efficient bargains are always struck, but there is some fixed cost of reaching agreement (the costs of getting together, drafting agreements, and making payments). Then, agreements that produce small efficiency gains (less than the bargaining cost) would not be made, and all agreements that are made would come at a cost. In this case, it can be demonstrated that, if the distribution of possible harm is symmetric (that is, if harm is just as likely to be a given amount above average as it is to be the same amount below average), the optimal level of damages continues to equal average harm. Because bargaining is less necessary under the liability rule, bargaining costs are less important, so the liability rule continues to be more efficient than a property rule. Now, consider the administrative costs of litigation. Suppose that there is no litigation under a property rule (if the rule is clear, parties may simply follow it) but that the costs of paying damages under the liability rule just equal the fixed cost of reaching ex ante bargains. Then it can be shown that the property rule would tend to be superior. The frequency of bargains under the property rule would be less than the combined frequency of bargaining and litigation under the liability rule, so total administrative costs would be lower under the former.

⁹⁵ Publicly traded businesses should be operated in an approximately risk-neutral manner because their owners are able to diversify their portfolios. This means that they would want each of their holdings to be operated roughly so as to maximize its expected value, without particular regard to risk. See ROBERT C. CLARK, CORPORATE LAW § 11.3, at 476–77, § 15.7, at 658 (1986).

able to purchase coverage at a price they consider attractive — need not constitute an argument for state provision of implicit insurance coverage through legal rules. If market-provided insurance is expensive, that will usually reflect real costs in its supply: moral hazard, fraudulent claims, or the effort required to assess harm. In such cases, legal rules should not generally be adjusted on account of risk-bearing unless courts can address the problems leading to expensive insurance better than insurance companies can.⁹⁶

Even if insurance were generally unavailable, it is not readily apparent whether risk-bearing considerations would favor property or liability rules. First, both property rule protection of victims and liability rules shield victims from risk.⁹⁷ Second, whatever may be the differences between the risks associated with property and liability rules, we cannot determine whether one rule is more desirable than the other without knowing whether victims or injurers are generally more in need of protection against risk. Although we may be able to form a judgment about this factor in particular contexts,⁹⁸ we cannot do so in general.

4. *Income Distribution.* — Concern about the distribution of income has no bearing on the choice between property and liability rules. Income redistribution can be accomplished more efficiently through the use of the income tax and transfer arms of government than through the selection of legal rules to serve distributional goals. If legal rules are chosen in part for distributional reasons, the goal of efficiency will sometimes be compromised, whereas distributional changes can be effected through modification of income taxes and transfers without sacrificing efficiency in the use of legal rules.⁹⁹ Moreover, legal rules are usually imprecise instruments for accomplishing distributional change because the groups affected by a rule tend to

⁹⁶ If, however, insurance markets fail due to adverse selection, it is possible that legal solutions would increase welfare, although the problem of how to accomplish this tends to be complex. See, e.g., B.G. Dahlby, *Adverse Selection and Pareto Improvements Through Compulsory Insurance*, 37 PUB. CHOICE 547 (1981).

⁹⁷ One may note subtle differences. An imperfect liability rule may over- or undercompensate victims, whereas a property rule protecting victims would perfectly insure them in the absence of bargaining. However, a property rule protecting victims may induce bargaining, through which victims are overcompensated because they will receive some of the surplus generated by their agreements.

⁹⁸ For instance, we would say that victims are more in need of protection against risk if they are poor people living near a polluting factory owned by a large corporation but less in need of protection if they are wealthy individuals living near polluting farms owned by poor farmers.

⁹⁹ For development of the argument that legal rules should not be used to redistribute income because the income tax and transfer system is superior, see Steven Shavell, *A Note on Efficiency vs. Distributional Equity in Legal Rulemaking: Should Distributional Equity Matter Given Optimal Income Taxation?*, 71 AM. ECON. REV. 414 (1981), and Louis Kaplow and Steven Shavell, *Why the Legal System Is Less Efficient Than the Income Tax in Redistributing Income*, 23 J. LEGAL STUD. 667 (1994).

be heterogeneous in their need for money or their ability to pay.¹⁰⁰ For example, the incomes of both pollution victims and polluters (that is, polluting firms' owners, workers, and consumers) will vary greatly;¹⁰¹ also, it is not clear which group would be relatively favored by the use of property or liability rules because the effects would depend upon how the property entitlement was assigned. In addition, a change in a legal rule affects only a fraction of any income class, whereas the income tax and transfer system affects virtually everyone.¹⁰²

5. *Notions of Entitlement.* — Notions of entitlement — noninstrumental justifications for rights — are often advanced in arguments about property and the law, and we briefly address them here. We should say, however, that our discussion is tentative, in no small part because we are unaware of a sustained, coherent statement and application of entitlement arguments to our subject.¹⁰³

What is the implication of a belief in entitlements for the choice between property rules and liability rules? By definition, property rule protection of a potential victim's entitlement protects it absolutely, whereas use of a liability rule may result in violation of the entitlement and possible undercompensation for its breach (if damages are sometimes too low). Thus, property rule protection of victims' entitlements to be free from harm appears superior to liability rule protec-

¹⁰⁰ See A. MITCHELL POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS 125-27 (2d ed. 1989).

¹⁰¹ Recall the example in note 98.

¹⁰² The general preference for redistribution through direct means has often been noted. See, e.g., Ellickson, *supra* note 1, at 683 (noting that most economists prefer direct transfer payments to indirect redistribution). But some of the important investigations of property versus liability rules have suggested that distribution should be taken into account. Both of Polinsky's articles on the subject, cited in note 1 above, devote substantial attention to the issue. In these articles, he does not regard the use of the income tax system as an adequate solution to distributional objectives because of the adverse incentive effects of redistributive taxation. See, e.g., Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1083-85, 1096. But, as explained in the articles cited above in note 99, departing from efficient legal rules to further distributive objectives causes the same adverse incentive effects as does redistributive taxation and also produces additional inefficiency; thus, only the income tax system should be employed to achieve distributional goals. (We note that Polinsky has subsequently expressed more skepticism about the desirability of using the legal system to redistribute income. See POLINSKY, *supra* note 100, at 7-10, 119-27, 144 n.87.)

Calabresi and Melamed also believe distributional factors to be important in the choice of legal rules. See Calabresi & Melamed, *supra* note 1, at 1098-1101. Their exposition is somewhat difficult to interpret, however, as they include many possible considerations under the rubric of "distribution." See *id.* at 1102-05. We understand their conception of distribution to include the following elements: (1) distributive justice directed at equality of income or wealth (the subject under present discussion); (2) natural law or corrective justice, concerned with entitlement (discussed in the next subsection); and (3) a possibly related concern for "merit goods" (such as education or bodily integrity) to which citizens might deserve an inalienable entitlement (which we believe to be inapposite in most contexts that we consider, unless interpreted as variations of the entitlement arguments discussed in the next subsection). See *id.*

¹⁰³ The closest example is Calabresi and Melamed's discussion of distributional factors. See *supra* note 102.

tion. But this same property rule violates any entitlements that potential injurers might have. A landowner, for example, might have an entitlement to burn leaves or to raise pigs, and this entitlement would be violated if he were forced to stop in order to protect his neighbor's entitlement to clean air or to odor-free air. Protection of the entitlement of the injurer, therefore, requires his possession of the property right to harm the victim. (And if he does not possess this right, it would appear, at the least, that a liability rule should govern, which would permit him to act and pay damages rather than be denied the opportunity.)

In consequence, consideration of the notion of entitlement does not generally point in favor of a property rule protecting victims, a property rule protecting injurers, or the liability rule — because victims' and injurers' entitlements compete with each other. Thus, it is necessary to invoke some justificatory theory to decide who should possess which entitlements and when.

One justification would derive from an underlying conception of natural rights. To make such a justification plausible, we would have to identify the origin of natural rights, which involves articulating a normative theory that is not connected to individuals' welfare (for a welfare-based theory is already captured by our original analysis). But if, by assumption, no person cares about a natural right *per se* — that is, independently of its utilitarian value — why should it be given any weight?¹⁰⁴

A second possible justification for why an entitlement should go to a particular person may emerge from a belief that, when a person uses property, a species of psychological bond to the property is formed. Violating a person's entitlement to his property would cause disutility by breaking the bond. This conception of the basis of entitlement raises such empirical questions as how long it takes for the bond to form, what the nature of the bond is for a corporation rather than for a person, and so forth. In any event, to the extent that psychological bonds underlie entitlements, one can, and presumably ought to, analyze the breaking of the bonds as components of harm (analogous to pain and suffering) in the type of utilitarian analysis that we have undertaken; separate treatment is not required. Indeed, our analysis of possible underestimation of harm emphasized that all elements of disutility should be reflected in damages.¹⁰⁵

A third source of justification of entitlements is that a legal rule itself confers an entitlement on a person. In other words, ownership of

¹⁰⁴ This is, of course, the time-honored question that utilitarians have put to anti-utilitarians. The question is particularly significant in the present context, for individuals may (and often do) sell their entitlements if their valuations are less than others' valuations.

¹⁰⁵ See *supra* section II.A.3.(b); see also *infra* section III.A.2 (making the same claim when addressing the taking of things).

a thing gives a person a set of entitlements with respect to it. But this idea is vulnerable to an obvious criticism: it renders circular any claims that the law should be this or that way in order to protect a person's entitlement.

A fourth justification of entitlements concerns distributive justice. In the preceding subsection, we explained why the general notion of distributive justice does not affect our analysis. Some commentators, however, have sought to justify distributive outcomes in specific cases by appealing to particularistic norms of corrective justice.¹⁰⁶ But difficulties remain in identifying the basis for these norms, in justifying them independently of parties' desires, and in distinguishing them from general theories of distributive justice.¹⁰⁷

¹⁰⁶ Accounts of corrective justice include JULES L. COLEMAN, *RISKS AND WRONGS* (1992); Richard A. Epstein, *Nuisance Law: Corrective Justice and Its Utilitarian Constraints*, 8 J. LEGAL STUD. 49 (1979); George P. Fletcher, *Fairness and Utility in Tort Theory*, 85 HARV. L. REV. 537 (1972); and Ernest J. Weinrib, *The Gains and Losses of Corrective Justice*, 44 DUKE L.J. 277 (1994).

¹⁰⁷ Before proceeding to discuss some of this work, we pause to note that it is not clear the extent to which corrective justice is advanced as a prescriptive theory rather than as a descriptive one. Compare Jules L. Coleman, *The Practice of Corrective Justice*, 37 ARIZ. L. REV. 15, 18 (1995) ("Most legal theorists who have been interested in corrective justice have been interested in it insofar as it might figure in an account, explanation or interpretation of various legal practices . . .") with *id.* at 20 ("[L]egal theorists who invoke the concept of corrective justice mean to treat it as a substantive moral ideal . . .").

We find peculiar the argument that a person deserves a particular payment from another person in a particular type of case when general distributive norms might call for the payment received to be taxed away (and, similarly, when the norms might call for the person making the payment to enjoy an income tax benefit to restore him to his correct level of income). To be sure, one could argue that the payment is nonetheless meaningful to the parties themselves, but then corrective justice is merely a component of preferences; its existence would be an empirical question, and if the preference exists, a utilitarian analysis would already include it. See generally George P. Fletcher, *Corrective Justice for Moderns*, 106 HARV. L. REV. 1658, 1666-69 (1993) (book review) (criticizing COLEMAN, cited above in note 106, for failing to offer a successful account of corrective justice that is independent of general distributive concerns); Stephen R. Perry, *Comment on Coleman: Corrective Justice*, 67 IND. L.J. 381 (1992) (making a similar critique of Coleman's views).

We are not alone in finding it difficult to ascertain clearly the various claims of corrective justice: "There are a number of quite different accounts of corrective justice [involving obligations of reparations between parties], but it has proven surprisingly difficult to specify the circumstances under which correlative rights and obligations of reparation arise and to say why they are justified." Stephen R. Perry, *The Moral Foundations of Tort Law*, 77 IOWA L. REV. 449, 450 (1992). Perry emphasizes the problem that corrective-justice claims, as others have formulated them, may dissolve into general distributive claims. See *id.* at 451-52. He sketches his own account, in which corrective and distributive justice are not wholly distinct. See *id.* at 496-513. In his scheme, he asserts that an obligation of reparation arises when there is culpable fault or when there is "outcome-responsibility" that "at a certain point" is "publicly acknowledged" as sufficiently equivalent. *Id.* at 510. The location of that point is not a "matter[] capable of rational demonstration," but "depend[s] on a sense of appropriateness that emerges from considered reflection on the normative implications of outcome-responsibility, where the outcomes in question are harmful interferences with human well-being." *Id.* The basis for overriding general distributive preferences or failing to advance the parties' interests as they perceive them (which would be necessary for Perry's theory to have independent significance) is not identified.

In the end, therefore, we find the notion of entitlement — as we understand its possible meanings — unclear and unhelpful for analysis.¹⁰⁸

E. Examples

Having completed our analysis of property versus liability rules in the context of externalities, we now briefly discuss several examples of the use of these rules to illustrate our arguments. We follow the examples with a comment on the distinction between property and liability rules.

1. *Industrial Pollution.*¹⁰⁹ — The problem of industrial pollution has become increasingly important over the years as the volume of discharges released into the environment has grown and as our knowledge of its consequences has developed. Pollution control is achieved predominantly through direct regulation,¹¹⁰ which is to say, through property rule protection.¹¹¹ Still, liability rules are utilized to some extent. Also, closely related to liability rules, tradeable pollution rights

¹⁰⁸ Our list of additional considerations does not include the so-called “offer-asking” problem associated with the possibility that the price that an individual would demand to give up an entitlement may exceed the price that he would pay to acquire it. See Don L. Coursey, John L. Hovis & William D. Schulze, *The Disparity Between Willingness to Accept and Willingness to Pay Measures of Value*, 102 Q.J. ECON. 679 (1987); W. Michael Hanemann, *Willingness to Pay and Willingness to Accept: How Much Can They Differ?*, 81 AM. ECON. REV. 635 (1991); Daniel Kahneman, Jack L. Knetsch & Richard H. Thaler, *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325 (1990). (For discussions of the offer-asking problem in the context of critiquing the economic analysis of law, see Mark Kelman, *Consumption Theory, Production Theory, and Ideology in the Coase Theorem*, 52 S. CAL. L. REV. 669 (1979); and Duncan Kennedy, *Cost-Benefit Analysis of Entitlement Problems: A Critique*, 33 STAN. L. REV. 387 (1981).) We do not believe, however, that this possibility raises issues separate from those we have already considered. Specifically, consider the most plausible sources of differences in offer and asking prices. One source is a wealth effect (individuals with an entitlement are thereby wealthier than those who do not have it). In such a case, it is possible that an outcome in favor of either party is efficient because efficiency is conditional on the distribution of wealth, which is affected by the assignment of the entitlement. As we discuss above in subsection 4, however, distributional goals should be pursued independently, using taxes and transfer payments. Other plausible sources of offer-asking differences are psychological factors (such as a feeling of attachment) and the effect of the law itself on parties’ valuations; these factors were considered in the text. Regardless of the cause of an offer-asking difference, we are inclined to believe that, once the cause is identified, the appropriate implications for the analysis, if any, will be apparent.

