PROPERTY RULES
VERSUS
LIABILITY RULES

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Property Rules versus Liability Rules

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A fundamental legal problem is whether property rights should be protected by property rules or by liability rules. In this Article, we provide a systematic economic analysis of the choice between property and liability rules. We answer a basic question: why is it that liability rules are commonly used in the context of harmful externalities (such as pollution and automobile accidents), whereas property rules are generally employed to protect possessors of things against potential takers? In the course of our analysis, we demonstrate that many commonly held beliefs about property and liability rules are mistaken. Our analysis is also relevant to policy; for example, we show that in important contexts liability rules (and pollution taxes) are more efficient than property rules (including much regulation) even when damages must be set using only limited information about harm.

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I. Introduction

The state has at its disposal two fundamental ways of
protecting property rights. It may choose to adopt *property
rules,* under which it guarantees property right assignments
through the threatened use of its police powers against
unconsented-to infringements. Alternatively, the state can
employ *liability rules*, under which it merely discourages
violations by requiring transgressors to pay victims for the
harms they suffer.

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

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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). (We note that our Article does not
examine rules prohibiting alienation, as did Calabresi & Melamed, 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.
See generally Susan Rose-Ackerman, Inalienability and the Theory of Property
Rights, 85 **Colum. L. Rev.** 931 (1985).) Other prominent articles that study
property versus liability rules from an economic perspective are Robert C.
Ellickson, Alternatives to Zoning: Covenants, Nuisance Rules, and Fines as
Land Controls, 40 **U. Chi. L. Rev.** 681 (1973); Frank I. Michelman, Pollution as
a Tort: A Non-Accidental Perspective on Calabresi's Costs, 80 **Yale L.J.** 647,
667-83 (1971); A. Mitchell Polinsky, Controlling Externalities and Protecting
Entitlements: Property Right, Liability 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].
    Several articles have been written about contract law analogs of the
choice between property and liability rules. See, e.g., Anthony T. Kronman,
Specific Performance, 45 **U. Chi. L. Rev.** 351 (1978)(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)(whether remedy for unconscionable contracts should be to void them,
property-like protection to the "victim," or to supply terms a court believes
reasonable, a liability-like approach). We do not consider the contractual
context in this Article (although we suspect that our analysis has some
bearing on contract law).

major object of the Article is to explain why individuals'
possessory interests in things are generally protected by
property rules, whereas their 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 --
if, say, I own an automobile or a home -- another person
ordinarily cannot take it away from me 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 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 threatened with harm by another party, I
may be protected primarily by a liability rule. This is the case
for much polluting behavior and for many of the great multitude
of acts governed by the law of unintentional torts. We are
permitted to engage in such acts, from walking to driving to
construction, even though they create risks of harm and thus

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[2]As will be evident, by the protection of possessory interests in things,
we refer to 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, we will usually speak of them as such in this Article. But see
infra subsection II.E.4 (on incomplete enforcement of property rights).

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constitute probabilistic invasion of property interests, but we

are often obligated to pay damages for any harm that is caused.

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 insured

by his power to enjoin harmful behavior (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 in the literature.[5] Moreover, as we

will discuss, arguments that commentators have advanced in

support of liability rules for the control of externalities would

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[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 321-24 (1993); Restatement (Second) of Torts §§ 821F, 826 (1979); Boomer
v. Atlantic Cement Co., 26 N.Y.2d 219, 257 N.E.2d 870, 309 N.Y.S.2d 319 (1970)
(injurer permitted to pay damages instead of being subject to an injunction);
Ellickson, supra note 1, at 719-22 (suggesting that historical weakness of
nuisance law of confining relief to property rules partly responsible for
belief that zoning was necessary); Thomas W. Merrill, Trespass, Nuisance, and
the Costs of Determining Property Rights, 14 J. Leg. Stud. 13, 14-20 (1985);
Note, Efficient Land Use and the Internalization of Beneficial Spillovers: An
Economic and Legal Analysis, 31 Stan. L. Rev. 457, 464-65 (1979)(describing
historical movement from property rule protecting victims to property rule
protecting injurers to liability rule).

[5]Most of the 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, at page 5, which is erroneous. (We discuss their specific argument
further in note 6.)

seem to apply as well in the context of possessory interests.[6] This observation suggests that something is missing from their arguments, presuming that property rule protection of possessory interests is appropriate. We will discuss the problems with commentators' 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, where 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 this point implies that property rules will be superior.[7] However, we demonstrate 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

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

[7]One of the main concerns of a recent paper 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 (unpublished, 1994). They correctly observe that Calabresi and Melamed's article, supra note 1, is difficult to interpret on the issue, that Polinsky's writing, see supra 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. See Krier & Schwab, supra, at 11-18.

assessment of current and proposed schemes of environmental regulation.[8]

In addition, we will cast doubt on the beliefs that property rules are best when transaction costs are low -- because use of property rules will then induce parties to bargain and reach desirable outcomes -- whereas liability rules are best when transaction costs are high -- because use of liability rules will then induce injurers to act desirably, mimicking the outcomes that would otherwise have been reached through bargaining.[9] We find that these beliefs are 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 under property rules;[10] and when transaction costs are high and bargaining is impossible, property rules may lead to better outcomes than liability rules.[11]

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[8]See *infra* subsection II.D.1.

[9]*See, e.g.,* **Richard A. Posner, Economic Analysis of Law** 57, 70 (4th ed. 1992); Calabresi & Melamed, *supra* note 1, at 1126-27 (discussed in note 6); Krier & Schwab, *supra* note 7, at 10-11 (presenting -- for purposes of subsequent criticism rather than endorsement -- the conventional wisdom). See also Craswell, *supra* note 1, at 1-15 (adopting the view in the contract context, and noting the acceptance of the view by others); David D. Haddock, Fred S. McChesney, & Menaham Spiegel, An Ordinary Economic Rationale for Extraordinary Legal Sanctions, 78 **Calif. L. Rev.** 1, 13-36 (1990)(arguing for extraordinary sanctions -- property rule protection -- to force bargaining); Merrill, *supra* note 4, at 14, 25 (favoring use of the law of trespass when transaction costs are low and the law of nuisance, with a balancing test to assign the entitlement and possibly to require payment of damages, when transaction costs are high).

[10]See *infra* subsection II.B.2. This general point is also a theme of Polinsky, Resolving Nuisance Disputes, *supra* note 1, and of an article written 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 17.

[11]See *infra* subsection III.A.2.

We now offer a summary of our analysis, which is divided into a Part dealing with harmful externalities and a Part addressing the taking of things. Let us briefly describe 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 it.

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. Here the commonly held view of the literature is that liability rules are superior to property rules, assuming that courts can accurately determine harm.[12] 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 harm, simply because the firm will have to pay for any harm done. In contrast, if victims' rights 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.[13]

However, some of the literature suggests that liability

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[12]See, e.g., **R. Posner**, supra note 9, at 70 & n.5; Calabresi & Melamed, supra note 1, at 1108, 1119-20; Krier & Schwab, supra note 7, at 11-14 & n.31 (describing this view -- without the caveat that harm can accurately be determined -- as "virtual dogma" and citing numerous authorities); Polinsky, Resolving Nuisance Disputes, supra note 1, at 1076 n.7 (noting commentators' views).

[13]Or, if firms' rights to behave in a way that pollutes are protected by a property rule -- that is, if they are freely permitted to pollute -- they will generate pollution even when prevention cost is less than harm.

rules may be inferior to property rules if courts would have difficulty ascertaining the actual level of harm.[14] 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 misleading. 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 courts set damages equal to their best estimate of the average harm, 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.[15] 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 cost. (To be sure, it will *sometimes* be true that actual harm is greater than a firm's high prevention cost, but on average that will not be so.)

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[14]See, e.g., **R. Posner**, <u>supra</u> note 9, at 70 n.5; Calabresi & Melamed, <u>supra</u> note 1, at 1125-27; Krier & Schwab, <u>supra</u> note 7, at 14-18.

[15]The case of a property rule protecting injurers is analogous.

Our conclusion about the superiority of the liability rule would 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, so that parties are able to 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.[16] For instance, even if a firm cannot pollute and pay 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 may 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. However, we offer a conjecture that liability rules

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[16]See R.H. Coase, The Problem of Social Cost, 3 J. L. & Econ. 1 (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, supra note 1, 1088-92 (showing that property rules and liability rules each lead to efficiency when bargaining is perfect).

hold an underlying advantage.[17]

We then examine several factors -- apart from parties' ability to bargain -- that are of possible relevance to the choice between property and liability rules. One is victim behavior: victims' ability to mitigate harm.[18] Although victims can be provided some incentives to reduce harm under liability rules that are accompanied by defenses, we observe that the factor of victim behavior lends appeal to the property rule entitling injurers to cause harm or to modified liability rules under which compensation is paid to the state, because under such rules victims are left uncompensated for harm incurred. Another factor that we investigate is the judgment-proof problem: that injurers may not have enough wealth to pay for harm done. This means that a liability rule may be ineffective in inducing injurers to prevent harm. (Consider a company that operates a highly dangerous chemical process that could kill thousands, but whose assets are under a million dollars.) In the face of this problem, we indicate that property rule protection of victims may

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[17]In earlier work, Polinsky also reached the conclusion that it is indeterminate whether property or liability rules are superior when bargaining is imperfect (although he does not analyze a formal model of bargaining with asymmetric information). See, e.g., Polinsky, Resolving Nuisance Disputes, supra note 1, at 1079.
    Ayres and Talley, supra note 10, devote much of their article to exploring the relative performance of property and liability rules when bargaining is imperfect. They do not emphasize the theoretical ambiguity about the relative performance of property versus liability rules with regard to whether desirable outcomes occur when bargaining is imperfect. Instead, they stress that under liability rules, problems of imperfect bargaining are likely to be less severe than under property rules. We believe their view to be misleading. See infra note 63; appendix subsection I.B.2, comment d.