¹⁰⁹ For statements of the standard economic analysis of pollution remedies (but ones that do not emphasize the categories of property and liability rules), see WILLIAM J. BAUMOL & WALLACE E. OATES, *ECONOMICS, ENVIRONMENTAL POLICY, AND THE QUALITY OF LIFE* (1979); HARVEY S. ROSEN, *PUBLIC FINANCE* 100-07 (3d ed. 1992); and JOSEPH E. STIGLITZ, *ECONOMICS OF THE PUBLIC SECTOR* 184-97 (1986).

¹¹⁰ See, e.g., Clean Water Act, 33 U.S.C. §§ 1311-1314 (1988 & Supp. V 1993); Clean Air Act, 42 U.S.C. §§ 7407-7410 (1988 & Supp. V 1993).

¹¹¹ The main difference between regulation and property rule protection is that private parties enforce the latter at their option, whereas the government enforces regulation. This difference, however, does not affect our analysis.

have begun to be employed,¹¹² and the possible imposition of pollution taxes has been widely discussed.¹¹³

Bargaining appears to have relatively little importance in the context of industrial pollution because, as is often stated, victims of pollution are unlikely to bargain with those responsible for it. One reason is that the victims of many types of pollution are numerous, making coordination among them difficult, in part because individual victims will want to rely on other victims to bargain on their behalf.¹¹⁴ A further obstacle to bargaining is that each victim's expected harm from a particular generator of pollution may be small, so that individual victims may have weak incentives to bargain with that party.¹¹⁵

Our analysis suggests, of course, that when bargaining is improbable, liability rules tend to be superior to property rules. This conclusion raises questions about the observed degree of reliance on property rule protection and regulation. We note, however, that the legal rule that is actually applied is neither of the simple property rules that we studied, namely the rule protecting victims against any amount of pollution and the rule allowing firms to pollute without bound. Either rule would be extremely inefficient. What we find in reality are regulations that divide entitlements, that allow firms to pollute within prescribed limits, or that impose technological requirements — restrictions

¹¹² See Robert W. Hahn & Gordon L. Hester, *Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program*, 6 YALE J. ON REG. 109 (1989). For a discussion of the provisions of the 1990 Clean Air Act Amendments that authorize tradeable pollution rights, see PETER S. MENELL & RICHARD B. STEWART, ENVIRONMENTAL LAW AND POLICY 408-12 (1994). For an overview of the recent movement toward the use of economic incentives in federal pollution control policy, see Richard H. Pildes & Cass R. Sunstein, *Reinventing the Regulatory State*, 62 U. CHI. L. REV. 1, 112-25 (1995). In addition, California has a system of tradeable pollution rights. See CAL. HEALTH & SAFETY CODE § 44256 (West 1995); John P. Dwyer, *The Use of Market Incentives in Controlling Air Pollution: California's Marketable Permits Program*, 20 ECOLOGY L.Q. 103, 113 (1993) (stating that through the tradeable rights program "the Los Angeles Basin will become an experimental laboratory for the rest of the nation"). For analyses of tradeable rights, see J.H. DALES, POLLUTION, PROPERTY & PRICES (1968); T.H. TIETENBERG, EMISSIONS TRADING: AN EXERCISE IN REFORMING POLLUTION POLICY (1985); Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1341-51 (1985); and Robert N. Stavins, *Transaction Costs and Tradeable Permits*, 29 J. ENVTL. ECON. & MGMT. 133 (1995).

¹¹³ See, e.g., ROSEN, *supra* note 109, at 100-07; STIGLITZ, *supra* note 109, at 185-94; Adam Chase, *The Efficiency Benefits of "Green Taxes": A Tribute to Senator John Heinz*, 11 UCLA J. ENVTL. L. & POL'Y 1, 9-18 (1992) (arguing that pollution taxes are more efficient and provide better incentives than direct regulation).

¹¹⁴ See, e.g., Calabresi & Melamed, *supra* note 1, at 1119 (discussing the collective-action problem).

¹¹⁵ Cf. Ellickson, *supra* note 1, at 772-79 (proposing adjustments in the legal rules governing pervasive nuisances, which may impose minor costs on individual plaintiffs but substantial harm in the aggregate).

that one hopes reflect to some degree the harmfulness of pollution and the costs of its prevention.¹¹⁶

Nonetheless, we believe that significantly greater use of liability rules should be made. The primary advantage of liability rules, recall, is that firms facing liability are allowed to decide for themselves whether and how much to pollute, on the basis of their knowledge of the costs of pollution prevention and of the extra profits they can make by expanding production. Because courts and regulators frequently cannot discover this information in practice, they will sometimes make poor decisions when they prescribe particular behavior or a particular level of permissible pollution.¹¹⁷ Thus, only under liability rules is society able to make use of firms' superior knowledge of the costs of pollution control.¹¹⁸

Moreover, the criticism that a liability rule should not be employed because harm from pollution cannot be adequately measured is invalid. We have demonstrated that the use of a liability rule under which damages are set equal to estimated harm is superior to the use of property rules, and thus to pollution regulation. Indeed, the criticism overlooks the point that difficulties in assessing harm pose as great a problem for regulation as for the use of a liability rule: under regulation, the state must use its knowledge of harm (as well as of prevention costs) in deciding how much pollution to permit.¹¹⁹

Another implication of our analysis is that pollution taxes are preferable to the system of tradeable pollution rights that is in partial use

¹¹⁶ See statutes cited *supra* note 110. Nominally, many pollution regulations may have been set without the use of cost-benefit analysis. See Ackerman & Stewart, *supra* note 112, at 1334-40 (discussing the costs of present failure to use cost-effective means of reducing pollution). For example, the Clean Air Act does not include cost as a factor in standard-setting. See *Union Elec. Co. v. EPA*, 427 U.S. 246, 265 (1976) (holding that "economic or technological infeasibility" is precluded from consideration). Similar limitations exist in the Clean Water Act. See *Reynolds Metals Co. v. EPA*, 760 F.2d 549, 565 (4th Cir. 1985) (stating that balancing of costs and benefits is not required with respect to the "best available technology" standard); *Association of Pac. Fisheries v. EPA*, 615 F.2d 794, 805 (9th Cir. 1980) (stating that costs must be "wholly disproportionate to potential effluent reduction" before the EPA may take them into account). It is not clear, however, that existing rules are as extreme as would be implied by such formulations or that existing rules are fully enforced. See MENELL & STEWART, *supra* note 112, at 374.

¹¹⁷ Apparently, a significant error of this type may have occurred in the design of the Clean Air Act Amendments of 1990. See Jeff Bailey, *Electric Utilities Are Overcomplying with Clean Air Act*, WALL ST. J., Nov. 15, 1995, at B8.

¹¹⁸ See BAUMOL & OATES, *supra* note 109, at 241; STIGLITZ, *supra* note 109, at 192-93.

¹¹⁹ In some instances, it also may be difficult to measure the quantity of emissions. In such cases, liability rules (including pollution taxes) and property rules that regulate the amount of pollution (including tradeable permit schemes) would be excessively costly or infeasible. See *supra* note 43. But regulation of plant location, technology, or other observable characteristics would be possible.

today.¹²⁰ Pollution taxes are essentially a form of liability rule,¹²¹ whereas the tradeable-rights system has property-rule-like elements. To be sure, tradeable pollution rights have an advantage over conventional regulation of the amount of pollution each firm may generate. Under tradeable rights, firms that find it relatively cheap to prevent pollution do not buy the rights, but rather proceed to prevent pollution, while firms that find it quite expensive to prevent pollution tend to buy pollution rights and proceed to pollute. As a result, the induced *distribution of pollution among firms* is socially desirable. But the *total quantity of pollution* is fixed by the government when it decides on the quantity of tradeable rights. In setting the quantity, the government must use its own estimate of pollution control costs.¹²² Only if the government's estimate is accurate will the price that emerges in a market for tradeable pollution rights equal the best estimate of harm. As we have stressed, however, the government's estimates of costs are likely to be inaccurate, so the price of tradeable rights is likely to be incorrect.¹²³ Thus, firms will not decide how much to pollute on the appropriate basis; the result is that the total quantity of pollution will not be determined as it ought to be. By contrast, if the government employs pollution taxes in the way economists generally recommend — setting the tax equal to expected harm — the total quantity of pollution will be approximately efficient.¹²⁴

We further believe that pollution taxes offer certain advantages over conventional liability. As we discussed above, liability-related incentives are dulled if firms do not have the assets to pay for the harms that they might cause. This disadvantage is often relevant in the context of pollution — for example, with regard to the possibility of large-scale release of radioactive waste. Moreover, the problem of tracing harm to injurers means that damages have to be inflated for proper incentives to exist under the liability system, thereby making the judg-

¹²⁰ As we will explain in the text to follow, the belief that a tradeable rights system is preferable to a pollution tax because it is easier to set the quantity of pollution rights than the rate of the pollution tax, *see, e.g.*, James E. Krier, *Marketable Pollution Allowances*, 25 U. TOL. L. REV. 449, 452–54 (1994), is wrong.

¹²¹ The main difference between pollution taxes and a conventional liability rule is that victims do not receive tax receipts as payments for harms suffered. This difference is not important for what we have to say in this subsection — although it obviously does improve victims' incentives relative to what they are under conventional liability rules, as discussed in section II.C.

¹²² We emphasize that control costs include not only the costs of existing technology, but also the costs of developing new technologies and of reducing output, which may be even more difficult for the government to ascertain.

¹²³ See the example cited above in note 117.

¹²⁴ Instead of imposing pollution taxes, the government might sell pollution rights for a price equal to expected harm. The results under these two regimes would be the same. Such pollution rights differ from the ones under discussion in the text because the quantity of these rights would be determined by firms' willingness to purchase the rights at a price equal to expected harm, rather than by the government. *See* Robert Cooter, *Prices and Sanctions*, 84 COLUM. L. REV. 1523, 1535–36 (1984).

ment-proof problem more serious.¹²⁵ The use of pollution taxes rather than ex post liability would alleviate the judgment-proof problem because pollution taxes are set equal to *expected* harm, not actual harm. Hence, the magnitude of the taxes is lower, perhaps much lower, than the magnitude of possible liability. Taxes, therefore, would create proper incentives for some firms with insufficient assets to be adequately deterred by the prospect of liability.¹²⁶ We also note that a system of pollution taxes would avoid the administrative costs of determining damages suffered by individual victims and the adverse effect of compensation on victims' incentives.¹²⁷

2. *Automobile Accidents.* — Driving behavior provides a standard example of an activity creating harmful externalities that cannot be resolved through bargaining. The individuals who drive do not know whom they might injure in an accident, and bargaining between each potential injurer and every potential victim is manifestly impossible. As a result, liability rules should, according to our analysis, be superior to property rules. Two particular features of the current means used to control driving behavior seem worth noting. First, although liability rules are widely employed to control driving behavior, so is regulation to a significant extent. Second, the form of liability applied in the automobile accident context, the negligence rule, is different from the form we have discussed, strict liability. Nevertheless, as we now explain, both of these features of the control of driving behavior are roughly consistent with our analysis.

The regulations governing driving behavior are the traffic laws: speed limits, requirements to obey stop signs and traffic signals, and so forth. The general disadvantage of regulations — that they will be inefficient because of the state's lack of knowledge — may not be too important in the case of traffic laws. These laws are often minimal in character and are based on common experience; thus, compliance may result in relatively little loss of social welfare. (Further, as we explain in the next paragraph, when there are gains to be made from noncompliance, noncompliance may occur.) In addition, an important benefit of traffic regulations is that they address the judgment-proof problem.

¹²⁵ Suppose that a firm that dumps pollutants at night faces a one-in-three chance of being caught. Then, if the harm that the pollutants cause is \$1 million, damages would have to be \$3 million when the firm is caught in order for incentives to be appropriate. The firm thus needs to have assets of at least \$3 million, rather than only \$1 million, to be adequately motivated to prevent harm under the liability approach.

¹²⁶ For instance, a firm that discharged a pollutant that has a 1% chance of causing harm of \$10 million would have inadequate incentives under a liability rule if its assets were only \$2 million. If the firm paid a tax, however, the proper amount of the tax would be 1% × \$10 million or \$100,000, an amount it could afford to pay. (If it could not pay the tax — perhaps in advance — it might then be forbidden from polluting.) Hence, the firm's incentives under the tax would be adequate. See Steven Shavell, *The Optimal Structure of Law Enforcement*, 36 J.L. & ECON. 255, 285 (1993); *supra* note 84.

¹²⁷ See *supra* note 121.

Many drivers do not have assets nearly sufficient to pay for the harm they might cause, even after existing levels of liability insurance coverage are taken into account. Thus, it is desirable that they be required to obey regulations.

We also note that traffic regulations are sometimes not so much commands that must be obeyed as they are, or closely resemble, liability rules.¹²⁸ In particular, sanctions for failure to comply with traffic regulations often are not prohibitive; that is, they are not sufficient to induce nearly perfect compliance. Rather, sanctions are frequently moderate and might be better viewed as approximating harm in an expected sense. (For example, like the pollution taxes discussed in the preceding subsection, traffic fines might be seen as a tax on behavior that has the potential to cause harm.) This liability-rule-like feature of regulation is socially desirable for the usual reason that liability is attractive: it allows injurers latitude to act in harm-producing ways when the cost of not doing so is high. For instance, some drivers will have important reasons to double park (perhaps they will otherwise be late for an important meeting), and they will choose to do so because the expected fine they will pay for double parking is not prohibitively large.

Let us turn now to the issue of the form of liability. As we mentioned, it is the negligence rule that is actually applied in the context of automobile accidents, whereas our analysis focused on the strict liability rule. On reflection, one may view the negligence rule as a hybrid of a property rule granting a partial entitlement to cause harm and a liability rule (strict liability): provided that an injurer exercises due care, he effectively acquires a property rule entitlement to cause harm; only if he fails to take due care does he become liable for harm.¹²⁹ Our concern is to evaluate the advantages and disadvantages of the property-rule-like feature of the negligence rule.

This characteristic of the negligence rule — no liability if due care is taken — obviously provides injurers with an incentive to exercise due care. But like any property regime, it poses the following problem: when the rule assigning rights (here, the due care level) fails to reflect actual danger and prevention costs, undesirable behavior results. In addition, the property-rule-like aspect of the negligence rule is incomplete in the kind of injurer behavior it controls: injurers do not have incentives to reduce harm through moderating their level of driving or through taking other actions that the negligence rule does not encompass. Under strict liability, by contrast, injurers would have

¹²⁸ We discuss the general point that what is nominally a property rule may in fact approximate a liability rule in section II.E.4.

¹²⁹ Cf. Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1087 (discussing intermediate mixed entitlements in the pollution context).

incentives to take care whenever care is appropriate, and they would also have incentives to reduce their level of driving to mitigate risk.¹³⁰

But the property-rule-like element of the negligence rule may have an administrative cost advantage relative to strict liability: when injurers clearly are not negligent, victims will tend not to file suit under the negligence rule, but victims will bring such suits under strict liability. In addition, negligence determinations in the domain of automobile accidents are often based upon simple rules, such as the traffic laws themselves; this also conserves administrative costs.¹³¹ Finally, the negligence rule better preserves victims' incentives to avoid harm (although defenses to strict liability can address this problem to some extent).

3. *Nuisance.* — Nuisances range from common disturbances (exemplified by noisy parties, dogs that roam around making pests of themselves, and compost heaps that produce foul odors) to more serious problems (such as a factory's discharge of wastes onto a neighboring farm).¹³² Frequently, if not typically, these negative-externality-creating actions could be discussed by the involved parties, who are often few in number (perhaps just two). Thus, we suspect that in the nuisance context, bargaining can often help to solve problems if they are not addressed well by legal rules. Accordingly, although liability rules tend to be superior to property rules in controlling other harmful externalities, the legal approach adopted for the resolution of nuisances may matter less than in many other situations.

The legal approach that is traditionally employed for nuisances is a property rule regime. If a disturbance is sufficiently bothersome, then the victim is accorded the right to enjoin it; otherwise, he is denied the injunctive right and the injurer can continue his actions without having to pay damages.¹³³ If noisy parties are judged to be too disturbing, injunctions against them will be granted; but if they are not

¹³⁰ See Shavell, *supra* note 76. Needless to say, a general comparison of strict liability and negligence rules would involve factors in addition to those we discuss.

¹³¹ Although victims will sue less often under a negligence rule than under strict liability, litigation costs will be greater under a negligence regime. The arguments in the text suggest that the frequency effect will be large and the cost differential of diminished significance (relative to many negligence inquiries), but ultimately the question whether the negligence rule is indeed cheaper is an empirical one.

¹³² Many would include pollution in the category of nuisance. See, e.g., Polinsky, *Resolving Nuisance Disputes*, *supra* note 1, at 1075. We find it convenient, however, to distinguish industrial pollution, the subject of subsection 1, for which there are usually large numbers of victims and bargaining is impossible, from nuisances, in which bargaining often will be feasible. Indeed, in the article just cited, Polinsky limits his attention to cases in which there are only two parties or in which many parties have a common representative. See *id.* at 1075-76; see also Ellickson, *supra* note 1, at 761-79 (advocating different approaches for localized nuisances and those causing pervasive harm).

¹³³ For a discussion of the law and exceptions to the property rule, see the sources cited above in note 4.

so judged, they can be held and damages need not be paid. How, if at all, can the use of property rules be justified for nuisance?

Administrative cost considerations provide a plausible rationale for property rules in the context of modest, quotidian nuisances like noisy parties.¹³⁴ As noted above, if property rule assignments of entitlements tend to resemble optimal assignments, then property rules involve low administrative costs. Under liability rules, however, administrative costs will be borne whenever harm optimally occurs, because damages will be paid. In the area of common nuisances, this difference may matter. Determining when a gathering is too disturbing may be reasonably easy, so that festivities will not usually generate litigation: only parties that are not overly disturbing will be held, and no one will try to enjoin these parties because they know they will be unsuccessful; conversely, parties that would be overly noisy will tend not to be held, because individuals would realize that such parties would be stopped.

Under the liability rule, however, either of two inferior outcomes might well occur. On one hand, the cost of litigation might discourage victims of noisy parties from suing for damages,¹³⁵ thus converting the rule into a *de facto* property rule favoring injurers. On the other hand, victims might be willing to bring suits. In this case, approximately the same number and types of parties will be held as under the property rule in question. But when parties are held, damages will often be paid for the disturbances created, and thus administrative costs will tend to be higher. Of course, to the extent that property-rule decisions are difficult for courts to make in an approximately optimal manner, the force of our argument is reduced because of the costs that would be incurred in bargaining and litigation.

With regard to serious nuisances, the liability rule might be superior to property rules. The issue of administrative costs is relatively unimportant for nuisances of substantial magnitude (certainly by comparison to the context of common nuisances). As we explained previously, the liability rule might be superior to property rules when bargaining is imperfect due to asymmetric information. If there were also other impediments to bargaining, it is likely that the liability rule would be attractive.¹³⁶

¹³⁴ Another factor that we advanced for property rule protection of victims is the judgment-proof problem. See *supra* section II.D.1. But this does not seem to be relevant for the common nuisance. It is doubtful that people who hold noisy parties or allow their dogs to roam would be unable to pay for any harm done. For many serious nuisances, however, this factor may favor property rule protection of victims (or posting of bonds, and the like).

¹³⁵ By contrast, under the property rule, a victim of a noisy party can often initiate legal action merely by calling the police.

¹³⁶ Robert Ellickson, in his important investigation of land use controls, offers similar arguments for preferring a regime that relies much more heavily on nuisance law than on zoning to regulate conflicts among neighbors' activities. See Ellickson, *supra* note 1. He criticizes zoning as

4. *Comment on the Distinction Between Property Rules and Liability Rules.* — We have proceeded, for the most part, under the assumption that property and liability rules are distinct: under property rules, a person's entitlement is guaranteed, whereas under the liability rule, the injurer is permitted to harm the victim as long as he pays damages equal to harm. As we briefly noted at the beginning of this Part,¹³⁷ however, one can conceive of the two property rules and the liability rule that we studied as all being, in fact, liability rules with different levels of damages: the property rule protecting injurers corresponds to a liability rule with zero damages; the conventional liability rule that we emphasized is the rule with damages equal to courts' best estimate of harm; and the property rule protecting victims mirrors a liability rule with extremely high, or infinite, damages.

Viewing property rules and the conventional liability rule as members of a continuum of liability rules that differ merely in their level of damages has relevance for the conceptual analysis and for the understanding of particular legal rules. The primary conceptual point is that the fully optimal liability rule may, in principle, be one with any level of damages. Thus, the fully optimal rule may be neither one with extreme damages (that is, a property rule) nor one with damages equal to harm (that is, the conventional liability rule). In this regard, we should remind the reader that, in the simple situation of section II.A, in which injurers and victims do not bargain, we in fact demonstrated that the conventional liability rule is optimal — that is to say, superior to a liability rule with any other level of damages. However, in other situations, such as those for which a property rule might be superior to the conventional liability rule, the property rule might not be fully optimal; instead, some liability rule with other than extreme damages might be best. For example, we said in section II.C that, because payment of damages equal to harm may dilute victims' incentives to avoid harm, property rule protection of injurers might be superior to the conventional liability rule. Here, the fully optimal rule arguably would not be property rule protection of injurers, but rather a liability rule with damages less than harm.¹³⁸

a species of inalienable property rule; for example, if an area is zoned exclusively for residential use, a store may not pay the neighbors who would be disturbed for permission to build in a strategic location. *See id.* at 691–711. Moreover, motivated by a concern that not all bargaining will be successful, Ellickson advocates a liability rule (or reverse liability rule) to regulate nuisances. *See id.* at 738–48; *see also* Rabin, *supra* note 29 (advocating liability rules in the nuisance context). Ellickson also discusses how the administration of nuisance law might be changed to address a range of important land use conflicts in a more administratively efficient manner than conventional private litigation. *See* Ellickson, *supra* note 1, at 762–71.

¹³⁷ *See supra* p. 724.

¹³⁸ Such a rule would possess some of the advantages of conventional liability — it would harness the information injurers have about prevention costs — and would still provide victims with some incentive to avoid harm.

When we consider how property and liability rules are actually applied, we also see that the view that they lie on a continuum is descriptively helpful, because the rules often turn out to be different from both true property rules and the liability rule with damages equal to harm. We pointed out, for example, that what appears to be property rule protection of victims of automobile accidents is in fact far from absolute; much prohibited driving behavior (such as speeding or double parking) is only nominally proscribed, and the expected sanction for an offense may not be very high and may even approximate expected harm. We also noted earlier that damages paid by liable parties may fall systematically short of harm; damages may also exceed harm, notably if they include a punitive element.

Although the view that property rules and conventional liability rules lie on a continuum is helpful, we found it expositionally convenient to consider only the conventional liability rule and the property rules in our analysis above, and we will do the same in Part III.

III. THE TAKING OF THINGS

In this Part, we turn from the subject of harmful externalities to that of protecting possessory interests in things,¹³⁹ that is, preventing them from being taken.¹⁴⁰ Under the *property rule*, no one may take a thing from its present possessor. More precisely, this is the property rule when the possessory entitlement resides with the present possessor, and that is what we will usually mean by a property rule; however, we briefly mention the alternative property rule of granting the entitlement to a taker.¹⁴¹ Under the *liability rule*, a person is permitted to take a thing from its possessor but must then pay damages equal to its court-estimated value.¹⁴² Of course, in reality a property rule protecting possessors generally prevails; use of a liability rule is exceptional.¹⁴³

¹³⁹ Although we do not address an individual's possessory interest in himself, an interest that also receives property rule protection, we note that many of the arguments developed in this Part would apply in that context.

¹⁴⁰ We discuss the nature of the distinction between the taking of things and harmful externalities in section III.G. For now, it suffices for the reader to interpret the taking of a thing primarily as an instance in which a person brings into his own possession a physical object that had been in another person's possession.

¹⁴¹ As will be clear to the reader, the property rule with the entitlement granted to the taker will usually have all the undesirable features of the liability rule, but to an even greater extent. Thus, we do not consider this version of property rule in most of our discussion.

¹⁴² As in the case of harmful externalities, there is the possibility of a reverse liability rule. *See supra* note 29. Under it, the possessor is permitted to prevent the taker from appropriating his thing if he pays the taker damages equal to its estimated value to the taker. We do not consider this reverse rule here, because it will be evident that in the present context the reverse rule will generally be inferior to the standard liability rule.

¹⁴³ The main examples of liability rules for the taking of things are the government's right of eminent domain, which allows the state to take private property in exchange for payment of just

We will assume that legal rules are used to promote the social objective of maximizing the value of things, which means channeling things to the parties who place the highest value on them. But the social goal will be appropriately modified when we go beyond the basic analysis to consider additional factors.

We now analyze property and liability rule protection of possessory interests, beginning with the situation in which parties do not bargain with each other and then considering the case in which they do. Afterwards, we will examine several other issues, including how the choice of rule affects the feasibility of bargaining, the problem of reciprocal takings, and efforts to avoid or to carry out takings.

We believe that our analysis will explain why property rule protection is superior to liability rule protection of possessory interests, which is to say, the analysis rationalizes observed practice. That is, *we will provide justifications for a fundamental aspect of ownership: that the owner of a thing has the right to prevent others from taking it from him, even if they are willing to pay damages.* In the course of our demonstration of this point and at the end of this Part, we will reconcile this view with our sharply different conclusion in the previous Part that liability rules are often superior in controlling harmful externalities.

compensation, and the right of private parties to violate possessory interests in cases involving emergencies, *see, e.g.*, *Ploof v. Putnam*, 71 A. 188 (Vt. 1908) (discussing the right to moor one's boat at another's dock in a storm); *Vincent v. Lake Erie Transp. Co.*, 124 N.W. 221 (Minn. 1910) (discussing the obligation to pay damages caused by mooring one's boat to another's dock during a storm).

The subject of eminent domain has received extensive attention in academic literature. *See, e.g.*, POSNER, *supra* note 9, § 3.7, at 56-61; Lawrence Blume & Daniel L. Rubinfeld, *Compensation for Takings: An Economic Analysis*, 72 CAL. L. REV. 569 (1984); Louis Kaplow, *An Economic Analysis of Legal Transitions*, 99 HARV. L. REV. 509 *passim* (1986); Frank I. Michelman, *Property, Utility, and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law*, 80 HARV. L. REV. 1165 (1967). Eminent domain is usually viewed independently, rather than as part of the subject of property versus liability rules. *See infra* note 189. Nonetheless, some authors have cited this example in the present context. *See, e.g.*, Calabresi & Melamed, *supra* note 1, at 1106-08.

Because the classic taking involves the government's converting land from private to public possession, our analysis suggests that a property rule protecting the private possessor is best. Indeed, most property the government acquires is purchased, rather than forcibly taken. (Consider defense procurement and an endless variety of routine purchases, as well as many acquisitions of land.) The best (and most familiar) justification for takings arises when there is a need to assemble particular parcels, such as for a road — a situation in which holdout problems can be serious. *See, e.g.*, POSNER, *supra* note 9, § 3.7, at 56-57; Calabresi & Melamed, *supra* note 1, at 1106-07. Takings are commonly employed for this purpose. We note that the relevant analysis differs for government takings because it is not obvious that the government will be motivated in the same way as private actors. For some discussion of the relevant institutional differences, *see* Kaplow, cited above, at 566-76 and 602-06.

A. *Parties Do Not Bargain with Each Other*¹⁴⁴

We consider first the situation in which the party who initially possesses a thing, whom we will for simplicity call the owner,¹⁴⁵ is unable to bargain with a potential appropriator, whom we will call a taker. Although this situation might be thought atypical — we expect the taker would usually have the opportunity to bargain with the owner — it is possible. For example, someone may want to take my boat to go fishing when I am not around the pier. Moreover, the case of no bargaining is worth analyzing because it provides a baseline for evaluating outcomes when bargaining is possible.