[18]The point that victims as well as injurers may be able to prevent harm was emphasized by Coase. See Coase, supra note 16, at 2, 12-13.

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 income distribution, 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,
therefore, is that *there is a prima facie case favoring liability
rules over property rules for controlling harmful externalities,
but that property rule protection may become desirable on account
of one or another 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 possession
might 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 permitted 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, but one often finds 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 that is not already his to bargain for it with its possessor.[19] The belief derives from the idea that, through bargaining, we can be reasonably confident that property will change hands when and only when the change is desirable, for example, 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 pays damages of $10,000, but in fact I value the car more highly than he does, I could bargain with Jack, paying him to refrain. (This is, of course, an application of the Coase Theorem.[20])

How then can we 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.[21] First, we explain that under a liability rule, bargaining might be rendered effectively impossible. Under a

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[19]See, e.g., **R. Posner**, supra note 9, at 70; Calabresi & Melamed, supra note 1, at 1124-27 (discussed in note 6); Krier & Schwab, supra note 7, at 23.

[20]See Coase, supra note 16.

[21]The order in which we consider these arguments here is somewhat different from that in Part III.

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 courts, there would be no point to my paying him to desist -- for Jill or somebody else could easily 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. And by definition of a regime of liability for takings,[22] 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 problem of reciprocal takings and the possibility of bargaining are put to the side, it might seem that the liability rule with damages equal to the average value of a thing would be attractive, by the logic we offered 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 (but important) and that are best deferred.[23]

Still another problem affecting the performance of liability

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[22]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.

[23]See infra subsection III.A.2.

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 will take measures to protect their things (such as installing special locks on their cars) and potential acquirers will likewise make investments to accomplish takings (such as obtaining devices to counter the locks). Such efforts and resource uses are a social waste, akin to those engendered by the problem of theft, and argue against a regime of liability.

After discussing these arguments and considering administrative costs and several other factors, we conclude that *there is a strong theoretical 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 arrestor).[24]

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[24]Our conclusions, and the logic behind them, would not be altered in an essential way were we to assume that the injurer only reduced, rather than eliminated, the risk of harm or its magnitude by taking a precaution, or if

We will suppose that a *property rule* involves two elements: a choice whether to grant an entitlement to the victim or to the injurer, and absolute protection of the 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 harm, or that the state would 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 this.[25]

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's[26] best estimate of it.[27] That the measure of

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the injurer could alter harm by changing his level of activity. However, our conclusions are affected by consideration of *victims'* behavior; <u>see</u> <u>infra</u> section II.C.

[25]The characterization of a property rule as a compound of a choice of who should enjoy an entitlement and then its absolute protection is emphasized in Calabresi and Melamed, <u>supra</u> note 1.
   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 by Polinsky, <u>Controlling Externalities</u>, <u>supra</u> note 1. We discuss partial entitlements below at page 60.

[26]Throughout the article, we will use the word "court" as a 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.

[27]We assume for simplicity that liability is strict, but discuss the negligence rule in subsection II.E.2. Also, we do not consider in the text what Calabresi and Melamed call the "reverse" liability rule: where the victim has the right to prevent harm, but must pay the injurer for the cost he bears to do so. <u>See</u> Spur Industries, Inc. v. Del E. Webb Development Co. 108 Ariz. 178, 494 P.2d 700 (1972); Calabresi & Melamed, <u>supra</u> note 1, at 1116-17. The

damages under 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 would blur into property rules: 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. But
later we do discuss the class of liability rules in which damages
may be set at any level.[28]

Finally, in most of the analysis we take the social goal to
be the minimization of total social costs: harm and prevention
costs. In section II.D, however, we 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
where parties do not bargain with one another, then addressing
the situation when they do, and subsequently examining the
various other factors relevant to the performance of property and
liability rules.

A. Parties Do Not Bargain with Each Other[29]

Victims and injurers often will not bargain with each other

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analysis of a reverse liability rule would be similar to that of a
conventional liability rule; we comment on reverse liability rules below in
notes 35, 81, 84, 85, and 125, and in appendix subsection I.A.2.

[28]See _infra_ subsection III.E.4.

[29]Many of the arguments in this section and the next are developed
formally in our appendix.

because of the costs of so doing, because they do not know each others' identities, or for other familiar reasons.[30] This case where bargaining is unlikely is of great practical significance, as it includes most settings in which industrial pollution is generated as well as the problem 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 only if the injurer has the entitlement to cause harm,[31] whereas under the liability rule there will be harm if 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 it is clear that property rules and the liability rule are equivalent because, under each, the optimal outcome is achieved.[32] Under property rules, the state can assign the entitlement to obtain the optimal result: the state grants the entitlement to the victim if harm would exceed prevention cost

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[30]See, e.g., Coase, supra note 16, at 15-16, 18.

[31]It might be asked how property rights are enforced given our assumption that parties do not bargain. Notably, 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.

[32]In stating 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 the what parties pay or receive, an issue that we consider in subsection II.D.4.

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 $1,000 but the state does not know whether the prevention cost is $800 or $1,200, 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 $1,200 (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.[33] Faced with liability of $1,000 for harm, the injurer will cause harm only if his prevention cost

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[33]See, e.g., Polinsky, <u>Resolving Nuisance Disputes</u>, <u>supra</u> note 1, at 1100-02, 1111-12.

(which he knows[34]) is $1,200; 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.[35]

The foregoing argument in favor of the liability rule also applies in the general case where the state's information about harm as well as about prevention cost is imperfect. That is (as stated in the introduction), the liability rule is superior on average to property rules, where the measure of damages under the liability rule is the mean harm estimated by the courts. In the above example, suppose that there are three equally probable levels of harm -- $500, $1,000, and $1,500 -- but that the state cannot determine the actual harm (or prevention cost) in a given case. Under the liability rule, damages would be $1,000, the average harm. Accordingly, if the prevention cost is $800, the injurer would prevent harm, which is the desirable result when the average harm is $1,000. (On average $200 is saved by

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[34]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 cost, particularly with regard to their 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 a liability rule (that it takes advantage of injurers' superior knowledge about prevention costs) will still exist.

[35]An analogous argument shows the desirability of the reverse liability rule where 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.

preventing harm.) If the prevention cost is $1,200, the injurer
would cause harm, which is the desirable result because only
$1,000 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,[36] so that no harm occurs. The
outcome will differ from that under the liability rule when the
prevention cost is $1,200. In this case, under the liability
rule, harm occurs, and on average it is $1,000 -- the average of
$500, $1,000, and $1,500. But under the property rule, the
injurer spends $1,200 in all events. Because $1,200 exceeds
$1,000, average costs are higher under the property rule. Of
course, it is *possible* that costs would be higher under the
liability rule than under the property rule. This would occur if
the true harm were $1,500. On average, however, costs are higher
under the property rule, because the average harm is $1,000.
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 under the liability rule when the prevention cost is $800.
Average harm will be $1,000 under the property rule, which
exceeds the $800 spent by injurers under the liability rule, so
again the liability rule will be superior.

If the reader reflects on this example, he or she will see

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[36]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.

that the inherent advantage of the liability rule in the
situation where the state can ascertain harm continues to apply
where the state must estimate harm. Namely, under the liability
rule, the state is able to make implicit use of injurers'
information about prevention cost, because injurers know their
actual prevention cost[37] and compare it to average harm. In
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 reader can also appreciate that the argument we have
made is not particular to the example and explains our having
proved the superiority of liability rules generally in the
mathematical appendix to this article.[38] Specifically, we have
shown the following conclusion:[39] *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

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[37]See *supra* note 34.

[38]See *infra* appendix subsection I.A.2.

[39]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) is best. See Martin I. Weitzman, Prices vs. Quantities, 41 **Rev. Econ.**
Stud. 477 (1974). As we explain in the appendix in subsection I.B.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
expected harm.

about harm or prevention cost.[40]

In fact, the conclusion we demonstrate in the appendix is even stronger. We show as well that under the liability rule, the *optimal magnitude of damages is average harm.*[41] In other words, not only is liability 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 liability 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.[42]

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[40]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 costs 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 subsection 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 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 liability rules. See section III.A and appendix Part II for further discussion. Finally, we note that if the quantity of emissions were not observable, the only feasible property regime would involve banning or permitting all pollution, both of which are likely to be very inefficient outcomes. (But it may be possible to impose some direct limits, as by forbidding factories to operate in an area or requiring the use of a particular technology. See Weitzman, supra note 39, at 479 n.3.)

[41]See infra appendix subsection I.A.2. Were other factors admitted, like litigation costs, optimal damages would differ. See, e.g., A. Mitchell Polinsky & Daniel L. Rubinfeld, The Welfare Implications of Costly Litigation for the Level of Liability, 17 J. Leg. Stud. 151 (1988); A. Mitchell Polinsky & Steven Shavell, Enforcement Costs and the Optimal Magnitude and Probability of Fines, 35 J.L. & Econ. 133 (1992).

[42]The reader should bear in mind that we are assuming that the court cannot observe the actual harm, so it must use a single 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 subsection II.E.4.

3. *Criticism of the Case for Liability Rules.* With the above conclusions in mind, let us turn to the arguments that we mentioned in the introduction, to the effect that when harm is difficult to estimate, liability does not function well and property rules, particularly protection of the victim, may well be superior. There are two types of argument that underlie this hypothesis, one that is mistaken and one that has possible merit.

a. *Does uncertainty about harm favor property rule protection of victims?* The mistaken argument involves the following logic: harm cannot be estimated accurately; liability therefore will not necessarily result in a desirable outcome; thus, to safeguard victims adequately, property rule protection of victims is best employed. One often hears the argument expressed in discussion in approximately the following terms. "We don't know how injurious the effect of pollution will ultimately 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 conservative and accord victims property rule protection, the right to clean air."