1. *State's Information Is Perfect.* — If the court has perfect information about the values of a thing both to the owner and to the taker,¹⁴⁶ then (as in the case of externalities) it makes no difference whether a property or liability rule is employed. The property rule assignment of an entitlement will be to the owner if he values a thing more highly than the taker; otherwise the entitlement will be awarded to the taker.¹⁴⁷ Under the liability rule, the taker will take the thing if and only if he values it more highly than the owner, because damages will equal the true value to the owner. Thus, under either type of rule, the thing will be, or come to be, possessed by the party who values it more highly.¹⁴⁸

2. *State's Information Is Imperfect.* — If the court does not have perfect information about value, as will typically be true in cases of interest, it must estimate value. Let us consider the following assumptions about value and the court's knowledge.¹⁴⁹ First, suppose that things have a significant *common value*, that is, a component of value

¹⁴⁴ The analysis in this section is presented formally in the Appendix, Part II.

¹⁴⁵ Even though owners do enjoy property rule protection of their possessory interests, and this is the very practice that we are trying to explain, we trust that our usage will not cause confusion. We also note that owners are not the only ones who in fact enjoy possessory rights. For example, renters, with interests derived from owners, also enjoy such rights.

¹⁴⁶ It will be easy for courts to determine value in the case of fungible goods that are regularly traded on markets and in contexts in which there is no situational value (in contrast to the example described below in which a laptop computer is needed at a particular place and time, *see infra* p. 760). Another situation in which courts may be able to ascertain value tolerably well is in the case of an emergency: it may be apparent in such exceptional circumstances that the taker's value exceeds the owner's.

¹⁴⁷ Interestingly, it is just in the case of emergency situations, *see supra* notes 143, 146, that exceptions to property rule protection of possessors are sometimes made. (We also mention that some of the problems we identify later in this Part are less likely to be important in many emergency situations: a single taker may be identifiable, and the probability of the emergency may be small enough to have little adverse effect on possessors' incentives. Defining emergencies too broadly, however, would give rise to most of the liability rule's defects.)

¹⁴⁸ We remind the reader that in this section we consider only the efficient *ex post* possession of things, without factoring in *ex ante* incentives, which are considered in section III.E.

¹⁴⁹ How the assumptions and the argument here relate to the analysis of the parallel situation in the case of harmful externalities is discussed on page 763 and in the Appendix at section II.B, comment b.

that is the same for both the owner and any taker. For example, a boat or a home will have certain characteristics that all will evaluate similarly, such as the speed and operating characteristics of the boat or the number of rooms in the home.

Second, assume that things also have *idiosyncratic value* to individuals. Idiosyncratic value derives from characteristics of a thing that different individuals evaluate differently, such as the design of a home.¹⁵⁰ Assume also that the average idiosyncratic value to owners exceeds the average idiosyncratic value to takers. One justification for this assumption is, of course, that owners often obtain (or choose to retain) things precisely because they place greater idiosyncratic value on them than others do. For example, I may purchase my home just because it has higher idiosyncratic value for me than for others: I may particularly like its design, setting, or location.

Another important justification for the assumption that idiosyncratic value for owners is higher than it is for takers concerns a thing's *situational value*. For example, consider the owner of a laptop computer who has brought it to a conference for the purpose of taking notes. On average, such an individual will place a higher value on using it at the conference than would a random person, or another attendee who did not make the effort to bring a laptop.¹⁵¹

The assumption that idiosyncratic value is higher for owners means that it will be socially desirable on average for things not to be taken, but rather for them to remain in the possession of their owners. It will on average be optimal for a boat or for a home to remain in the possession of the present owner because he places a higher idiosyncratic value on it than a possible taker, and it will on average be optimal for those who bring laptop computers to conferences to retain possession of their computers during the conferences. Of course, this assumption does not imply that it will always be optimal for things not to be taken; there will be some occasions when things ought to change hands, when the idiosyncratic value to the taker exceeds that to the owner.

We now examine the choice among legal rules. An immediate consequence of the assumption that value is higher on average for owners is that, as between property rule protection of owners and property rule protection of takers, the former is preferable.

Now consider property rule protection of owners versus the liability rule. Under property rule protection, the situation is simple: there are no takings. The disadvantage of this result is that when a taking would be desirable, it will not transpire. (Recall that in this section

¹⁵⁰ See, e.g., Ellickson, *supra* note 1, at 735-36.

¹⁵¹ Note here that the higher idiosyncratic value to the owner does not arise from any special value the computer may have had to him when he purchased it. Rather, the idiosyncratic value at issue here is dependent upon the particular time and place.

we are assuming that no bargaining occurs.) How important this problem is depends on the likelihood that the idiosyncratic value of a taker exceeds that of an owner. The higher is the distribution of idiosyncratic values of owners relative to that of takers, the less important is the problem.

Under the liability rule, we presume that damages are set equal to the average value of owners, that is, owners' average common value plus their average idiosyncratic value. Inevitably, therefore, damages will sometimes be too high and sometimes too low. When takers expect courts' estimates of common value to be too high, takings will be rare,¹⁵² so that the result will be close to that achieved under the property rule. By contrast, when takers expect courts' estimates of common value to be too low, it is likely that takers will take things; this result will be socially undesirable. Thus, the possibility of error (even when there is no systematic bias, as we have assumed that damages equal owners' average values) implies that the liability rule may be inferior to a property rule protecting owners. We now explain why this disadvantage of the liability rule will tend to be worse than the disadvantage of a property rule.¹⁵³

Suppose, for example, that the common value associated with the use of a laptop computer during conferences varies between \$0 and \$200, depending on the type of conference, and is \$100 for the average conference. Courts are able to determine the average common value but are unable to identify at which conferences laptops are more or less valuable. In addition, assume that the average idiosyncratic value of those who bring computers to conferences is \$25 and that most of these idiosyncratic values are in the neighborhood of \$25, whereas for other individuals, who do not bring computers, the average and usual idiosyncratic value is \$5. Thus, the idiosyncratic value to a person who brings a computer to a conference virtually always exceeds that of a possible taker.¹⁵⁴

Under these assumptions, almost any taking of a computer at a conference will be undesirable. Accordingly, property rule protection of owners to prevent takings will be socially preferable. It will prevent all takings. By contrast, under the liability rule, there may well be many takings. To explain, damages under the liability rule will be

¹⁵² The reason is that takers' actual common values will be less than courts' estimates and that takers' idiosyncratic values will usually be less than courts' estimates of owners' average idiosyncratic value.

¹⁵³ If damages were systematically too low, the disadvantage of liability rules would be much greater. For discussion of why courts' values will tend to be systematically too low, see section II.A.3.(b). As we note there, however, it may be possible to correct systematic errors.

¹⁵⁴ This assumption is made for simplicity and to dramatize our point. It will be clear from the example that our point about the inferiority of the liability rule would hold as well if the distributions of owners' and takers' idiosyncratic value were to overlap more substantially. See *infra* Appendix section II.B, cmt. c (supplying examples).

the \$100 average common value plus the \$25 average idiosyncratic value to owners, or \$125. Consequently, whenever a conference is of a type such that the common value is above the \$125 damage amount, all potential takers, aware that their value exceeds the level of damages,¹⁵⁵ will take computers, a very undesirable outcome.¹⁵⁶

It should be evident from the logic of this example and what we have said about it that *property rule protection of owners is superior to use of the liability rule if the distribution of idiosyncratic values of owners lies sufficiently above that of takers and if courts also err sufficiently in estimating common values*. The essential reason is that the problem under the liability rule of socially undesirable takings — when damages are too low because the common value is high — will dominate in importance the problem under property rule protection that desirable takings will not occur. Setting damages above the court's best estimate — in the limit, a property rule — avoids a potentially significant problem of excessive takings while discouraging few desirable takings.¹⁵⁷ (This conclusion follows when there is no systematic bias in setting damages, which are sometimes too high and sometimes too low. The problem of excessive takings under the liability rule would be exacerbated if courts were systematically to ignore idiosyncratic value.¹⁵⁸ In the preceding example, if courts were to ignore idiosyncratic value, damages would be only \$100, and takings would occur more often than we said.)

¹⁵⁵ It seems plausible that those attending a specialized conference in their field would know when taking notes was particularly valuable while, at the same time, they would understand that a court might be unable to appreciate the above-average value of the information provided.

¹⁵⁶ When the common value is less than \$125 but exceeds \$100, there will still be a tendency for undesirable takings. (If the idiosyncratic values of potential takers are concentrated around \$5, the takers will want to take whenever the common value plus \$5 exceeds damages, which is to say whenever the common value is at least \$120.)

¹⁵⁷ However, we should consider briefly whether a liability rule with damages different from average value might perform better than the liability rule with damages equal to average value. If damages exceed average value — say, damages equal the highest possible common value plus the mean idiosyncratic value to owners — those few takings that would occur would constitute efficient transfers, on average. The reason is that, with damages this high, no one would take unless his idiosyncratic value exceeded the mean idiosyncratic value of owners. (In addition, such high damages would reduce or even eliminate most of the other problems we describe below because owners would usually benefit when a taking occurs.) We mention, however, that the range of possible common values can be quite large. (Just what is the highest possible common value of having a laptop computer with which to take notes at a conference?) Thus, such a liability rule would approximate property rule protection. Also, although raising damages removes most of the inefficiency caused by a liability rule, in most instances it would also eliminate most of the benefits of the rule (as efficient takings would become rare). Thus, in general it is not clear that a liability rule will become preferable as damages are raised. Finally, as we observed in note 3, actual property rights are presently not in fact perfectly protected. As a result, even if some small gain were possible from relaxing property rule protection from an absolute level, it is not clear that lesser protection than currently exists would be justified. *See also infra* Appendix section II.B, cmt. c (discussing numerical examples).

¹⁵⁸ *See supra* pp. 730–31.

Finally, let us observe that there is no contradiction between the conclusion drawn here that the liability rule may well be inferior to property rule protection and our conclusion in the externality context that the liability rule is superior to property rule protection. The resolution of the seemingly opposed conclusions is presented in the Appendix.¹⁵⁹ For the moment, we note that the crucial difference between the model studied in the externality context and that examined here, from a theoretical perspective, is as follows. In the case of externalities, we assume that the prevention cost and the harm to victims are independent of each other (for example, that an injurer's cost of preventing pollution is independent of a victim's susceptibility to disease).¹⁶⁰ In the present context, however, the two variables analogous to prevention cost and harm are not independent: the value of a thing to its owner and the value of the same thing to the taker are dependent because they both include the thing's common value.¹⁶¹

B. Parties Bargain with Each Other

We now consider the more usual situation in which owners and potential takers are assumed to be able to bargain with one another. (In this section, we set aside the problems identified in sections III.C and III.D that might render bargaining infeasible under a liability rule.)

1. *Bargaining Is Always Successful.* — If parties always will make mutually beneficial transfers when such transfers are possible, *then property rule protection and a liability rule are equivalent.*¹⁶² Under property rule protection, a transfer will occur if and only if a potential taker values the thing more highly than does the owner. Under a liability rule, this statement will also be true. In particular, even if low damages would lead a potential taker to take when the owner values the thing more highly than does the taker, no taking would occur. For example, suppose that the value of a thing to the

¹⁵⁹ See *infra* Appendix section II.B, cmt. b.

¹⁶⁰ See *supra* note 43.

¹⁶¹ It can be shown that, if the common value were zero in the present case, then the liability rule would be superior to property rule protection of owners. This consequence follows because damages would thereby equal the average of owners' idiosyncratic values; hence, when a taking occurred, it would be socially desirable on average because it would occur only when the taker's idiosyncratic value exceeded the average owner's idiosyncratic value. See *infra* Appendix section II.B, cmt. b.

We also note that raising damages above owners' average values (in the limit, a property rule) causes little inefficiency due to the deterrence of desirable takings, because owners' idiosyncratic values are usually higher than those of takers. By contrast, in the externalities context, raising damages above average harm is more likely to produce inefficiency by discouraging desirable activity than to avoid inefficiency that otherwise occurs as a result of failing to deter injurers who should be deterred.

¹⁶² We abstract from the costs of entering into agreements and of litigation. For a discussion of these elements, see section III.F.

taker is \$400, damages are \$300, and the value to the owner is \$500. The taker would have an incentive to take, but the owner would be willing to pay the taker up to \$200 not to do so, and the taker would accept any amount over \$100; hence, the two parties would reach an agreement whereby the owner retains the thing. If and only if the taker values the thing more highly than does the owner would a transfer result under the liability rule.

2. *Bargaining Is Not Always Successful.* — If bargaining does not always lead to a mutually beneficial outcome — because a party may ask for too much, misconceiving the other's true position — either property rule protection or a liability rule might be superior. Observe that under either type of property rule, not all mutually beneficial sales will be consummated, because of asymmetry of information. The owner, for example, might ask too much of the taker even though the taker does in fact value the thing more highly than does the owner. Furthermore, the problem of failure to conclude mutually beneficial bargains might be either more or less serious under property rule protection than under the liability rule. Thus, it may be that either rule is better (as was true in the case of externalities).

Still, we suspect that property rule protection will tend to be superior to the liability rule. Under the liability rule, recall that takers will often have an incentive to take when courts underestimate the common value of things, even though takings will usually be undesirable because owners generally have higher valuations. Thus, in order to maintain the socially desirable status quo, owners will frequently need to bribe takers not to take. However, in some percentage of these instances, bargaining will fail, and, usually undesirably, the things will be taken. By contrast, under property rule protection, bargaining will never be needed to prevent an undesirable taking. Bargaining will be needed for socially desirable outcomes only when a taker places a higher value on a good than does an owner, which will tend to be infrequent. Thus, even if bargaining sometimes fails under a property rule, the adverse consequences should be limited.¹⁶³

3. *Conventional View of the Advantage of Property Rule Protection.* — We mentioned in the Introduction that there exists in the folklore, and to some extent in writings, an idea that property rule protection of things is good because it forces someone who wants something to bargain for it, and presumably he will tend to obtain it if and only if he values it more highly than does the owner.¹⁶⁴ We find this reason for favoring property rule protection to be misleading. As

¹⁶³ As in the case of harmful externalities, see *supra* section II.B.2, which rule is better is indeterminate. However, when the property rule almost always produces an efficient outcome without bargaining as in the present context, it seems plausible that the property rule's advantage will remain when imperfect bargaining is introduced.

¹⁶⁴ See *supra* note 9 and accompanying text.

we have stressed, under a liability rule, a potential taker will also tend to obtain a thing if and only if he values it more highly than does the owner. When damages do not equal owners' valuations, bargaining may be necessary, as under property rule protection. In particular, if, under a liability rule, a taker would decide to take a thing, and the owner wished to pay him not to do so because the owner places a higher value on the thing, the taker will very much have reason to bargain for a payment from the owner.

To be sure, we did suggest that if bargaining is imperfect, due to asymmetry of information, property rule protection may tend to be superior to a liability rule. However, this preference is *not* because property rule protection is needed to induce takers to bargain. Rather, it is because property rule protection leads to a lesser need for bargaining and thus to a lesser chance of failure to conclude a necessary agreement.¹⁶⁵

C. *A Fundamental Problem with Bargaining Under a Liability Rule*

1. *The Impediment.* — Our discussion of property versus liability rules in the preceding section on bargaining presumed implicitly that bargaining is feasible when parties are in proximity to each other and that the bargaining process is not itself costly. However, as we mentioned in the Introduction, *a fundamental obstacle impedes bargaining under the liability rule but not under property rule protection.* The difficulty with bargaining under the liability rule arises when courts set damages too low — for instance, when damages for taking a car are \$10,000 but its common value is \$12,000.¹⁶⁶ In such a situation, there would often be a *multiplicity of potential takers*: anyone who happens to be about and who places a value on the car exceeding damages would want to take the car. Moreover, individuals would be attracted to places where cars might be undervalued, raising the likely number of potential takers.

Consider the situation of an owner and a *particular* potential taker who values the car less highly than does the owner (but above the level of damages). The owner would like to bargain with the taker and pay him not to take the car. However, it would be irrational for

¹⁶⁵ We should also note that these points apply if one imagines anarchy (rather than liability rule protection) to be the alternative to property rule protection. Under anarchy, when a taker could take and not pay any damages, there could also be bargaining and bribes not to take things, and so forth. The problems noted in the sections to follow, however, would be even more serious.

¹⁶⁶ Our argument assumes that parties can anticipate when damages will be too low, in this case \$10,000. We observe that this assumption can hold when damages on average are unbiased — sometimes they are too high and sometimes they are too low — which is what we assume throughout. If damages were systematically too low, our argument would hold in a greater fraction of cases and perhaps in all cases.

the owner to pay *this* taker not to take the car, for he would subsequently have to pay *another* potential taker not to take the car, and then another and another.¹⁶⁷ Therefore, the potential taker will tend to take the car even though the owner values it more highly. The general point, in other words, is that when courts err and set damages too low, bargaining by owners will be effectively infeasible, and socially undesirable takings will occur.

By contrast, property rule protection of owners involves no similar barrier to bargaining. Although there may be many potential buyers, the owner need not trade with any of them, and he can choose with whom he wants to bargain and possibly consummate a trade. Thus, no undesirable trades will occur. Furthermore, if there are no asymmetries of information between the owner and possible buyers, all socially desirable transfers will occur.

Our conclusion from the present argument is that a property rule enjoys a strong advantage over the liability rule, assuming, as is plausible, that the probability of underestimation of owners' values would be substantial under a liability regime. We emphasize that this conclusion does not depend upon the assumption that there is systematic underestimation of owners' values under a liability rule. Even when one assumes that courts' estimates are on average correct, but are sometimes too high and sometimes too low, the liability rule will be inferior because the occasions in which damages are too low will involve the multiple-taker problem we have identified. (When damages are too high, there will be few takings, so the liability rule in such instances will be similar to a property rule.)

Finally, we note that the identified problem with the liability rule does not seem as important in the externality context. Specifically, suppose that damages are underestimated and that the victim, say a person bothered by noise from his neighbor, contemplates paying the neighbor to desist. It will be worth the victim's effort to make a bargain with this neighbor if there are few other neighbors who would also make noise and cause the same disturbance to the victim, which we think will often be the case. More generally, we suspect that frequently there will not be many parties who would cause the same harm to a victim, so that the victim would indeed find it worthwhile to bargain with a particular injurer.¹⁶⁸ When there are multiple injurers in the externality context, however, we do believe that bargaining will frequently break down. However, the typical reason for break-

¹⁶⁷ This argument also suggests the possibility that a potential taker would worry that the car would later be taken from *him*, thereby diminishing his desire to take the car. One can understand this complication as a variation on another problem with the liability rule — that of reciprocal takings — which we address next, in section III.D.

¹⁶⁸ A reason for the difference between the two contexts involves common value: many people will wish to take my car if it will be undervalued, but those who enjoy noisy parties will not wish to relocate their festivities in order to disturb my peace and quiet.

down will involve the free-rider problem that arises when there is a multiplicity of victims (as when pollution victims free ride on each others' efforts to bribe polluters) rather than the difficulty created by a multiplicity of injurers, as analyzed in this section.¹⁶⁹

2. *Contrast to the Conventional View of the Advantage of Property Rule Protection.* — In the present section, we have identified a reason to prefer property rule protection that is altogether different from the conventional reason, which holds that property protection fosters the bargaining process between a prospective acquirer and an owner. The advantage of property rule protection that we have discussed is not that it encourages prospective *takers* to bargain. (They would be happy to bargain under the liability rule.) Rather, the advantage is that property protection gives *owners* an incentive to bargain that they would not have under the liability rule, because under the liability rule, an owner's payment to a taker to step aside would be wasted on account of other prospective takers waiting in the wings.

D. *Reciprocal Takings*

Another difficulty with the liability rule arises when damages are too low:¹⁷⁰ if a person takes a thing from the owner, the owner will want to retrieve it from the taker. Suppose that, under the liability rule, damages would be only \$75 for taking something worth at least \$100 to its owner and to many others. Then if someone takes the thing, which is likely, the owner would wish to take it right back (returning to the taker the \$75 that the owner received as damages).¹⁷¹ Moreover, this behavior could continue, and it may come to involve additional parties. Such *reciprocal takings* are problematic because they will lead inevitably to destructive contests to retain or to take control of things, and thus to the use of force. Indeed, the issue of reciprocal takings seems to us so serious as to make a true liability rule system unworkable.

The only apparent solution to the problem of reciprocal takings lies in a mixed system that would employ a liability rule for the initial taking combined with property rule protection of the taker's posses-

¹⁶⁹ Suppose, though, that in the externality context there is only a single victim and multiple injurers, say a single victim of multiple polluters. In such circumstances, bargaining may or may not be inhibited for the reason discussed in this subsection. There will tend not to be a problem with bargaining if each additional unit of pollution causes additional harm. In this case, the victim would benefit from striking a bargain with a particular polluter, for if that polluter alone desists, the victim will suffer from less pollution. If, however, pollution from any one polluter would cause a complete loss for the victim (consider the situation of a company that bottles spring water claimed to be pristine, in which any amount of pollution would make the product of little value), the victim would not benefit from making an agreement with only a particular polluter. If even a single polluter does not agree to prevent harm, the victim will suffer his full loss.

¹⁷⁰ As discussed in note 166, we do not assume that damages are systematically too low but do assume that parties can anticipate when damages will be too low.

¹⁷¹ See Rabin, *supra* note 29, at 1333.

sory right afterwards. But this type of regime has two problems. First, if one must choose between property rule protection of those who create or acquire things and those who take them, it seems clear that the former choice generally would be superior because it would produce better incentives, as will be discussed in section III.E. Second, this mixed system seems unworkable. Notably, a single party would have to be selected and given the right to take; otherwise, destructive competition might arise among potential takers. The problems the courts would face in selecting this fortunate taker are daunting.¹⁷²

Finally, let us note that the analog of the problem of reciprocal takings does not arise in the case of harmful externalities. If pollution harms a victim, he can ordinarily do nothing to reverse his harm (he cannot cause an effluent to flow back to the polluter). Once harmful externalities occur, they cannot be undone, unlike the taking of a thing.

However, a problem of "reciprocal action" could arise before harm occurs if a victim tried to prevent an injurer from causing harm and the injurer tried to thwart the victim. Yet the law tends to prevent such problems of reciprocal action. For instance, if a factory is subject to a liability rule and a potential victim were to attempt to enter the factory's premises and interfere with its operations, he could be stopped or prosecuted for a crime. The legal system can adopt this solution to potential problems of reciprocal action because it can naturally distinguish between the victim of harm and the injurer.¹⁷³

E. Incentives of Owners to Avoid Losses and Incentives of Others to Take Property

An additional factor that works against the liability rule is the effort that owners may make to avoid having their property taken by others and the effort that potential takers may exert to take things. Owners and potential takers will engage in such activity under a liability rule, and the more so the greater the probability that damages would be less than the value of things to owners.¹⁷⁴ When damages

¹⁷² Imagine the difficulties courts would have were they to hold hearings at which anyone wishing to take a thing would be allowed to attend. Alternatively, suppose that the policy were to grant the right to take to the first person to appear, in which case there would be unproductive races to be first.

¹⁷³ Notice that the legal system might adopt the analogous remedy to the problem of reciprocal takings under a liability rule, namely, by giving property rule protection either to the taker or to the owner. But if the law gave property rule protection to the taker (that is, if the law gave the taker the freedom to act), we would face the problem of having to distinguish just one taker from among many potential takers, as we discussed above. If, instead, the legal system gave property rule protection to the owner (the right to be free from takings), it would thereby have adopted the property rule.

¹⁷⁴ In making this claim, we are assuming, as in the preceding sections, that owners and potential takers are able to anticipate circumstances in which damage awards will be below the

are expected to be too low, owners will do things to prevent takings, such as hiding or locking up assets. Moreover, owners will change their investments in things (fail to make improvements to things likely to be taken) and their patterns of purchase (decide against acquiring things that can easily be taken). Potential takers will invest effort in looking for things because such takings amount to bargain purchases.¹⁷⁵

Efforts to protect and to take property are economically sterile — a social waste — and thus constitute a disadvantage of a liability rule.¹⁷⁶ Changes in investment, purchase, and use decisions constitute an additional source of inefficiency under a liability rule. Of course, these effects also constitute the well-known disadvantages of theft.¹⁷⁷ In fact, the difference between the disadvantages of theft and the disadvantages under a liability rule in cases in which damages are underestimated is only one of degree.¹⁷⁸

By contrast to the situation under a liability rule, under property rule protection of owners no wasteful effort will be expended either to avoid takings or to take things. (This assumes, as we have throughout, that property rules are perfectly enforced.¹⁷⁹)

We note that the qualitative character of owners' behavior in the present context often differs from that of victims in the context of harmful externalities. In the externality context, it is best if victims are uncompensated, so that they have an incentive to mitigate harm.¹⁸⁰ But in the context of the taking of things, owners are creators of value, so that it is best for them to be fully compensated: this preserves the proper incentives for them to raise the value of their things and not to expend resources to protect their things from being taken.

value of things. *See supra* note 166. Circumstances in which the parties expect damages to exceed the value of things will not influence the behavior of owners: they will not try to prevent a taking if they would make a profit from it. Such circumstances would not tempt a taker either.

¹⁷⁵ *Cf.* Haddock, McChesney & Spiegel, *supra* note 9, at 16–17 (making an analogous point when damages undercompensate for a possessor's market opportunities).

¹⁷⁶ Note that bargaining will not generally solve the sorts of problems described here because adverse effects will arise before parties bargain. *Cf. supra* note 74 (discussing the issue in the externalities context). Indeed, individuals will protect their property to avoid having to bribe a prospective taker, because some surplus will typically be lost by such a bribe compared to the circumstance in which no taking is possible in the first place. Moreover, the problem of multiple takers identified in section III.C would arise even if *ex ante* bargaining were possible.

¹⁷⁷ *See* Steven Shavell, *Individual Precautions to Prevent Theft: Private Versus Socially Optimal Behavior*, 11 INT'L REV. L. & ECON. 123 (1991).

¹⁷⁸ One may conceive of legalized theft as a liability system in which damages for a taking are zero, whereas we have emphasized problems that exist as long as there is a probability of underestimation of value.

¹⁷⁹ *See supra* note 3.

¹⁸⁰ *See supra* section II.C.

F. Other Considerations

We comment here on several remaining considerations: the judgment-proof problem, administrative costs, risk aversion, income distribution, and entitlement. We can be brief because of our discussion in section II.D.

The judgment-proof problem would plainly be a count against the liability rule if it meant that a party could take and retain a thing despite being unable to pay a judgment.¹⁸¹ But we think the more natural interpretation of how a liability rule would function is that a taker would not be able to take (or keep) a thing if he could not pay the judgment. If so, the judgment-proof problem would not be important.¹⁸²

The major administrative costs under property rules are those involved in effecting transfers, which may involve bargaining, but need not (consider sales on organized markets). Under the liability rule, administrative costs will be incurred whenever there is a taking; these costs might or might not exceed those of a sale in a property rule regime, depending on the character of the legal system and typical expenses of settlement. But our conjecture is that even settlement costs would tend to exceed those of concluding a sale. In addition, when takers anticipate that damages will be underestimated, bargaining (if feasible¹⁸³) might frequently take place between owner and taker to induce the latter to refrain. The costs of such bargaining would tend to make a liability rule administratively more expensive than a property rule.¹⁸⁴

With respect to the risk aversion of owners,¹⁸⁵ we observe that they are well insulated from risk under property rule protection,¹⁸⁶ whereas they are not fully shielded under a liability rule, assuming that there is uncertainty as to the magnitude of damages. But the risk of inadequate damages could, in principle, be insured.

¹⁸¹ See Calabresi & Melamed, *supra* note 1, at 1125 n.69.

¹⁸² Problems would, however, arise if the thing were harmed, such as when a car is stripped. The judgment-proof problem is of a different nature in the externality context for two reasons. First, the harm from externalities cannot be undone (in the way that a thing taken can be returned). Second, the harm can more readily exceed the assets of the injurer.

¹⁸³ For bargaining to be feasible under liability rules, the multiplicity of takers problem and the reciprocal takings problem discussed in sections III.C and III.D must somehow be overcome. That is, we are implicitly assuming some qualified form of liability regime in which a particular taker is allowed to take but is then himself protected by a property rule.

¹⁸⁴ As we have discussed, bargaining merely to preserve the status quo — retention of things by their owners — may be frequent under a liability rule because of the possibility that damages would be less than the value of things.

¹⁸⁵ Parallel comments to ours may be made with respect to the risk aversion of potential takers.

¹⁸⁶ Some risk remains, as owners may be unsure of the surplus they will gain from a sale. (Also, values may change over time. This risk, however, is not directly affected by the choice of legal rule.)

As for the distribution of income, we note that property rule protection favors owners over takers. Under property rule protection, when owners sell things, they tend to receive more than the value they place on them; they are generally able to extract some of buyers' surplus. Under the liability rule, owners' valuation is all that they are in principle awarded, and when damages are too low, they will suffer undercompensated takings or pay bribes to others to refrain from taking things. Consequently, were one to assume that owners generally possess more wealth than takers, property rule protection would favor richer individuals. But even if true, this result should not be considered a disadvantage of property rule protection. As we said before, the income tax and transfer system is superior to legal rules as a means of meeting distributional objectives.