The 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.[43] Thus, a property

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[43]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

rule protecting victims will result in a different outcome from that 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.

   b. *Does systematic underestimation of harm favor property rule protection of victims?* The criticism of liability that does have potential relevance concerns the possibility that damages might be systematically below average harm. If damages are below average harm, the liability rule might be inferior to property rule protection of victims because excessive harm will occur under the liability rule.[44] This possibility leads us to consider whether, in fact, damages are too low.

   We do suspect that damages are too low where there are components of loss that are hard to estimate, including idiosyncratic elements of harm.[45] For example, when a person's

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conclusion at page 21 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. If courts can ascertain harm (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 property rules.

   [44]Cf. Polinsky, Resolving Nuisance Disputes, supra note 1, at 1103-06 (discussing the problem when bargaining is possible, but imperfect.) We should note, however, that the liability rule might still be superior to the property rule. If courts underestimate harm, they might mistakenly assign the property right entitlement to the injurer -- just because of their erroneous measurement of harm. This would lead to harm always being done, whereas under the liability rule, harm would not always occur.

   [45]See, e.g., 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.

home is destroyed, damage awards are normally limited to market value, even though it is generally acknowledged that the person might have attached special additional value to the home. When individuals are killed, damages are ordinarily based on lost income, even though this ignores the value of individuals to family and friends. When environmental harms cause losses that are hard to measure from market data (such as the death of animals, like sea otters, without clear commercial value), damages calculated by 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 that would expose the area to a risk of harm.[46]

But such a proposal raises the allied question: if damages do not approximate average harm, is this problem in the nature of things, or can the legal system remedy it? 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 the courts exclude certain components of loss is that they are "speculative" and thus cannot be "objectively

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[46]See also Polinsky, Resolving Nuisance Disputes, supra note 1, at 1103-06 (discussing the effect of understated damages on the choice between property and liability rules).

determined," in contrast to market-related losses.[47] 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 courts' and parties' time and resources.
We assume, therefore, that one might 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 a lesser evil than an
excessive level of administrative costs.

Yet if the administrative costs of determining harm fully
according to customary procedures would be problematic for our
legal system, courts could employ streamlined methods
(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.[48]

Going further, courts could employ predetermined tables for

[47]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.");
Rodgers v. Fisher Body Div., General Motors Corp., 739 F.2d 1102, 1107-08 (6th
Cir. 1984) (excluding hypothetical testimony on plaintiff's lost wages);
American Insurance Co. v. Treasurer, School Dist. No. 37, 273 F.2d 757, 759
(10th Cir. 1959) (excluding evidence of insured's "uncommitted intent" in
determining the extent of tornado loss); Rhen v. United States, 17 Cl. Ct.
140, 143-44 (1989) (disallowing recovery of anticipated profits after contract
default resulted in a "general loss of business"); Krier & Schwab, supra note
7, at 18; sources cited supra in note 45.

[48]See Louis Kaplow & Steven Shavell, Accuracy in the Assessment of
Damages, 39 J.L. & Econ. (forthcoming 1996).

estimating losses (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 virtually nothing, the cost on a per-case
basis of including a presently excluded component of loss.[49] The
argument that there is a systematic tendency to underestimate
loss would then not apply, and the argument in favor of use of
liability rules would gain appeal.[50]

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 here that parties can
costlessly bargain with each other before the injurer decides
whether or not to cause harm.[51] In this situation, intuition
suggests that the choice between property and liability rules
should diminish in importance because, if either property or

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[49]See id.; 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 (1989); Ellickson, supra note 1, at 736-37, 739-40 (advocating
schedules for subjective value of homes in nuisance context to avoid
undervaluation while limiting administrative costs); Frederick S. Levin, Pain
and Suffering Guidelines: A Cure for Damages Measurement "Anomie", 22 **U. Mich.
J. L. Ref.** 303 (1989).

[50]Whereas we have discussed in the latter part of this subsection how
courts can remedy a problem of systematic underestimation of harm by altering
their methods of damage assessment, it might be claimed that this is for some
reason impossible. If so, then it might be proposed that the legislature
protect victims through use of a property rule. Yet if the legislature could
do that, we wonder why it could not instead require that courts employ damage
tables. (And if it were claimed that courts would circumvent such tables,
they might also be able to circumvent the legislature's property rule by
failing to enforce it faithfully.)

[51]For discussion of costly bargaining, see subsection II.D.2.

liability rules 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 is the Coase Theorem.[52]

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 would be refused, so that mutually beneficial agreements might not be made.[53]

1. *Bargaining Is Always Successful.* Consider first the case where parties always strike mutually beneficial bargains because they have perfect information about each other.[54] In this case, *there is no difference between property and liability rules:* bargains leading to an optimal result will always be made if, under a rule, an optimal outcome otherwise would not occur. The essential reason is that if an optimal outcome would not occur, it must be possible to lower costs by agreeing to the optimal

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[52]See Coase, supra note 16.

[53]See, e.g., Joseph Farrell, Information and the Coase Theorem, 1 **Econ. Persp.** 113, 114-15 (1987)(discussing how applicability of Coase theorem depends upon nature of bargaining).

[54]See, e.g., Alvin Roth & J. Keith Murnighan, The Role of Information in Bargaining: An Experimental Study, 50 **Econometrica** 1123 (1982)(offering evidence that parties usually agree when each knows the other's willingness to pay).

outcome; thus, with an appropriate payment by one side to the other, both sides can be made better off.

For example, suppose that under a property rule the victim has the right to be free from harm, but that this allocation is suboptimal because harm would be $1,000 and prevention cost, $1,200. Then a mutually beneficial agreement in which the injurer would be allowed to cause harm exists: any payment by the injurer to the victim between $1,000 and $1,200 would be mutually acceptable. 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 the maximum amount, $1,200.[55] The victim would not ask for too much (more than $1,200) and stymie an agreement, because it is assumed that he knows the injurer's prevention cost.

Let us consider one more example: harm would be $1,500, prevention cost $1,200, and a liability rule applies and damages are incorrectly estimated to be $1,000, so that the injurer would choose to cause harm in the absence of bargaining. In this case, the victim would make an offer to induce the injurer not to cause

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[55]Actually, if the victim asks for $1,200, the injurer would be indifferent whether to make an agreement, so the victim might demand slightly less, say $1,199.99; but for ease we say he will demand $1,200.

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 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 Thaler, Anomalies: The Ultimatum Game, 2 **J. Econ. Persp.** 195 (1988). The direct implication is that gains might be shared differently, but this does not directly influence our argument. An insistence on 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 relevant the analysis of the next subsection.

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harm; any offer between $200 and $500 would be mutually acceptable to them,[56] and the victim would choose $200.

These examples illustrate the point that where bargaining will always succeed, the outcome reached will always be optimal. As a consequence, the choice between liability and property rules does not affect the achievement of optimality.

2. *Bargaining Is Not Always Successful*. Now let us examine the case where bargaining does not always lead to a mutually beneficial outcome. As we said, this problem occurs when a party asks for too much, misconceiving the other's true position, in which case his offer or demand will be rejected. For example, consider again the case where the victim enjoys the property right to be free from harm and harm would be $1,000, but now assume that the victim is uncertain about the injurer's prevention cost: some injurers' costs are $1,200, others' costs are $2,000, and the victim does not know which type of injurer he confronts. In this case, if the victim demands $2,000 for allowing the injurer to cause harm and the injurer happens to be one whose prevention cost is $1,200, the injurer will refuse the demand. Further, the victim would find it rational to ask for $2,000 if the probability that the injurer's prevention cost is $2,000 is sufficiently high (over 20%), for the extra $800 he obtains from those willing to pay $2,000 rather than $1,200 will

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[56]The victim would be willing to pay up to $500, for if the injurer caused harm, the victim's loss, after collecting damages of $1,000, would be $500. The injurer would want at least $200, for this would reduce his cost to $1,000 after he bears the prevention cost of $1,200, and $1,000 is what he would pay if he caused harm.

more than compensate for the rejections and loss of $200 (receipt of $1,200 net of harm of $1000) from those only willing to pay $1,200.[57] More generally, parties will often find it rational to ask for an amount exceeding the maximum the other type of party might be willing to pay, even though that strategy will lead to some rejected offers.[58]

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 worse? *The answer is that there is no unambiguous conclusion: examples can be*

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[57]If the fraction of injurers whose prevention cost is $2,000 is f and the victim asks for $2,000, the likelihood of acceptance will be f, and the victim's expected gain will be ($2,000 - $1,000)$f$ = $1,000$f$. (The $1,000 is subtracted because the victim suffers harm if and only if his demand is accepted.) If the victim demands $1,200, both types of injurers will accept, so the expected gain will be $1,200 - $1,000 = $200. Therefore, a $2000 demand is profitable for the victim if and only if $1,000$f$ > $200, which is to say, if and only if f exceeds .2.

[58]This 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 generally Roger B. Myerson & Mark Satterthwaite, Efficient Mechanisms for Bilateral Trading, 29 **J. Econ. Theory** 265 (1983); John Sutton, Noncooperative Bargaining Theory: An Introduction, 53 **Rev. Econ. Stud.** 709 (1986) (survey of literature).

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

*constructed in which either the liability rule is superior to
property rules or the reverse is true.*[59]

We present such examples in the appendix,[60] 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 the court knows only the
distributions of prevention costs and of harms. Given the legal
rule, the victim makes a single offer or demand to the injurer,
where the offer or demand is that which maximizes the expected
gain of the victim; the injurer accepts or rejects the offer or
demand. We then evaluate a legal rule by computing average
social costs under the rule. Our examples demonstrate that these
average social costs could be lower either under the liability
rule with damages equal to average harm or under property rules.[61]

Although we cannot say that the liability rule is
necessarily superior to property rules when imperfect bargaining

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[59]This is first shown in Steven Shavell, Property Rights and the Rule of
Liability in a Simple Bargaining Model (unpublished, 1988).