Finally, for the sorts of reasons advanced previously, we do not believe that notions of entitlement are likely to have independent relevance in the choice of rules. We do suspect, however, that most who are concerned about supporting security of entitlements would favor a property rule protecting possessors over a liability rule.¹⁸⁷

G. Comment on the Distinction Between the Taking of Things and Harmful Externalities

We have divided our analysis in this Article between the taking of things and harmful externalities, and we have generally assumed that the scope of each context was self-evident. We have interpreted the taking of a thing to be an instance in which possessory rights in a physical object are transferred from one individual to another and in which the object generally has a component of value common to the two individuals. And we have defined a harmful externality to be an event adverse to a victim arising when an injurer takes some action from which he benefits and which only incidentally causes the adverse event.

We note, however, that not all cases can easily be placed within one category or the other. For example, suppose that when an apartment building is erected in front of a hotel, it blocks the hotel's view of the ocean.¹⁸⁸ Should this be considered a taking of a thing even though no one takes possession of a tangible object? (Note that the view will have a common component of value, as it will be desirable both to those who live in the building and to those who stay in the

¹⁸⁷ This preference is particularly clear for libertarians. In the context of externalities, however, application of a libertarian approach is more difficult for the sorts of reasons identified by Coase with regard to joint causation by victims and injurers. See Coase, *supra* note 18, at 2, 8-15.

¹⁸⁸ Cf. *Fontainebleau Hotel Corp. v. Forty-Five Twenty-Five, Inc.*, 114 So. 2d 357 (Fla. Dist. Ct. App. 1959) (concerning a shadow cast on the neighboring hotel's pool), *cert. denied*, 117 So. 2d 842 (Fla. 1960).

hotel.) Or should it be considered a harmful externality? (Note that the blocking of the hotel's view may have been a consequence incidental to the construction of the apartment building.)

Moreover, the distinction between externalities and the taking of things appears to be subject to linguistic manipulation. A harmful externality can often be described as the taking of a thing; for example, a firm that pollutes someone's air can be said to have taken clean air or an easement from the victim. Similarly, the taking of a thing can be described as the doing of harm to a victim.

Ambiguity about how to categorize a situation does not, however, make our analysis or our conclusions problematic.¹⁸⁹ The main reason is that we have identified the assumptions underlying our conclusions, rather than having relied simply on our categorization of situations as involving either harmful externalities or the taking of things.

For example, when we examined whether use of a liability rule (with damages equal to average harm) would result in an efficient allocation of resources in the absence of bargaining, we explained in sections II.A and III.A that our conclusions ultimately depend on whether the victim's harm is independent of the injurer's benefit or is not (that is, whether the two have a common value). Hence, when considering the blocking of the hotel's view by the apartment building, we can say that the use of a liability rule may not result in a more efficient allocation of the resource of ocean views because an ocean view has common value to the different parties. In this respect, the analysis of the situation involving the blocking of ocean views is closer to our analysis of the taking of things.¹⁹⁰ However, unlike in our analysis of the taking of things, reciprocal takings are no problem here because the hotel can hardly take the ocean view back from the apartment building. In this regard, therefore, the situation is more like one involving harmful externalities. It is unnecessary for us to say whether, on the whole, we consider the situation involving the blocking of views to be a harmful externality or instead the taking of a

¹⁸⁹ The problems with the distinction between harmful externalities and the taking of things are reminiscent of the difficulty the Supreme Court has had distinguishing between governmental takings for which just compensation is required by the Fifth Amendment (a liability rule) and regulation for which no compensation is required (a property rule entitling the injurer to act freely). See Jeremy Paul, *The Hidden Structure of Takings Law*, 64 S. CAL. L. REV. 1393 (1991); Joseph L. Sax, *Takings, Private Property and Public Rights*, 81 YALE L.J. 149 (1971). We note, however, that our use of the distinction is different from the Court's. When determining whether government compensation is constitutionally required, the legal result follows directly from the categorization, but courts have not been clear or consistent about the rationales underlying the distinction. We explain in the text to follow how our analysis addresses this problem.

¹⁹⁰ We note, however, that unless one is willing to assume that those who arrive first generally value things more highly than do subsequent takers, it need not follow that original possessors — the hotel in this instance — would be expected on average to have higher idiosyncratic values.

thing. We can profit well enough from our analysis by drawing on its elements as described in Parts II and III.¹⁹¹

In any case, we emphasize that the distinction between harmful externalities and the taking of things is useful, even if imperfect. The distinction often is readily made in important contexts, such as industrial pollution, automobile accidents, and transfers of things — indeed, in most of the cases explored in prior literature. Moreover, even if the distinction sometimes blurs, most situations that we would say are harmful externalities have a set of characteristics (independence of injurer benefit and victim harm, no problem of reciprocal takings, and so forth) different from the set of characteristics describing the taking of things. Finally, analysis of the two sets of characteristics points to very different conclusions: the distinction is analytically useful. Thus, we believe that the distinction is a constructive addition to prior literature, in which commentators have often mixed the two contexts in the presentation of arguments.

IV. CONCLUSION

Having completed our analysis of the question whether liability or property rules enjoy an advantage, let us take brief stock of our conclusions. In the examination of harmful externalities, we showed that in the absence of bargaining between victims and injurers, a liability rule with damages equal to estimated harm is unambiguously superior to property rules even though actual harm in a given case may be difficult to determine.¹⁹² This result is significant in light of the important contexts, like those of automobile accidents and industrial pollution, in which parties are practically unable to bargain because potential victims are strangers to injurers or are too numerous. When we then considered additional factors, we found that some (the possibility of bargaining, administrative costs) did not systematically favor either type of rule, whereas others (the judgment-proof problem, victim behavior) lent appeal to forms of property rule protection or modifications of a conventional liability rule. Thus, we can point to circumstances in which property rule protection might be desirable, even though the liability rule enjoys an underlying advantage.

Our analysis of possessory interests in things differed in substantial respects from that of externalities, as did our conclusions. We emphasized that, contrary to traditional thinking, property rule protection of

¹⁹¹ In addition to distinctions based on common value and reciprocal takings, we also identified differences between the contexts with respect to the problem of multiple potential takers in section III.C, victims' *ex ante* incentives in section III.E, and the judgment-proof problem in note 182.

¹⁹² This assumes that there is no systematic bias in damage awards. We discussed in section II.A.3.(b) the possibility that damages might be too low, and offered possible solutions to this problem.

possessory interests is not unique in inducing prospective takers to bargain for transfers; that could happen under a liability rule as well. However, we did develop a number of arguments disfavoring the liability rule. In particular, we discussed the tendency toward excessive takings when bargaining is not possible, the reluctance of owners to bargain (even when feasible) due to the multiplicity of potential takers, the problem of reciprocal takings, and the creation of wasteful incentives to protect and take property. Together, these arguments furnish a powerful theoretical case against the liability rule and, we believe, justify one of the most basic incidents of ownership: the right of the owner of a thing to prevent others from taking it. Most observers have probably felt that this property right is best explained on account of its superiority to the alternative of anarchy,¹⁹³ but this misses the significant possibility of permitting takings upon the payment of damages.¹⁹⁴ Rationalizing this basic incident of ownership against the alternative of liability rules is an essential part of the justification of a private property regime.

We hope that our analysis will clarify conceptual understanding of property rules versus liability rules — especially to make apparent that the functions and desirability of property and liability rules are substantially different in the contexts of harmful externalities and of individuals' possessory interests in things. We also hope that some of our conclusions will be helpful for policymaking, especially with assessments of the desirability of liability rules and pollution taxes when the calculation of harm is difficult.

¹⁹³ For a comprehensive synthesis of the economic costs and benefits of forms of property ownership of land, see Robert C. Ellickson, *Property in Land*, 102 YALE L.J. 1315 (1993).

¹⁹⁴ We comment on Calabresi and Melamed's brief discussion of the issue in notes 5 and 6 above. We also note that a liability rule has long been considered a serious alternative to property rule protection in the context of eminent domain. See *supra* notes 143, 189.

APPENDIX

I. HARMFUL EXTERNALITIES

There is a population of risk-neutral victims and of risk-neutral injurers. An injurer may act in a way that causes harm h to a victim or may prevent harm by incurring a cost c . The harm that a particular victim might suffer is assumed to be fixed, but harm varies among victims according to positive density $g(h)$, with cumulative distribution function $G(h)$. Similarly, the prevention cost c that each injurer might incur is taken to be fixed, but c is assumed to vary among injurers according to positive density $f(c)$, with cumulative distribution function $F(c)$. The variables h and c are assumed to be independent.¹⁹⁵ An injurer knows his c but not necessarily the victim's h , and a victim knows his h but not necessarily the injurer's c . The state may or may not know h or c , as will be specified. There may or may not be bargaining between victims and injurers.

The social objective is minimization of total expected social costs: harm plus prevention cost. Thus, it is socially optimal for an injurer to prevent harm if and only if $c \leq h$. (For convenience, we say that when $c = h$ it is optimal to prevent harm.)

We consider two types of legal rule. Under *property rules*, the state, given its information, either assigns to the victim the entitlement to be free from harm or assigns to the injurer the entitlement to cause harm. If the victim has the entitlement, the injurer cannot harm him (without his permission). If the injurer has the entitlement, the victim cannot prevent the injurer from causing harm.

Under the *liability rule*, an injurer is permitted to harm the victim but must pay him non-negative damages d . Although in principle damages could be set at any level, we will focus primarily on the case in which d equals h , when the state can observe h , or when it cannot, the case in which d equals the mean (expected value) of h , $E(h)$. This is because, as was noted in the text, damages are intended to equal harm. We note also that $d = 0$ corresponds to property rule protection of the injurer (for the injurer can cause harm and not pay damages) and $d = \infty$ (or any d exceeding the highest possible value of c) corresponds to property rule protection of the victim (for the injurer effectively would never cause harm without bargaining).

We now compare property and liability rules in two cases: when there is no bargaining between a victim and an injurer and when there is bargaining.

¹⁹⁵ We discuss this assumption further in this Appendix at section I.A.2, comment d.

A. No Bargaining

1. *State's Information Is Perfect.* — In this case, we have:

PROPOSITION 1. *Assume that there is no bargaining between victims and injurers. If the state has perfect information about harm h and prevention cost c , property rules and the liability rule with $d = h$ are equivalent.*

To demonstrate this, observe that under property rules, the first-best outcome can be achieved: because the state knows c and h , the state can assign the entitlement to victims when $c \leq h$ (so harm will not occur) and to injurers when $c > h$ (so harm will occur). Also, the first-best outcome can be achieved under the liability rule with $d = h$, for then an injurer will prevent harm if and only if $c \leq h$.

2. *State's Information Is Imperfect.* — We assume here that the state knows only the distributions of h and c , and we have:

PROPOSITION 2. *Assume that there is no bargaining between victims and injurers. If the state knows only the distributions of harm h and prevention cost c , then (a) the liability rule with $d = E(h)$ is superior to property rules. Also, (b) the liability rule with $d = E(h)$ is superior to the liability rule with any other d .*

Under property rules, because the state does not observe c or h , it must assign the entitlement in the same way for all parties. If it assigns the entitlement to victims, injurers must prevent harm so that social costs will be $E(c)$; and if it assigns the entitlement to injurers, social costs will be $E(h)$. Hence, social costs will equal $\min(E(c), E(h))$, and the state will assign the entitlement to victims if and only if $E(c) \leq E(h)$. Under the liability rule with $d = E(h)$, an injurer will incur c and prevent harm if and only if $c \leq E(h)$, so that expected social costs will be

$$(1) \int_0^{E(h)} cf(c)dc + \int_{E(h)}^{\infty} E(h)f(c)dc.$$

Now (1) is strictly less than $E(h)$, for the first term is strictly less than $\int_0^{E(h)} E(h)f(c)dc$ because, when c is in the range between 0 and $E(h)$, $c < E(h)$. Also, (1) is strictly less than $E(c)$, for the second term is strictly less than $\int_{E(h)}^{\infty} cf(c)dc$ because, when c is in the range between $E(h)$ and ∞ , $c > E(h)$. Hence, (1) is less than $\min(E(c), E(h))$, so we have demonstrated (a).

With respect to (b), since an injurer will prevent harm if and only if $c \leq d$, expected social costs given d are

$$(2) \int_0^d cf(c)dc + \int_d^{\infty} E(h)f(c)dc.$$

The socially best d minimizes (2). Setting the derivative of (2) with respect to d equal to zero, we obtain the first-order condition, $df(d) - E(h)f(d) = 0$, which implies that $d = E(h)$, confirming (b).

Comments. (a) Part (a) of the proposition actually follows from part (b). This is because, as we remarked above, the property rules corre-

spond to liability rules with $d = 0$ or $d = \infty$, yet we showed in (b) that the optimal d is $E(h)$. Furthermore, one of the property rules will be the *worst* possible rule (and the other property rule will tend to be poor) because social costs are strictly decreasing as d increases from 0 to $E(h)$, and social costs are strictly increasing as d rises from $E(h)$.¹⁹⁶

(b) If the state has imperfect information about prevention cost c but can observe harm h , then the liability rule not only is superior to the property rule, but also allows achievement of the first-best outcome. Under the property rule, if the state assigns the entitlement to the injurer, social costs are $E(c)$, and if to the victim they are h ; hence the state assigns the entitlement to the injurer if and only if $E(c) \leq h$. In either case, the outcome will sometimes deviate from the first-best result. But under the liability rule, the outcome will always be first-best, since when $d = h$, injurers prevent harm if and only if $c \leq h$.

(c) If the state has imperfect information about h but can observe c perfectly, property rules and the liability rule are equivalent. Under property rules, the state will assign the entitlement to the victim if and only if $E(h) \geq c$. Under the liability rule, since $d = E(h)$, the same outcome will occur. But a reverse liability rule, under which victims pay c to prevent harm, would be superior to either property rule.

(d) The assumption that c and h are independent was used when we wrote $E(h)$ in the integrands in (1) and (2), for that presumed that the mean harm, conditional on c being larger than $E(h)$ or d , was just $E(h)$. We have discussed the plausibility of this assumption previously.¹⁹⁷

When c and h are not independent, the liability rule may not be superior to property rules. To illustrate, consider a discrete example in which there are two equally possible pairs of (c, h) , namely $(0, 0)$ and $(100, 110)$. If victims have the property entitlement, the first-best outcome results for $c \leq h$ in each case, and expected social costs are 50 (that is, $50\% \times 100$). Under the liability rule, however, $d = 55$ (for this is average harm), so that the injurer will cause harm when $c = 100$, and expected social costs are thus 55 (that is, $50\% \times 110$). The reason for this result is that, although the injurer makes his decision on the basis of average harm, it turns out that the injurers who have high prevention costs are also the ones who cause high amounts of harm. Our model for the taking of things in section II.B of this Appendix is another illustration of how the lack of independence between c and h

¹⁹⁶ This is true because the derivative of (2) is $f(d)(d - E(h))$.