[60]See infra appendix subsection I.B.2, comments b & c.

[61]Ayres and Talley, supra note 10, 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.
Notwithstanding this difference, either property rules or the liability rule
could be superior in their model (as in ours). See infra appendix subsection
I.B.2, comment d.

occurs, our surmise is that the liability rule tends to be
superior. The reason is that we know the liability rule is
superior in the absence of bargaining. That is, before any
bargaining occurs, at the beginning of the "race" between the
types of rule, the liability rule is ahead of the property rules.
Hence, we would expect that after imperfect bargaining occurs,
the liability rule would remain ahead of the property rules,
although not as far ahead. (More precisely, this is what we
would expect because, if bargaining is entirely successful,
liability and property rules are tied.) This outcome would hold
true unless bargaining were, for some reason, to be substantially
more successful under property rules than under the liability
rule.[62]

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 reflects two elements: that an

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[62]We remind the reader that the liability rule that we have been
discussing is the rule with damages equal to expected harm. It should be
observed, however, that the optimal liability rule is likely to be
characterized by a different level of damages. Whereas the optimal level of
damages in the absence of bargaining is the expected harm, see supra page 21;
infra appendix subsection I.A.1, comment a, we would not suppose that the
optimal level of damages in the presence of bargaining, given its
complexities, would remain equal to expected harm. We have no reason to
believe, however, that the optimal level of damages would systematically be
either above or below the expected harm. Our supposition, moreover, is that
the optimal level of damages would not be extreme, and often might approximate
the expected harm. The reason is that in the absence of bargaining, not only
is the mean harm the best level of damages, but extreme damages are the worst
levels (and social welfare becomes continuously worse as damages move toward
the extremes). Thus, in the presence of bargaining, we would not predict that
extreme damages would become optimal.
     Nevertheless, it seems possible for fairly extreme damages to be optimal
(as is suggested by the fact that, as stressed in the text, property rules
might be superior to the liability rule with damages equal to the expected
harm). When fairly extreme damages are optimal (for example, damages of
$.01), 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).

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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, failure
of bargaining will be less serious when it does occur. Both
factors suggest that the liability rule will tend to be superior
to a property rule when bargaining is not always successful.[63]

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[63]As we do, Ayres and Talley, supra 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!
See infra appendix subsection I.B.2, comment d.) To repeat what we have said
in the text, we expect the liability rule to be superior to property rules
mainly because, *under the liability rule, there is a lesser need for parties
to engage in bargaining, and inefficiency in the absence of bargaining will
tend to be only moderate.* We do not expect (as they do) the liability rule to
be superior because, *when* parties engage in bargaining, parties are more
likely to achieve an agreement than under property rules.
    Ayres and Talley also make a separate point, that bargaining under
liability rules will be impeded if courts assess harm accurately because this
effectively introduces asymmetry of information between victims and injurers.
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. & Org. 84 (1994), and Jason S. Johnston, Bargaining under Rules
versus Standards, University of Pennsylvania Institute for Law and Economics
Discussion Paper No. 165 (1994). See also 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 be struck 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 not want to make bargains
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, both victims and injurers may have similar knowledge of the
damage amount in advance, reducing asymmetry of information and allowing for
some bargains to be concluded.
    We also mention that, even if the foregoing point is put to the side,
courts should not seek to ascertain harm with accuracy if (as was just
assumed) injurers do not know the harm victims would suffer, for in that

But we must caution the reader that, however plausible it may seem, our conjecture that liability rules tend to be superior to property rules in the present context is only a hypothesis. As we have already stated, which type of rule is superior given imperfect bargaining is formally indeterminate, and we have constructed examples illustrating this point.[64] One conclusion that can safely be offered, however, is that the choice between property and liability rules is less likely to be important when parties can bargain than when they cannot.[65]

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circumstance accuracy will not improve injurers' incentives to reduce harm but will involve added cost for the legal system. On this theme, see Kaplow and Shavell, <u>supra</u> note 48, and, for a qualification, see Spier, <u>supra</u>.

[64]<u>See</u> <u>infra</u> appendix subsection I.B.2, comments b & c. The reader may ask why a property rule might turn out to be superior to the liability rule, in light of the what we have explained to be the initial advantage of the liability rule. One speculation is that just because the property rule is behind 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. (We remind the reader that, when the bargaining process is perfect, use of the property rule results ultimately in the same level of welfare as does use of the liability rule.) A second observation is that because imperfect bargaining involves subtle and complex elements, it is hard to predict the effect of this or that beginning point for bargaining, here a liability rule or a property rule.
We also mention that, although we have said that whether a property rule or the liability rule is superior is indeterminate, Talley, in part of his working paper that is related to the Ayres and Talley article, <u>supra</u> note 10, presents a demonstration of the superiority of a liability rule. <u>See</u> Eric L. Talley, <u>Property Rights, Liability Rules, and Coasean Bargaining under Incomplete Information</u>, John M. Olin Program in Law and Economics, Stanford Law School, Working Paper No. 114, at 17-26 (1994). His demonstration, however, assumes that an "optimal mechanism" governs the outcome of bargaining, rather than a bargaining process that the parties would be likely to employ, and he also makes other restrictive assumptions. <u>See</u> <u>infra</u> appendix subsection I.B.2, comment d. 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). <u>See</u> <u>supra</u> note 62.

[65]In the numerical examples we report in appendix subsection I.B.2, comments b and c, we found that the difference between the inefficiencies resulting under property and liability rules in the case of imperfect bargaining was usually quite small by comparison to the difference in the case

C. Victims' Behavior

To 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 are also frequently able to mitigate or prevent harm, for instance by installing air purifiers to prevent the ill effects of pollution. Victims' ability to avoid and reduce harm means that it may be socially advantageous for them to do so. If victims can cheaply locate away from a factory to a place where they would not be subject to pollution, that may be desirable, because then the factory need not undertake expensive precautions to prevent harm. Or if victims can install air purifiers at lower expense than the factory would bear for smoke scrubbers, then victims should be the ones who prevent harm.

The implication of victim behavior for our conclusions is fairly clear. (For simplicity, we confine our consideration here to the situation in the absence of bargaining.[66]) First, the liability rule becomes less appealing than we had suggested

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of no bargaining.

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

because, if victims will be compensated for their losses, their incentives to avoid or prevent harm will be dulled.[67] This problem can be ameliorated if courts deny or limit payments to victims when they should have taken action to avoid or mitigate harm. The familiar legal devices through which that may be accomplished are the defense of contributory negligence and the principle of mitigation of damages. But these are arguably 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.[68] However, a legal rule in which injurers make payments to the state rather than to victims would solve the problem of victims' incentives.[69]

Second, and similarly, the case for property rule protection of victims (such as it is) becomes weaker because it is also associated with a dilution of victims' incentives.[70] And again,

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[67]See, e.g., Coase, supra note 16, at 42.

[68]The argument that we are making is in part that defenses will only incorporate variables that the court can observe; this is in essence the thesis in Steven Shavell, Strict Liability versus Negligence, 9 J. Leg. Stud. 1 (1980), that defenses typically take into account levels of "care" but not levels of "activity."

[69]Examples include fines, pollution taxes, see infra note 108, and the use of private suits with decoupling, under which some 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).

[70]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 (without defenses concerning victims' behavior), for under it victims are fully compensated for any losses suffered. Thus, victims' behavior under the property rule and the liability rule is the same.

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although the law may seek to circumvent the incentive problem, notably through the doctrine of coming to the nuisance[71] and through limitation of the right to an injunction to those circumstances where the victim could not have prevented harm,[72] this attempt will not be a cure-all.

But third, property rule protection of injurers' right to cause harm may become appealing, because under this regime victims will plainly have strong motives to avoid exposure to risk and to reduce risk 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 make more attractive the use of property rule

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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 66) is where 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, relative to their incentives under the liability rule, because reducing the magnitude of harm increases the surplus they can later obtain through bargaining.

[71]See Donald Wittman, First Come, First Served: An Economic Analysis of "Coming to the Nuisance", 9 **J. Leg. Stud.** 557 (1980).

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

protection of injurers or modified liability rules under which damages are paid to the government rather than to victims.

D. Additional Considerations

1. *Judgment-Proof Injurers.* In evaluating the liability rule, we have assumed heretofore 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. A firm that might cause many deaths in a fire or from the release of toxic substances may not have the assets necessary to pay damages.

A general consequence of a party's limited wealth is that the party's motive to reduce harm due to the prospect of liability may be diluted.[73] For example, a firm with assets of only $1 million would tend to 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 liability by only 10% x $1 million or $100,000. But the expenditure would be eminently desirable from a social standpoint, as it reduces expected harm by 10% x $20 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

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[73]See Steven Shavell, The Judgment-Proof Problem, 6 Int'l Rev. L. & Econ. 45 (1986).

victims.[74]   If victims enjoy this protection, then in principle
they can prevent harm regardless of how low the assets of the
injurer may be.   A potential victim of a $20 million accident can
enjoin the firm with assets of only $1 million from continuing
its dangerous operations.[75]   Property rule protection of victims
will be superior to the use of the liability rule when the
drawback of liability, the inadequacy of 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, in some contexts it may be possible to retain
the advantages of the liability rule by requiring injurers to pay
in advance for *expected* harm rather than to pay for *actual* harm
after it occurs.   After all, the expected harm -- the harm
discounted by the probability that it will occur -- will often be
much lower than the actual harm and thus may be within the
capacity of the injurer to pay.[76]   Another response to the

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[74]Property rule protection of victims can be interpreted to include not
only victims' right to enjoin operations of firms, but also common safety
regulations.   A requirement that a firm install a safety device is a species
of guarantee against harm for the victim.

[75]A qualification to this statement is that, sometimes, enforcement of
property rule protection will be through use of monetary sanctions (such as
criminal fines) and, if so, a party's lack of assets might hamper enforcement.
In this situation, however, the state would tend to turn to use of its police
powers to enforce property rule protection (such as closing down a firm by
locking its gates).   Also, the state might resort to imprisonment as a
sanction.

[76]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% x $10 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,

judgment-proof problem would be to retain the liability rule but to require potential injurers to demonstrate their ability to pay (for example, by posting bonds or acquiring liability insurance).[77]

2. *Administrative Costs.* Now let us consider the issue of the administrative costs surrounding the use of liability and property rules. These are the public and privately borne costs associated with cases, whether settled or litigated, together with the costs that parties incur when they are led to bargain because a rule would otherwise lead to a suboptimal outcome. To compare administrative costs under liability and property rules, we first consider litigation and settlement and then the costs of bargaining when rules would result in undesirable outcomes.

a. *Litigation and settlement.*[78] 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 there would be no litigation -- and no administrative costs incurred -- because it would be known whom

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saving $40,000. The judgment-proof problem does not affect the firm because it has assets sufficient 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% x $1 million = $50,000 to 4% x $1 million = $40,000, or by only $10,000.

[77]See Ellickson, supra note 1, at 741 (judgment-proof problem could be addressed by requiring plaintiffs to demonstrate it as condition to injunctive relief; in many nuisance cases, the defendant is a landowner who, by definition, has assets).

[78]A more complete analysis than that in this subsection would account for the effect of litigation and settlement costs on behavior and how the optimal level of damages under a liability rule should reflect such costs. See sources cited supra note 41.

the courts would say possesses the entitlement. Under the

liability rule, however, positive administrative costs would be

generated. Every time an injurer caused harm, he would have to

pay damages to the victim. Even though all such cases would be

immediately settled, because the amount of damages would be

known, some costs would be involved in effecting the transfers.

Hence, the liability rule would be administratively more costly

than property rules.[79]

But in the realistic situation with uncertainty about legal

outcomes, it is unclear whether property rules or liability rules

are administratively cheaper. Uncertainty implies that under

both types of rule, there will be some litigation (because

parties may disagree about possible trial outcomes) and also that

settlement in lieu of trial will involve positive costs (which to

some degree will mirror trial costs).[80] Would trial costs and

settlement costs tend to be higher under property rules or under

the liability rule? On one hand, under property rules, courts

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[79]But see Ellickson, supra note 1, at 762-71 (suggesting that specialized nuisance boards could reduce administrative costs of damages assessment); id. at 772 (indicating that collective systems, such as fines and regulatory taxes, would be administratively more efficient for pervasive harms).

[80]See, e.g., 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 rule 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 is plausible in asymmetric information settings. We also note that Ellickson's observation is 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.[81] On the other hand, under property rules, courts need only to rank the variables; it is not necessary for courts to determine their precise values to ascertain who ought to have the entitlement.[82] Under the liability rule, by contrast, a specific estimate of harm is required. Because of these competing tendencies, either property rules or the liability rule could turn out to be the cheaper with respect to litigation and settlement costs.[83]

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 (assuming of course that the state's information is imperfect). As a result, bargaining to avoid a suboptimal result will be required less often.

c. *Overall comparison.* Although it is apparent from the preceding discussion that the administrative cost comparison depends on the particulars of the situation, we can indicate

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[81]If a reverse liability rule were employed instead, a court would have to determine prevention cost rather than harm. In some instances this may be cheaper, favoring a reverse liability rule over a liability rule. See Calabresi & Melamed, supra note 1, at 1120-21.

[82]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, so the liability rule would tend to be cheaper.

[83]We also note that litigation costs under both rules depend on how accurately courts attempt to determine the relevant variables. See also supra page 25 and note 63.

circumstances in which each type of rule has an administrative cost advantage.

The liability rule will probably be associated with lower administrative costs than property rules if it is impractical for courts to obtain information about prevention costs but harm can be estimated fairly easily.[84] Then 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. Under property rule protection of victims (the case of property rule protection of injurers is similar), however, injurers will have a motive to bargain for permission to cause harm whenever prevention cost exceeds harm. In such instances, we might well expect bargaining expenses to exceed those of settlements under the liability rule. (This is mainly because, under the liability rule, the only issue before the parties is damages, which we are positing are estimated fairly easily. Under the property rule, by contrast, the parties have to agree on the division of the surplus, which equals the difference between prevention cost and harm.)

Property rules can be cheaper than the liability rule in other circumstances. Suppose for instance that the state can cheaply assign property rights to injurers because prevention costs usually are very high relative to harm. Then under the property rule, neither litigation nor bargaining will be likely

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[84]If prevention costs but not harm are easily estimated, both rules would entail significant bargaining and litigation costs. But a reverse liability rule would be administratively cheaper.

to occur. Under the liability rule,[85] however, there will be many

cases and associated costs (at least of settlement) because

prevention cost usually exceeds harm.[86]

3. *Risk Aversion*. We have not commented on the protection

of risk-averse parties (mainly individuals and small businesses[87])

against risk. We do not believe, however, that issues of risk-

bearing are of much importance to the choice between property and

liability rules, owing to the widespread availability of

insurance on reasonably competitive terms. Risk-averse parties

should often be able to insure against inadequate liability

awards, or against harms they would suffer when injurers enjoy

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[85]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 tend to involve a more efficient outcome.

[86]A property rule may have an administrative cost advantage even without supposing that property rights can cheaply be 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 cost of getting together, drafting agreements, making payments). Then, agreements that produced small efficiency gains (less than the bargaining cost) would not be made, and all agreements that were 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 equaled 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.)

[87]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, e.g., **Robert C. Clark, Corporate Law** 476-77, 658-59 (1986).

the property rule entitlement to cause harm. When parties do not

insure, because they are not able to purchase coverage at a price

they consider attractive, this need not constitute an argument

for the state to furnish implicit coverage through legal rules.

If market-provided insurance is expensive, that will usually

reflect real costs in its supply: moral hazard, fraudulent

claims, or costs of assessing harm. In such cases, legal rules

should not be adjusted on account of risk-bearing unless courts

can address the problems leading to expensive insurance better

than insurance companies can.[88]

Even if insurance were generally unavailable, it would not

be obvious whether risk-bearing considerations favor property or

liability rules. First, liability and property rule protection

of victims are similar in that they both tend to protect victims

from risk.[89] Second, whatever may be the differences between the

risks associated with liability and property rules, we cannot say

whether these differences are desirable without knowing whether

victims or injurers are generally more in need of protection

against risk. And although we may be able to form a judgment

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[88]See generally Steven Shavell, On Liability and Insurance, 13 **Bell J. Econ.** 120 (1982). If, however, insurance markets fail due to adverse selection, it is possible that legal solutions would increase welfare, although the problem of how this can be accomplished tends to be complex. See, e.g., Beverly G. Dahlby, Adverse Selection and Pareto Improvements through Compulsory Insurance, 37 **Pub. Choice** 547 (1981).

[89]There can be subtle differences. An imperfect liability rule may over- or undercompensate victims, whereas a property rule protecting victims would perfectly insure victims in the absence of bargaining. However, a property rule protecting victims may induce bargaining, under which victims are overcompensated because they will receive some of the surplus generated by their bargains.

about this factor in particular contexts,[90] we cannot in general.

4. *Income Distribution*. In general, income redistribution can be accomplished more efficiently through use of the income tax and transfer arms of government than through 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.[91] Moreover, legal rules are usually imprecise instruments for accomplishing distributional change because the groups affected by a rule tend to be heterogeneous in their need for money or their ability to pay.[92] 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.[93]

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[90]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 we would say that victims are less in need of protection if they are wealthy individuals living near polluting farms owned by poor farmers.

[91]The argument that legal rules should not be used to redistribute income because the income tax and transfer system is superior is developed in 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. Leg. Stud.** 667 (1994).

[92]Recall the example in note 90. See **A. Mitchell Polinsky, An Introduction to Law and Economics** 124-27 (2d ed. 1989).

[93]The general preference for redistribution through direct means has often been noted. See, e.g., Ellickson, supra note 1, at 683 (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 devote substantial attention to the issue. See articles cited supra in note 1. He does not regard the use of the income tax system as a

5. *Entitlement*. Notions of entitlement 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.[94]) The conception of entitlement in
relation to property appears to refer to a right to use things,
or to prevent others from using or encroaching on them, where the
right should be protected in the interest of justice.

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, further,
possible undercompensation for its breach (if damages are

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solution to distributional objectives because of the adverse incentive effects
of redistributive taxation. See Polinsky, Resolving Nuisance Disputes, supra
note 1, at 1083-85, 1096. But, as explained in the articles cited in note 91,
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.
    Calabresi and Melamed also believe distributional factors to be
important in the choice of legal rules. See Calabresi & Melamed, supra note
1, at 1098-101. 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" (education, bodily integrity) to which citizens might deserve an
inalienable entitlement (which we believe to be inapposite in most contexts we
consider, unless interpreted as variations of the entitlement arguments
discussed in the next subsection).

[94]The closest example is Calabresi and Melamed's discussion of
distributional factors. See supra note 93.

sometimes too low). Thus, property rule protection of victims'
entitlements to be free from harm appears superior to liability
rule protection.