¹⁹⁷ As noted earlier, this assumption is plausible because we think that the way in which, say, pollution could be prevented would have little to do with the harm that it might cause, which would be determined by the character of the thing or the environment exposed to the pollution. See *supra* note 43. We also noted a caveat in the case in which both harm and cost depend on the quantity of an externality and the quantity cannot be observed.

can change the result that the liability rule is more efficient than property rules.

(e) Our conclusion that a liability rule — which as we discuss in section II.E.1 includes the use of pollution taxes — is optimal in the externality context may appear to be inconsistent with arguments such as Martin Weitzman's claim that either price or quantity regulation may be optimal.¹⁹⁸ Weitzman's argument that quantity regulation may be desirable depends on two assumptions. First, he assumes that the level of harm may be a nonlinear (and in fact sharply increasing) function of the quantity of pollution; thus, the optimal price or tax depends on the quantity of pollution. (If there is a single level of harm, as in our model, a price approach will clearly be optimal.¹⁹⁹) But second, he assumes that a *single* price (a specific pollution tax rate, or damage level per unit of effluent) must be set *once and for all*; that is, it cannot be adjusted upward if the level of pollution is higher than expected (in which case the harm per unit of pollution is higher) or downward if the level of pollution is lower than expected.

We find the second assumption to be an unnecessary and unrealistic restriction, simply because it is not administratively difficult to change a price, tax rate, or damage level.²⁰⁰ In addition, pollution regulators might announce a tax *schedule* at the outset, indicating the tax due as a function of the amount of pollution.²⁰¹ Alternatively, if they used a permit scheme of the sort we describe in note 124, they could

¹⁹⁸ See Weitzman, *supra* note 42.

¹⁹⁹ See Marc J. Roberts & Michael Spence, *Effluent Charges and Licenses Under Uncertainty*, 5 J. PUB. ECON. 193, 202 (1976).

²⁰⁰ Weitzman motivates his restrictive assumption with examples involving emergencies. See Weitzman, *supra* note 42, at 478 n.1, 486. But these contexts are not typical of the problem of regulating harmful externalities. Marc Roberts and Michael Spence motivate restrictions on the ability to adjust prices by arguing that much investment in pollution control takes substantial time to plan and complete. See Roberts & Spence, *supra* note 199, at 193. But this does not prevent adjusting prices or announcing quantity-dependent prices. Rather, it suggests that firms' responses to price adjustments would not be immediate. But instant responses presumably are no more feasible when injurers are ordered not to pollute more than a stated quantity. Roberts and Spence seem to envision an initial announcement of a fixed level of pollution, in force for years; there could, however, also be an initial announcement of a pricing scheme under which prices depend on the total quantity of pollution, as we describe in the text to follow.

²⁰¹ See STIGLITZ, *supra* note 109, at 193–94. Roberts and Spence propose a scheme under which prices (the pollution tax) need not be constant. In their appendix, they show that by allowing the price schedule to adjust gradually with the quantity, the first-best scheme can be implemented. See Roberts & Spence, *supra* note 199, at 204–08. (In their model, harm is known with certainty; our analysis shows that if harm were uncertain, the pricing scheme would still be best, although not first best.)

We believe that the debate about whether one should regulate price or quantity misstates the issue. When harm varies with output, the optimal scheme is a *quantity-dependent price*. Such a pricing scheme allows the regulator to make use of injurers' information about prevention costs. If one simply sets quantities, this information is not used. (One could use this information by adjusting quantities in the manner described in note 124, which amounts to setting a price-dependent quantity, a scheme essentially equivalent to the quantity-dependent pricing mechanism.)

associate fees with permits or vary the quantity of permits (such as by selling more or repurchasing some) to ensure that the net price polluters paid was equal to expected harm at the observed level of pollution.

B. Bargaining²⁰²

We assume here that a victim makes a single demand (or offer) x to an injurer, who accepts or rejects it; x may correspond to payments received by the victim and/or to payments made by him — we will discuss the interpretation of x below. (We adopt the assumption that the victim makes the demand for concreteness and simplicity; for the most part, it does not affect the qualitative nature of our analysis.²⁰³)

1. *Parties Have Perfect Information About Each Other — Bargaining Is Always Successful.* — Suppose first that parties have perfect information about each other, that a victim knows the injurer's c , and that an injurer knows the victim's h . In this case, bargaining will always result in a mutually optimal agreement when one exists, so that we have:

PROPOSITION 3. *Assume that victims and injurers bargain and that they have perfect information about each other. Then a property rule and a liability rule with any level of damages d are equivalent and optimal — regardless of whether the state has perfect information about c and h .*

Suppose that a property rule in which the victim has the entitlement to be free from harm applies. One possibility is that $c \leq h$. In this case, the victim will make no demand of the injurer, for the injurer would pay at most c to be allowed to cause harm, but the victim would want at least h . The other possibility is that $c > h$. In this case, the victim will make the highest demand that the injurer would accept, a demand of c , for the injurer to be allowed to cause harm; the injurer will barely accept this demand and the victim will be better off (because he will make a profit of $c - h$).²⁰⁴ Thus, the outcome will be optimal after possible bargaining whether or not the entitlement is

²⁰² This section is based on Shavell, cited above in note 67.

²⁰³ We note, however, that if injurers instead of victims made offers, the analysis would be more complicated in the case in which information is imperfect and the liability rule applies. In that case, there would be a "signalling" phenomenon: the injurer's offer would convey information about his prevention cost; this information would be used by the victim in responding, as it would tell him something about the injurer's reaction (whether the injurer would cause harm and pay damages if the parties did not reach an agreement). Under our assumption, by contrast, the analysis is simpler because the victim makes the offer and the injurer either agrees or reacts. For further discussion, see Appendix section I.B.2, comment c.

²⁰⁴ Note the role of perfect information. The victim can determine the highest demand that the injurer will accept, c , because the victim knows c . In this case, only the victim's information matters, but that is because, for concreteness, we assumed that the victim makes a single offer or demand; had we assumed that the injurer makes the offer or demand, his information would matter.

given to the individual who values it most. Essentially, the same logic shows that the outcome will be optimal if the entitlement is assigned to the injurer or if a liability rule is employed, regardless of the relationship of d to c and h . For instance, suppose that the liability rule applies and that $h > c > d$. Here the injurer would cause harm and pay d in the absence of bargaining because $c > d$, even though this is not optimal. However, the victim would offer to pay the injurer $c - d$, the minimum the injurer would accept not to cause harm (for if the injurer causes harm, he pays d , and if he accepts the offer, he spends c but receives $c - d$, so he loses d on net); the injurer would barely accept, and the victim would be better off (he spends $c - d$, rather than suffering h and receiving d , for a net loss of $h - d$).

Comments. (a) As we stressed in the text, it is important to realize that bargaining results in the optimal outcome under the liability rule just as it does under property rules.

(b) That an optimal outcome results regardless of the legal rule (and regardless of the quality of information possessed by the state) is a classic illustration of the Coase Theorem.²⁰⁵

2. *Parties Have Imperfect Information About Each Other — Bargaining Is Not Always Successful.* — Now suppose that the parties have only imperfect information about each other; each knows only the distribution of the other's value. Also, suppose that the state knows only the distributions of c and h . For simplicity, we assume that both c and h are distributed on the unit interval and have positive density there; it will be obvious that this assumption is inessential.

We first characterize the nature of bargaining under property and liability rules.

PROPOSITION 4. *Assume that victims and injurers bargain and that their information is imperfect; they know only the distributions of each others' values. Also, the court knows only the distributions of harm h and prevention cost c . Then the behavior of the parties is as illustrated in Figure 1:*

(a) *Under the property rule in which victims are entitled to be free from harm, a victim, who would suffer harm h , makes a demand of $x_v(h) > h$ (see (5)), which he must be paid if harm is done; the injurer accepts this demand, pays $x_v(h)$, and causes harm if and only if $c > x_v(h)$.*

(b) *Under the property rule in which injurers are entitled to cause harm, a victim, who would suffer harm h , makes an offer of $x_i(h) < h$ (see (8)), which he will pay to avoid harm; the injurer accepts this offer, collects $x_i(h)$, and refrains from causing harm if and only if $c < x_i(h)$.*

(c) *Under the liability rule, the nature of a victim's offer or demand $x_l(h)$ depends on whether h is below or above d . When h is*

²⁰⁵ See Coase, *supra* note 18, at 2-15.

his prevention cost c exceeds x^{206} and $1 - F(x)$ is the probability of that event, the victim's expected payoff as a function of x is

$$(3) (1 - F(x))(x - h).$$

The victim will select x to maximize (3). We can restrict attention to x in $[0, 1]$ (since $x > 1$ is equivalent to $x = 1$, which all injurers would refuse). The derivative of (3) with respect to x is

$$(4) 1 - F(x) - f(x)(x - h).$$

Note that $1 - F(x)$ is the expected marginal benefit to the victim of raising his demand by a dollar (since $1 - F(x)$ is the probability that the offer will be accepted) and that $f(x)(x - h)$ is the marginal cost of so doing (since $f(x)$ is the density of injurers who will just decide not to accept the demand of x when x is raised, and $x - h$ is what is lost if a demand is not accepted). The first-order condition determining x is²⁰⁷

$$(5) x = h + (1 - F(x))/f(x).$$

The graph of demands as a function of h , denoted $x_v(h)$ (the subscript v standing for victims' rights), is shown in Figure 1. The Figure is justified by the following: (i) The optimal x for any h must be positive since (4) evaluated at $x = 0$ is positive; (ii) If x is in $(0, 1)$, then (5) holds, so that $x > h$ and $x_v(h)$ is increasing in h ;²⁰⁸ and (iii) $x = 1$ if and only if $h = 1$. In particular, if $h = 1$, then clearly $x < 1$ would not be chosen; and if $x = 1$, (4) must be non-negative, that is, $f(1)(1 - h) \leq 0$, implying that $h = 1$.

(b) We suppose next that injurers possess the entitlement to cause harm under a property rule. Here, the victim will make an offer to pay x to the injurer for him not to cause harm; if the injurer accepts and collects x , then he will have to spend c to prevent harm. Since the injurer will accept if and only if $c < x$, the victim will choose x to minimize

$$(6) F(x)x + (1 - F(x))h.$$

As before, we can restrict attention to x in $[0, 1]$. The derivative of (6) with respect to x is

$$(7) F(x) + f(x)(x - h),$$

so that the first-order condition determining x is

$$(8) x = h - F(x)/f(x),$$

²⁰⁶ If $c = x$, the injurer will of course be indifferent between paying x and causing harm and incurring c and preventing harm. For concreteness, however, we assume that the injurer will not cause harm when $c = x$, and we make similar assumptions below without further comment.

²⁰⁷ Here and below, we assume that the second-order condition sufficient for a global maximum holds.

²⁰⁸ This can be verified by totally differentiating (5), using the second-order condition, and solving for $x_v'(h)$.

and the graph of offers as a function of h , $x_i(h)$ (the subscript i standing for injurers' rights), is shown in Figure 1, which can be justified analogously to that of $x_v(h)$.

(c) Now we suppose that injurers are liable for harm done and that the damages d that they have to pay for causing harm are known both to them and to victims. If $h < d$, the victim may offer to accept as damages an amount x that is less than d , but greater than h , for this will increase the probability that the injurer will cause harm and pay the victim more than h .²⁰⁹ If the victim offers such an amount x , then the injurer will accept if and only if $c > x$. Hence, the victim will choose x to maximize (3), subject to $x \leq d$. Therefore, for $x < d$, the graph of victims' offers $x_l(h)$ (the subscript l standing for liability) coincides with the graph of $x_v(h)$ when the latter does not exceed d (that is, for $h < h_1$); otherwise, the victim's offer equals d , or equivalently, he makes no offer. Similarly, if $h > d$, the victim will offer to pay an amount x to the injurer for him not to cause harm, for if the injurer causes harm, the victim will suffer a loss of $h - d$. The injurer will accept an offer if and only if $c - x \leq d$, or if $c \leq x + d$. Hence, the victim will choose x to minimize

$$(9) \quad F(x + d)x + (1 - F(x + d))(h - d).$$

The derivative of (9) with respect to x is

$$(10) \quad F(x + d) + f(x + d)(x + d - h),$$

yielding the first-order condition

$$(11) \quad x + d = h - F(x + d)/f(x + d).$$

This equation has the same form as (8), with $x + d$ here playing the role of x in (8). Hence, if $x_i(h)$ solves (8), $x_i(h) - d$ will solve (11). Thus, as long as $x_i(h) \geq d$ (that is, for $h > h_2$) — so that $x_i(h) - d$ is non-negative — we have $x_l(h) = x_i(h) - d$; when $x_i(h) < d$ (that is, for $h < h_2$), $x_l(h) = 0$, or equivalently, no offer is made. Finally, if $h = d$, the victim makes no offer (or equivalently, an offer of d).

From the last three paragraphs, it follows that the graph of $x_l(h)$ can be understood from Figure 1 for damages of d . In region A, the victim's offer and the outcome are the same as if he has a property right to be free from harm; in region B, no offers are made, and the injurer commits the act if and only if c exceeds d ; in region C, the victim offers $x_i(h) - d$, and the injurer commits the act exactly when he would under a property rule under which he has the entitlement.

We now compare social costs under property and liability rules.

²⁰⁹ The victim cannot ask for more than d since the injurer can always cause the harm and pay only d . And, obviously, a victim with $h < d$ would never offer to pay the injurer not to engage in his activity. Thus, the only possible type of offer or demand is that under consideration.

PROPOSITION 5. *Assume that victims and injurers bargain and that their information is imperfect; they know only the distributions of each others' values. Also, the court knows only the distributions of harm h and prevention cost c . Then either the liability rule with damages d equal to $E(h)$ or a property rule could be superior — the liability rule and property rules cannot be unambiguously ranked.*

The argument behind this claim is most easily made graphically, using Figure 1 to describe the inefficiencies that occur under the different rules.