However, one presumes that potential injurers also enjoy
certain entitlements, and these might be violated if they are
required to avoid the breach of victims' entitlements. 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. To protect the
entitlement of the injurer, therefore, he must be allowed to
enjoy the property right to harm the victim. And if he does not
possess this right, it would appear, at the least, that he should
be permitted to act and pay damages rather than be denied the
opportunity.

In consequence, consideration of the notion of entitlement
does not point clearly in favor of a property rule protecting
victims, a property rule protecting injurers, or a liability rule
-- because victims' and injurers' entitlements compete with each
other. And while there may be a principled way of choosing
between competing entitlements, it is not obvious to us what it
is.

In any case, we find arguments based on entitlements
problematic for additional reasons having to do with possible
justifications for entitlements themselves. One justification
would derive from an underlying conception of natural rights. In

this regard, we would be inclined to inquire about the origin of natural rights, and we would ask for the basis of a normative theory that is not connected to individuals' welfare, to what they find valuable or detrimental. If no person cares about a natural right per se, that is, independently of its utilitarian value, why should it be given weight?[95]

A second possible justification for entitlements may emerge from a belief that when a person uses property, a species of psychological bond to the property is formed. Further, the person's entitlement to his property must not be violated in order to prevent the disutility that would flow from the breaking of his bond with it. This conception of the basis of entitlement raises such 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, the breaking of the bonds can, and one presumes ought to be, analyzed 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.[96]

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[95]This is, of course, the time-honored question that utilitarians have put to anti-utilitarians. This question is particularly significant in the present context, for individuals may (and often will) sell their entitlements if their valuation is less than others'.

[96]See supra subsection II.A.3; see also infra subsection III.A.2.

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A third source of justification of entitlements is that a legal rule itself confers an entitlement on a person, notably, that ownership of a thing gives a person a set of entitlements in 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 to protect a person's entitlement.

A fourth justification for entitlements might concern distributive justice. In the preceding subsection, we have explained why we do not believe that consideration of the general notion of distributive justice should affect our analysis. Some commentators, however, have sought to justify distributive outcomes in specific cases by appeals to particularistic norms of corrective justice. But difficulties in identifying the basis for these norms, in justifying them independently of parties' desires, and in distinguishing them from general theories of distributive justice remain.[97]

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[97]Accounts relying on corrective justice include Richard A. Epstein, Nuisance Law: Corrective Justice and Its Utilitarian Constraints, 8 J. Leg. Stud. 49 (1979); George P. Fletcher, Fairness and Utility in Tort Theory, 85 Harv. L. Rev. 537 (1972); Ernest J. Weinrib, The Gains and Losses of Corrective Justice, 1994 Duke L.J. 277 (interpreting Aristotle's classic account of corrective justice in Kantian terms). We find the suggestion peculiar 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 result is nonetheless meaningful to the parties themselves, but then justice is merely a component of preferences; its existence would be an empirical question and, if the preference exists, it would already be included in a utilitarian analysis. See also George P. Fletcher, Book Review, Corrective Justice for Moderns, 106 Harv. L. Rev. 1658, 1666-69 (1993) (criticizing Jules Coleman, Risks and Wrongs (1992), 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 having difficulty in ascertaining clearly various claims of corrective justice. "There are a number of quite different accounts

In the end, therefore, we find the notion of entitlement --
as we understand its possible meanings -- unclear or unhelpful
for analysis.[98]

E. Examples

Having completed our analysis of property versus liability

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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 may dissolve into general distributive claims. See id. at 450-
51. He sketches his own account, in which corrective and distributive justice
are not wholly distinct. See id. at 496-513. 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.

[98]Our list of additional considerations did not include the so-called
"offer-asking" problem associated with the possibility that an individual may
demand a higher price to give up an entitlement than he would be willing to
pay to acquire it. See, e.g., Don L. Coursey, John J. 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 critical applications to the economic analysis of
law, see Mark Kelman, Consumption Theory, Production Theory, and Ideology in
the Coase Theorem, 52 **S. Cal. L. Rev.** 559 (1979); Duncan Kennedy, Cost-Benefit
Analysis of Entitlement Problems: A Critique, 33 **Stan. L. Rev.** 387 (1981).)
We do not believe that this possibility raises issues separate from those we
have already considered, however. 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, see, e.g., Lucian A. Bebchuk, The Pursuit of a Bigger Pie: Can
Everyone Expect a Bigger Slice?, 8 **Hofstra L. Rev.** 671 (1980)). In this case,
either outcome is efficient conditional on the distribution of income wealth,
which is affected by the legal rule. As we discuss in subsection 4, the
choice of legal rule should not be influenced by distributional goals. 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.

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*.[99] 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,[100] which is to say, through property rule protection.[101]

Still, liability is employed to some extent. Also, closely

related, tradeable pollution rights have begun to be employed[102]

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[99]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); **Joseph E. Stiglitz, Economics of the Public Sector** 184-97 (1986).

[100]See, e.g., 33 U.S.C. §§ 1311-1314 (1988)(setting forth procedures for the Clean Water Act); 42 U.S.C. §§ 7407-7410 (1988)(setting forth procedures for the Clean Air Act).

[101]The main difference between regulation and property rule protection is that enforcement of the latter is by private parties at their option, whereas regulations are enforced by the government. This difference, however, will not be important for what we have to say.

[102]See, e.g., Robert W. Hahn & G.L. Hester, Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program, 6 **Yale J. Reg.** 109 (1989). For a discussion of the relevant provisions of the 1990 Clean Air Act Amendments, see **Peter S. Menell & Richard B. Stewart, Environmental Law and Policy** 408-12 (1994). 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 Bruce A. Ackerman & Richard B. Stewart, Reforming Environmental Law, 37 **Stan. L. Rev.** 1333 (1985); **J.H. Dales, Pollution, Property and Prices** (1968); **Thomas H. Tietenberg, Emissions Trading: An Exercise in Reforming Pollution Policy** (1985); Robert N. Stavins, Transaction Costs and Tradeable Permits, **J. Envt. Econ. & Mgt.** (forthcoming)(assessing

and the possible imposition of pollution taxes has been widely discussed.[103]

Bargaining appears to have relatively little importance in relation to industrial pollution. As is often stated, victims of pollution are unlikely to bargain with those responsible for it: the victims of many types of pollution are numerous, making coordination among them difficult, in part because individual victims will want to rely on others to bargain on their behalf.[104] A further obstacle to bargaining is that each victim's expected harm from a particular generator of pollution may be small, so that victims may have weak incentives to bargain with that party.[105]

Our analysis suggests, of course, that when bargaining is improbable, liability rules are superior to property rules. This conclusion raises questions about the observed degree of reliance on property rule protection and regulation. We note, however,

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whether systems of tradeable permits are as cost-effective as generally believed).

[103]See, e.g., H. **Rosen**, supra note 99, at 100-07; J. **Stiglitz**, supra note 99, at 185-94; Kenneth Berlin, Just Compensation Doctrine and the Workings of Government: The Threat from the Supreme Court and Possible Responses, 17 **Harv. Envtl. L. Rev.** 97, 136-44 (1993) (arguing that pollution taxes are superior to direct regulation and can survive constitutional challenges); 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); Richard A. Westin, Understanding Environmental Taxes, 46 **Tax Law.** 327, 331-35 (1993) (describing the microeconomic impact of pollution taxes).

[104]See, e.g., Calabresi & Melamed, supra note 1, at 1119 (discussing the collective action problem).

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

that the type of legal rule that is actually applied is not

either of the simple property rules that we studied, namely the

rule protecting victims against any amount of pollution or the

rule allowing firms to pollute without bound. These rules would

be extremely inefficient. What we find in reality are

regulations that divide entitlements, that allow firms to pollute

within prescribed limits that one hopes reflect to some degree

the harmfulness of pollution and the costs of its prevention.[106]

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

practically discover this information, they sometimes will make

poor decisions when they prescribe particular behavior or the

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[106]See sources cited supra note 100. Nominally, many pollution
regulations may have been set without engaging in cost-benefit analysis. See,
e.g., Ackerman & Stewart, supra note 102, at 1334-40 (discussing costs of
present failure to use cost-effective means of reducing pollution). For
example, the Clean Air Act prevents the Administrator of the EPA from
considering cost as a factor in standard-setting. See 42 U.S.C. §
7410(a)(3)(C) (1988); see also Union Electric Co. v. Environmental Protection
Agency, 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 33 U.S.C. § 1314(b)(1)(B) (1988); see also Reynolds
Metal Co. v. Environmental Protection Agency, 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. Environmental Protection Agency, 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
a calculus. See, e.g., P. Menell & R. Stewart, supra note 102, at 374.

level of permissible pollution. Thus, only under liability rules is society able to make use of firms' superior knowledge of the costs of pollution control.[107]

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

Another consequence of our analysis is that pollution taxes should be employed in preference to the system of tradeable pollution rights that is in partial use today. This is because pollution taxes are essentially a form of liability rule,[108] 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

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[107]See, e.g., W. Baumol & W. Oates, supra note 99; J. Stiglitz, supra note 99, at 192-93.

[108]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 liability rules, as discussed in section II.C.

it relatively cheap to prevent pollution do not buy the rights and proceed to prevent pollution, and 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.[109] Only if the government's estimate of control costs is accurate would the price that emerges in a market for tradeable pollution rights equal the best estimate of harm. But, as we have stressed, estimates of costs are likely to be inaccurate, so the price of tradeable rights is likely to be incorrect. Thus, firms will not decide how much to pollute on the basis that would be desirable; the result is that the total quantity of pollution is not determined as it ought to be. By contrast, if pollution taxes are employed in the way economists generally recommend, with the tax set equal to expected harm, the total quantity of pollution will be approximately efficient.[110]

We further believe that pollution taxes offer certain

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

[110]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 because the quantity of rights purchased would be determined by how many rights firms would be willing to purchase at a price equal to expected harm, rather than being set by the government. See, e.g., Robert Cooter, Prices and Sanctions, 84 **Colum. L. Rev.** 1523, 1535-36 (1984).

advantages over conventional liability. As we discussed above,
liability-related incentives are dulled if firms do not have the
assets to pay for harm that they might cause. This is often
relevant in the context of pollution -- for example, with regard
to the possibility of large-scale release of radioactive waste.
Related, the problem of tracing harm to injurers means that
damages have to be inflated for proper incentives to exist under
the liability system, which would make the judgment-proof problem
more serious.[111] The use of pollution taxes rather than ex post
liability would alleviate judgment-proof problems because
pollution taxes are set equal to *expected* harm, not actual harm.
This means that the magnitude of the taxes is lower, perhaps much
lower, than the magnitude of possible liability, so that the
taxes would create proper incentives for firms that do not have
assets sufficient to be adequately deterred from causing
pollution by the prospect of liability.[112] We also note that the
administrative costs of determining damages suffered by
individual victims would be avoided.

    2. *Automobile Accidents*. Driving behavior provides a

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[111]Suppose that a firm that dumps pollutants at night is caught with a one
in three chance. Then if the harm the pollutants cause is $1 million, damages
would have to be $3 million when the firm is caught for incentives to be
appropriate. But this means that the firm 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.

[112]For instance, a firm that discharged a pollutant that might with
probability 1% cause harm of $10 million would have inadequate incentives
under a liability rule if its assets were only $2 million. But if it paid a
tax, the proper amount of the tax would be 1% x $10 million or $100,000, an
amount it could pay. (If it could not pay the tax -- perhaps in advance -- it
might then be forbidden from polluting.) Hence, its incentives under the tax
would be adequate. See supra note 76; Steven Shavell, The Optimal Structure
of Law Enforcement, 36 **J.L.** & **Econ.** 255, 285 (1993).

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. Although liability rules are widely employed to control driving behavior, so is regulation to a significant extent. Moreover, the form of liability we observe, the negligence rule, is different from the form we discussed, strict liability. Nevertheless, as we now explain, both of these features of the control of driving behavior may be seen as 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, there may be relatively little loss of social welfare arising from compliance. (Further, where there are gains from non-compliance, non-compliance may occur -- see the next paragraph.) In addition, an important benefit of traffic regulations is that they address the judgment-proof problem. Many drivers do not have assets nearly sufficient to pay for the harm they might cause, even after liability insurance

coverage is 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.[113] In particular, sanctions for failure to comply with 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, traffic fines might be seen as a tax on behavior that has the potential to cause harm, like the pollution taxes discussed in the preceding subsection.) This liability-like feature of regulation is socially desirable for the usual reasons 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 high.

Let us turn now to the issue of the form of liability. As we mentioned, it is the negligence rule is actually applied in the context of automobile accidents, whereas our analysis focused on the strict liability rule. On reflection, the negligence rule can be seen to be a mixture of a property rule granting a partial

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[113]We discuss the general point that what is nominally a property rule may in fact approximate a liability rule in subsection II.E.4.

entitlement to cause harm, and of 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.[114] Our concern is to evaluate the advantages and disadvantages of the property-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 there is a problem with it, which is the problem of any property regime: 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 aspect of the negligence rule is incomplete in the kind of injurer behavior it controls; injurers do not have an incentive to reduce harm through moderating their level of driving or through other actions that are not encompassed by the negligence rule. Under strict liability, by contrast, injurers would have incentives to take care whenever care is appropriate, and they would also have incentives to reduce their level of driving to mitigate risk.[115]

But the property-rule-like element of the negligence rule has the advantage that it saves administrative costs relative to

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[114]Cf. Polinsky, _Resolving Nuisance Disputes_, _supra_ note 1, at 1087 (discussing intermediate mixed entitlements in the pollution context).

[115]See Shavell, _supra_ note 68. Needless to say, a general comparison of strict liability and negligence rules would involve factors in addition to those we discuss.

strict liability: when it is clear that the injurer is not
negligent, cases will tend not to arise under the negligence
rule, but there will be cases brought under strict liability. In
addition, negligence determinations in domain of automobile
accidents are often based upon simple rules, such as the traffic
laws themselves, which also conserves administrative costs.
Finally, a negligence rule better preserves victims' incentives
(although defenses to strict liability can address this problem
to some extent).

    3. *Nuisance.*[116] 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
serious problems, for example, that created for a farm by wastes
discharged from an abutting factory. Frequently, if not
typically, these negative externality-creating actions could be
discussed by the involved parties because the number of such
parties is often small, 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

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    [116]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, where there are usually large numbers of victims and bargaining
is impossible, from nuisances in which bargaining often will be feasible.
Indeed, Polinsky, in the article just cited, limits his attention to cases in
which there are only two parties or where many parties have a common
representative. See id. at 1075-76. See also Ellickson, supra note 1, at
761-79 (advocating quite different approaches for localized nuisances and
those causing pervasive harm).

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 important, 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.[117] If noisy parties are judged to be too disturbing, injunctions against them will be granted; but if they are not so judged, they can be held and damages need not be paid. How, if at all, can use of property rules be justified for nuisance?

We believe that administrative cost considerations provide a plausible rationale for property rules in the context of modest, quotidian nuisances like noisy parties.[118] We said that if property rule assignments of entitlements tend to resemble optimal assignments, then under property rules there will be low administrative costs, whereas under liability rules, there will be administrative costs borne whenever harm optimally occurs, because damages will be paid. In the area of common nuisances, this difference may be of significance. Decisions about when a gathering is too disturbing may be reasonably good, so that

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[117]For a discussion of the law and exceptions to the property rule, see the sources cited in note 4.

[118]Another factor that we advanced for property rule protection of victims is the judgment-proof problem. See supra subsection II.D.1. But this does not seem to be of relevance 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 harm done. For many serious nuisances, however, this factor may favor property rule protection of victims (or posting of bonds, and the like).

festivities will not usually generate litigation: parties that are not overly disturbing will be held, and no one will try to enjoin the parties because they know they will be unsuccessful; and parties that would be overly noisy will tend not to be held, because individuals would realize that the parties would be stopped. Under the liability rule, either of two inferior outcomes would be likely to occur. On one hand, the cost of bringing suit might discourage victims of noisy parties from bringing suit,[119] 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 type 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. 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.

With regard to serious nuisances, we believe that the liability rule may be superior to the property rule. The issue of administrative costs is relatively unimportant for nuisances of substantial magnitude (certainly by comparison to the context of common nuisances). And abstracting from these costs, our

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[119]By contrast, under the property rule, a victim of a noisy party can often instigate legal action merely by a call to the police.

conjecture that the liability rule tends to be superior to the
property rule when bargaining is imperfect suggests that the
former rule will be attractive.[120]

4. *Comment on the Distinction Between Property Rules and
Liability Rules.* Until this section with examples, we for the
most part proceeded assuming 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 if he pays damages equal to harm.
As we briefly noted at the beginning of this Part,[121] however, one
can conceive of the two property rules and the liability rule
that we studied as all being 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 harm; and the property rule protecting victims
may be seen as a liability rule with extremely high, or infinite,
damages.

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[120]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 zoning to regulate conflicts among neighbors' activities.
See Ellickson, supra note 1. He criticizes zoning as 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, Nuisance Law: Rethinking Fundamental Assumptions, 63
Va. L. Rev. 1299 (1977) (advocating liability rules in 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, at 762-71.

[121]See supra page 15.

Viewing property rules and the conventional liability rule as members of a continuum of liability rules differing in damages has relevance both for conceptual analysis and the interpretation of the observed use of 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 the conventional liability rule with damages equal to harm. In this regard, we should remind the reader that, in the simple situation of section II.A where injurers and victims do not bargain, we in fact demonstrated that the conventional liability rule is fully optimal -- superior to a liability rule with any other level of damages. However, in other situations, such as where we said 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.[122]

When we consider how liability and property rules are

[122]Such a rule would possess some of the advantages of conventional liability -- it would harness the information injurers have about prevention cost -- and would still provide victims with an incentive to avoid harm.

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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 true property rules or from 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 true expected
sanction for an offense may not be very high and may even
approximate harm. We also noted earlier that damages paid by
liable parties may fall systematically short of harm, and it is
also true that damages may exceed harm, notably if they include a
punitive element.

Although the view that conventional liability and property
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 consider the use of legal rules to protect
possessory interests in things, that is, to prevent them from

being taken.[123]   Under a *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; we will, however, briefly mention the alternative property

rule, when the entitlement is granted to a taker.[124]   Under the

liability rule,[125] a person is permitted to take a thing from its

possessor but must then pay damages equal to its estimated value.

Of course, in reality a property rule protecting possessors

generally prevails; use of a liability rule is exceptional.[126]

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[123]We will discuss the nature of the distinction between the taking of
things and harmful externalities later, in section III.G.   For now, it will
suffice 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.

[124]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 the property rule in most of our discussion.

[125]As in the case of harmful externalities, there is the possibility of a
reverse liability rule.   See supra note 27.   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 him.   We do not consider this
reverse rule here, because it will be evident that in the present context it
would generally be inferior to the standard liability rule.