Under the property rule in which victims have the entitlement, the vertically shaded area shows the c and h for which there is inefficiency, because an injurer with c above the 45° line but below x_v will not accept the offer from the victim but ought to cause harm. Thus, the inefficiency is the integral of $x_v(h) - c$ over the vertically shaded region.²¹⁰ Similarly, under the property rule in which injurers possess the entitlement, the inefficiency is the integral of $c - x_i(h)$ over the horizontally shaded region. The state is assumed to choose optimally who will receive the entitlement, so that inefficiency is minimized.

Under the liability rule, the inefficiency in region A corresponds to the vertically shaded area, and the inefficiency in region C corresponds to the horizontally shaded area. In region B, the inefficiency corresponds to the triangles T_1 and T_2 . Note that T_1 is contained in the region between x_v and the 45° line, so that for h in the left part of B, the liability rule is superior to the property rule with the entitlement protecting victims. Likewise, for h in the right part of B, the liability rule is superior to the property rule with the entitlement protecting injurers.

The liability rule will be superior to property rules if and only if the inefficiency under the liability rule is smaller than that under property rules (when the entitlement under the latter is given to minimize the inefficiency). It is apparent from Figure 1 that either property rules or the liability rule could be superior to the other. Specifically, suppose that the distribution of h is concentrated in B about d .²¹¹ (Note that the Figure applies regardless of the distribution of h , for the functions $x_v(h)$, $x_i(h)$, and $x_j(h)$ depend only on the distribution of c .) Then it is clear from the Figure that the inefficiency under the liability rule (corresponding to the parts of T_1 and T_2 near d) is less than the inefficiency either under x_v or under x_i ; thus, the liability rule is superior to either property rule.

Suppose, on the other hand, that the distribution of h lies virtually all outside the region B.²¹² Then the liability rule must be inferior to a property rule. To explain, suppose for concreteness that it is optimal

²¹⁰ That is, the deviation from first-best welfare is: $\int_0^1 \int_h^{x_v(h)} (x_v(h) - c) f(c) dc g(h) dh$.

²¹¹ This assumption is obviously consistent with $d = E(h)$.

²¹² This assumption is also consistent with $d = E(h)$.

for victims to enjoy the entitlement. Then the liability rule is equivalent to victims' having the entitlement for h in region A and is equivalent to injurers' having the entitlement for h in region C. But in region C, the inefficiency with x_v is less than that with x_i , so that the liability rule is inferior to the property rule protecting victims.

Comments. (a) To illustrate that the liability rule with $d = E(h)$ may be superior to property rules, suppose that injurers' costs c are uniformly distributed on the interval $[0,1]$ but that victims' harms are concentrated toward the center, in particular, that h is uniformly distributed on $[1/4, 3/4]$. Then it can be demonstrated that the liability rule with $d = 1/2$ is superior to either of the property rules.²¹³ Indeed, $d = 1/2$ is the optimal level of damages, and the further d is from $1/2$, the lower is welfare. (This is the same result that holds when there is no bargaining, as stated in Proposition 2(b).)

To illustrate that a property rule may be superior to the liability rule with $d = E(h)$, suppose that harm is concentrated away from $E(h)$; specifically, assume that h is 0 or 1, each with probability $1/2$.²¹⁴ In this instance, a property rule (in fact, either property rule) is superior to the liability rule with $d = 1/2$. Moreover, it can be shown that a property rule is superior to a liability rule with any d in $(0,1)$, and $d = 1/2$ is the worst possible value of d .

(b) We have also investigated the performance of property and liability rules in the case of triangularly distributed c and h . (The density of a triangular distribution on $[0,1]$ rises linearly from zero to a peak and then falls linearly to zero; thus, such a distribution allows for probability mass to be highest around a central value.) In the symmetric case, in which both densities have peaks at $1/2$, both property rules are superior to the liability rule with $d = 1/2$. More precisely, social costs are lowest (and are constant) for d in the range $[0, 1/3]$ and $[2/3, 1]$, and social costs increase for d between these ranges, reaching a maximum at $d = 1/2$. If either of the distributions is highly skewed, then the optimal d is extreme, approximating zero or one. The triangular-distribution example thus raises questions about the argument that liability rules tend to remain superior when bargaining is imperfect.

(c) We briefly note how our conclusions relate to those reached in recent work by Ian Ayres and Eric Talley.²¹⁵ (For a more complete

²¹³ For this illustration and others that follow in the Appendix, our method consisted of two steps: (1) deriving expressions for all the relevant terms (such as victims' offers for various values of harm, social costs due to rejected offers); and (2) solving the expressions for social costs by using a computer.

²¹⁴ This corresponds to any case in which there are only two types of victims, one type suffering greater harm than the other.

²¹⁵ See Ayres & Talley, *supra* note 10.

discussion, the reader should see our reply to their article.²¹⁶ Ayres and Talley consider a model of bargaining similar to ours, but one in which victims first make a statement to injurers, and then injurers make offers or demands. In the single numerical example that they solve, they find that the liability rule with $d = E(h)$ is superior to either property rule. This is, of course, consistent with our conclusion. They do not, however, illustrate the possibility that property rules may be superior to the liability rule. (In their original example in which injurers' benefits are uniformly distributed, which they discuss but do not solve,²¹⁷ it turns out that property rules and the liability rule perform equally well.)

Their article emphasizes, but never demonstrates, that liability rules enjoy a systematic advantage over property rules. They contend that liability rules are advantageous because they facilitate bargaining more than property rules do, but we do not understand why this should be so. Indeed, the very example they solve contradicts this hypothesis: under the liability rule, bargaining increases welfare by only 4.875, whereas under the property rule (with the victim having the entitlement), bargaining increases welfare by twice as much, 9.75.

We have noted the possibility that the liability rule with $d = E(h)$ may have some advantage over property rules. The reason is that, in the absence of bargaining, the liability rule is definitely superior to property rules, so that the liability rule might retain its advantage in the presence of bargaining. In the example that Ayres and Talley consider, this argument indeed explains the superiority of the liability rule in the presence of bargaining. Social welfare under the liability rule in the absence of bargaining is 55, whereas, under the property rule, it is only 50. The liability rule retains a slight advantage after bargaining: bargaining results in a greater increase in welfare under the property rule, but not quite enough to pass the liability rule.

In a separate paper, Talley demonstrates that a liability rule with a properly chosen d is always superior to property rules.²¹⁸ This result might appear to be inconsistent with our conclusions, but it is not, because it is derived under a particular set of assumptions.²¹⁹ Given our arguments, it is, of course, no surprise that there exist assumptions

²¹⁶ See Kaplow & Shavell, *supra* note 71. (In our reply, we also comment on their response to us.)

²¹⁷ See Ayres & Talley, *supra* note 10, at 1039-47.

²¹⁸ See TALLEY, *supra* note 72, at 17-26.

²¹⁹ One assumption that may be unfamiliar to the reader is Talley's use of the "optimal mechanism" for bargaining. The optimal mechanism is optimal in the sense that it is what would be imposed by a utilitarian dictator, who wished to maximize the sum of the parties' welfare. It is well understood by game theorists that there is no clear basis for interpreting the optimal mechanism as what the parties themselves would choose to adopt, and thus there is no clear basis for interpreting outcomes under the optimal mechanism as those that would actually obtain. See, e.g., DREW FUDENBERG & JEAN TIROLE, *GAME THEORY* 284, 289-90 (1991).

under which a liability rule with some d is superior to property rules; indeed, we have shown this as well. Moreover, we emphasize (as mentioned in note 72) that Talley's analysis does not show that the optimal liability rule is more than trivially different from a property rule (for example, optimal damages might be \$.01, in which case the liability rule resembles a property rule giving the entitlement to injurers).

II. THE TAKING OF THINGS

There is a population of risk-neutral owners of things and of risk-neutral takers;²²⁰ each owner faces a single taker.²²¹ The value of a thing to a person is the sum of two values: a *common value* and an *idiosyncratic value*. The common value of a thing is the same for all individuals. (As explained in the text, it derives from some feature of the thing that all individuals value in the same way, such as a car's gas mileage.) The common value, denoted v , varies from one object (or situation) to another as described by the density $z(v)$. The idiosyncratic value of a thing arises from aspects of it that people value differently (the color of a car may be liked by some but not others). The idiosyncratic value of a thing to its owner is x and to a potential taker, y . The densities of x and y will be denoted $g(x)$ and $f(y)$. We assume that x , y , and v are independent of each other. We also suppose that owners, on average, attach a higher idiosyncratic value to things than do takers: $E(x) > E(y)$. We discussed the justification for the latter assumption in section III.A.2 of the Article. The total value of a thing to its owner is $v + x$ and to a taker, $v + y$.

Each person knows v and his own idiosyncratic value. The state may or may not know v , x , and y .

The social objective is maximization of the expected value of things.²²² It is socially desirable for an owner to possess a thing if and only if $v + x \geq v + y$, that is, if and only if $x \geq y$; otherwise, the taker should have the thing.

We consider the property rule and the liability rule. Under the *property rule*, the state, given its information, assigns the entitlement to possess the thing either to the owner or to the taker. Under the *liability rule*, a taker is permitted to take the thing but must pay non-negative damages d . We will focus on the case in which d equals the value to the owner, $v + x$, if the state can observe this, or if not, when d equals the mean of $v + x$.

²²⁰ We call the party that faces an owner a "taker" even though that party may not in fact take a thing and thus might better be called a "potential taker."

²²¹ We emphasized in section III.C of the Article the importance of the possibility that multiple potential takers might face a particular owner, but here we abstract from this possibility.

²²² Thus, we abstract from incentives to protect and to take things and from other issues discussed in the Article.

We now compare property and liability rules for the case in which the owner and taker do not bargain. (The case in which there is bargaining was informally described in the text.)

A. *State's Information Is Perfect*

Here we have:

PROPOSITION 6. *Assume that owners and takers do not bargain. If the state has perfect information about parties' values, the property rule and the liability rule with $d = v + x$ are equivalent and optimal.*

Under the property rule, the state can achieve the first-best outcome by assigning the entitlement to owners if and only if $y \leq x$. Also, the state can achieve the first-best outcome under the liability rule with $d = v + x$, for then a taker will refrain from taking the thing if and only if $v + y \leq d = v + x$, or if and only if $y \leq x$.

B. *State's Information Is Imperfect*

Let us assume here that the state has imperfect information about the common value and the idiosyncratic values; it knows only their distributions. Then we have:

PROPOSITION 7. *Assume that owners and takers do not bargain. If the state knows only the distributions of parties' values, then:*

(a) *The property rule with the entitlement given to owners is superior to the property rule with the entitlement given to takers.*

(b) *The property rule with the entitlement given to owners may be superior to the liability rule with $d = E(v) + E(x)$. A sufficient condition for superiority of the property rule is that the support of the distribution of y lies below $E(x)$.*

With regard to (a), if owners have the entitlement, the expected value is $E(v) + E(x)$, and if takers have it, the expected value is $E(v) + E(y)$. Because $E(x) > E(y)$, the state should grant the owners the entitlement.

With regard to (b), observe that a taker will take a thing when $v + y > E(v) + E(x)$, or when

$$(12) \quad y > E(v) - v + E(x).$$

Now there will be a difference between the outcome under the liability rule and that reached under the property rule if and only if the taker takes — that is, when (12) holds. Further, when the taker takes, the expected difference in values between the taker and the owner is $y - E(x)$. Hence, the difference in social welfare under the liability rule is equal to

$$(13) \quad \int_0^\infty \left[\int_{E(v)-v+E(x)}^\infty (y - E(x))f(y)dy \right] z(v)dv.$$

If (13) is negative, the liability rule is inferior to the property rule. If the support of y lies below $E(x)$, then $y - E(x)$ is always negative, so that (13) must be negative.

Comments. (a) The interpretation of (12) and (13) bears comment. From (12), it is clear that if v is higher than its estimated value $E(v)$, then there may be takings even though y , the taker's idiosyncratic value, is "low"; the higher is v relative to $E(v)$, the lower may be the y for which a taker would take. Further, the more likely it is that takings will occur when y is low (less than $E(x)$), the more negative the contribution to (13) will be, and the less well the liability rule will perform. What makes takings likely even when y is low is the variability in v , which means that there is a substantial probability that $v > E(v)$. Because much of the probability mass of the distribution of y lies below $E(x)$, the probability is substantial that, when there is a taking, it will tend to reduce social welfare.

(b) Note that the liability rule may be inferior to the property rule even though damages equal the expected value of the object to the owner, which is analogous to the victim's harm in the externality context. The contrast with the externality context arises because here the total values of the two parties are correlated: both total values include v . If v is zero or if there is no variation in v — which eliminates the correlation — it is readily shown that the liability rule (with $d = E(x)$) is superior to the property rule with entitlement to the owner.²²³ Thus, the present result is consistent with the result in the externality context. (Recall also comment d in section I.A.2 of the Appendix showing that, in the externality context, relaxing the independence assumption altered the conclusion.)

(c) To illustrate our argument, we provide some numerical examples. All distributions are uniform on the intervals described in the table below. The final column displays the ratio of the social costs imposed by the liability rule from inducing undesirable takings to the social benefits from inducing desirable takings. A ratio that exceeds one indicates that the property rule is superior.

COMMON VALUE (v)	IDIOSYNCRATIC VALUE		COSTS/BENEFITS OF LIABILITY RULE
	OWNERS' (x)	TAKERS' (y)	
[90,110]	[0,10]	[0,5]	5.571
[90,110]	[0,10]	[0,8]	1.313
[95,105]	[0,10]	[0,6]	2.111
[95,105]	[0,10]	[0,8]	0.792

The property rule is clearly superior unless, as in the final example, the range of the common value is small (here, within 5% of its mean) and

²²³ In (13), the lower limit of the second integral becomes $E(x)$, so $y - E(x)$ is positive for all y in $(E(x), \infty)$.

the average takers' idiosyncratic value (4) is almost as high as the average owners' idiosyncratic value (5). (Shrinking the range of the common value alone would be sufficient to induce a preference for the liability rule, as explained in the preceding comment.)

The above analysis assumes that damages equal the average common value, 100, plus the average owners' idiosyncratic value, 5, for a total of 105. Higher damages clearly are optimal. In the third example, for instance, if damages were 110, takings would be rare: only takers with idiosyncratic values above 5 would take (for the highest possible common value is 105 and damages are 110) and they would take infrequently (a necessary condition is that the common value exceed 104). Such takings would, on average, be desirable, because the taker's value would, on average, exceed the owner's value. (See our discussion in note 157.) We would, however, interpret such a rule as more like a property rule than a liability rule: even though damages are not infinite, they are high enough to deter virtually all takings.