[126]The main examples of a liability rule for the taking of things are the
government's right of eminent domain, allowing it to take private property for
payment of just compensation, and the right of private parties to violate
possessory interests in emergencies, see, e.g., Ploof v. Putnam, 81 Vt. 471,
71 A. 188 (1908) (right to moor boat at another's dock in a storm); Vincent v.
Lake Erie Transp. Co. 109 Minn. 456, 124 N.W. 221 (1910) (obligation to pay
damages caused by mooring boat to another's dock during a storm).
    The subject of eminent domain has received extensive attention in the
literature.   See, e.g., R. Posner, supra note 9, 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 (1986); Frank I. Michelman, Property, Utility, and
Fairness: Comments on the Ethical Foundations of "Just Compensation" Law, 80
Harv. L. Rev. 1165 (1967).   The problem is usually viewed independently rather
than as part of the subject of property versus liability rules.   See infra
note 168.   Nonetheless, the example has been cited 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

We will assume that legal rules are used to promote the social objective of maximization of the value of things, which means channeling them 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 where parties do not bargain with each other and then considering that where 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 effort to prevent 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, why it rationalizes observed practice. That is, *we will provide justification 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

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from private to public possession, our analysis will suggest that a property rule protecting the private possessor is best. Indeed, most property the government acquires is through purchase rather than a forced taking. (Consider defense procurement and an endless variety of routine purchases, as well as many acquisitions of land.) The best (and familiar) justification for takings is when there is a need to assemble particular parcels, such as for a road, where holdout problems can be serious. See, e.g., R. Posner, supra, at 56-57; Calabresi & Melamed, supra note 1, at 1106-07. Takings are commonly employed for this purpose. We note, however, 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, supra, at 566-76, 602-06.

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.

A. Parties Do Not Bargain with Each Other[127]

We consider first the situation where the party who initially possesses a thing, whom we will call the owner[128] for simplicity, 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, a person 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 to the owner and to the taker,[129] then (as in the case of externalities) it makes no

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[127]The analysis in this section is presented formally in the appendix, Part II.

[128]Even though, in fact, owners do enjoy property rule protection of their possessory interests and we are trying to explain this, we trust that our usage will not cause confusion. We also note that it is not just owners who in fact enjoy possessory rights but also those, such as renters, with interests derived from owners.

[129]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 (of the sort described below in the example of needing a laptop computer at a particular place and time). Another situation in which courts may be able to ascertain value tolerably well is in an emergency: it may be apparent in such exceptional circumstances that the taker's value exceeds the owner's.

difference whether a property or liability rule is employed. The property rule assignment of 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.[130] 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.

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.[131] First, suppose that things have a significant *common value*, that is, a component of value that is the same for the owner and for 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

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[130]Interestingly, it is just in the case of emergency situations, see supra notes 126 and 129, 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 exacerbate the significance of most of the liability rule's defects.)

[131]The relationship between the assumptions and the argument to be given here and the analysis of the parallel situation in the case of harmful externalities will be discussed at page 75 and in the appendix at section II.B, comment b.

the number of rooms in the home.

Second, assume that things also have *idiosyncratic value* to individuals. Idiosyncratic value derives from characteristics that individuals evaluate differently, such as the design of a home.[132] 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) the things that they do just because they place greater idiosyncratic value on them than others. 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 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 purposes of making notes. On average, such an individual will place a higher value on using it at the conference than the random person, or than another attendee who did not make the effort to bring a laptop.[133]

The assumption that idiosyncratic value is higher for owners means that it will be socially desirable on average for things

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[132]See, e.g., Ellickson, supra note 1, at 735-36.

[133]Here note that the higher idiosyncratic value to the owner does not arise because, when he purchased the computer, the computer had special value to him. Rather, at a particular time and place, it is plausible that the laptop computer has higher idiosyncratic value to him.

not to be taken, but rather 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 laptop computers to remain in the possession of those who bring them to conferences during the conferences. This is not to say that it will always be optimal for things not to be taken; there will be some occasions where things ought to change hands, where the idiosyncratic value to the taker exceeds that to the owner.

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 will be preferred.

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 we are assuming that there is no bargaining.) How important this problem is depends on how likely it is that the idiosyncratic value of a taker exceeds that of an owner. The higher the distribution of idiosyncratic values of owners is 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, the average common

value plus the average idiosyncratic value of owners. Inevitably, therefore, damages will sometimes be too high and sometimes too low. Now, when courts' estimates of common value are expected by takers to be too high, takings will be unusual,[134] so that the result will be close to that under the property rule. But when courts' estimates of common value are expected to be too low, it is likely that takers will take things; this result will be socially undesirable.[135]

Suppose, for example, that the common value associated with 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. Moreover, assume that, for those who take computers to conferences, average idiosyncratic value is $25 and most of their idiosyncratic values are in this neighborhood, whereas for other individuals 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.[136] Under these assumptions, almost any

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[134]The reason is that takers' actual common values will be less than courts' estimates, and that their idiosyncratic values will usually be less than courts' estimates of owners' average idiosyncratic value.

[135]For discussion of why courts' values will tend to be systematically too low, see subsection II.A.3.b. But, as we note there, it may be possible to correct systematic errors. In the text, we do *not* assume systematic bias. Rather, courts' knowledge is imperfect: sometimes estimates are too high and sometimes they are too low.

[136]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 idiosyncratic value were to overlap. See infra appendix section II.B, comment c (supplying examples).

taking of a computer at a conference will be undesirable, and,
accordingly, property rule protection of owners to prevent
takings will be socially desirable. By contrast, under the
liability rule, there may well be takings, so that the rule is
inferior to property rule protection of owners. To explain,
damages under the liability rule will be $125, the $100 average
common value plus the $25 average idiosyncratic value to owners.
Consequently, whenever a conference is of a type such that the
common value is above the $125 damage amount, all potential
takers will take computers, a very undesirable outcome.[137]

It should be evident from the logic of this example and what
we have said 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
courts also err sufficiently in estimating common values.* The
essential reason is that, under the liability rule, the problem
of socially undesirable takings when damages are less than the
common value will dominate in importance the problem, under
property rule protection, that desirable takings will not occur.
We should note too that the problem of excessive takings under
the liability rule is exacerbated if courts would systematically
ignore idiosyncratic value, as might be likely.[138] For instance,

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[137]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, they will want to take whenever
the common value plus $5 exceeds damages, which is to say whenever the common
value is at least $120.)

[138]See supra note 135.

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.[139]

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.[140] For the

moment, we note that the crucial difference between the models

studied in the externality context and here from a formal

perspective is as follows. In the case of externalities, we

implicitly assumed that the prevention cost and the harm to

victims were independent of each other (for example, that an

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[139]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 possessors -- 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 possessors. (In addition, such high damages would
reduce or even eliminate most of the other problems we will describe below,
because possessors 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 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 from 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
subsection II.E.4, actual property rights are not in fact perfectly protected
presently. As a result, if some small gain were possible from relaxing
property rule protection, it is not clear that lesser protection than
currently exists would be justified. See also appendix section II.B, comment
c (discussing numerical examples).

[140]See infra appendix section II.B, comment b.

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injurer's cost of preventing pollution is independent of a victim's susceptibility to disease).[141] 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, as they both include the common value.[142]

B. Parties Bargain with Each Other

We now consider the more usual situation where owners and potential takers are assumed to be able to bargain with one another.

1. *Bargaining Is Always Successful*. If parties always will make mutually beneficial transfers when they exist, *then property rule protection and a liability rule are equivalent*.[143] Under property rule protection, there will be a transfer if and only if a potential taker values the thing more highly than does the owner. Under the liability rule, this 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 taker is $400, damages are $300, and the

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[141]See supra note 40.

[142]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 is because, if the common value were zero, damages would equal the average of owners' idiosyncratic value, and when a taking occurred, it would be socially desirable on average; it would occur only when the taker's idiosyncratic value exceeded the average owner's idiosyncratic value. See infra appendix section II.B, comment b.

[143]We abstract from the costs of entering into agreements and of litigation. See infra section III.F.

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 this and the taker would accept any amount over $100; hence, an agreement whereby the owner retains the thing would be reached. If and only if the taker values the thing more highly than 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 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 type of rule is better (as was true in the case of externalities).

Still, the natural suspicion is that if property rule protection would be superior to the liability rule in the absence of bargaining, it would tend to retain its superiority in the presence of bargaining. Our reasoning is simple. Under the liability rule, recall that takers will often have an incentive to take when courts underestimate the common value of things, but

takings will usually be undesirable because owners have higher

valuations. Thus, in order to maintain the socially desirable

status quo, there will be a frequent need for bargaining in which

owners bribe takers not to take. But in some percentage of these

instances, bargaining will fail and, usually undesirably, the

things will be taken. By contrast, under property rule

protection, there will be *no* instances in which bargaining is

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 an owner, and this will tend to be an

infrequent situation. Thus, even if bargaining sometimes fails

under a property rule, the adverse consequences should be

limited.[144]

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 the owner.[145] We find this reason for favoring property rule

protection to be misleading. As we have stressed, under a

liability rule as well, a potential taker will tend to obtain a

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[144]As in the case of harmful externalities, see supra subsection II.B.2, our argument remains a conjecture. But where the property rule almost always produces an efficient outcome without bargaining, the strength of the conjecture in the present context is greater than in the case of harmful externalities.

[145]See supra page 5 and note 9.

thing if and only if he values it more highly than the owner. When damages do not equal owners' valuations, bargaining may be required, 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, if bargaining is imperfect, due to asymmetry of information, we did suggest that property rule protection would be superior to a liability rule. But this 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.[146]

C. A Fundamental Problem with Bargaining Under a Liability Rule

1. *The Impediment.* Our discussion of liability versus property rules in the preceding section on bargaining presumed implicitly that bargaining is feasible when parties are in proximity to each other and the bargaining process is not itself costly. But, as we mentioned in the introduction, *there is a fundamental obstacle impeding bargaining under the liability rule but not under property rule protection.* The difficulty with

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[146]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, where 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 would, however, be serious.

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.[147] In such a situation, there would often be a *multiplicity of potential takers:* anyone who happens to be about and places a value on the car exceeding damages. Moreover, individuals would be attracted to places where cars might be undervalued, raising the likely number of potential takers.

Consider the situation of the owner and a *particular* potential taker who values the car less highly than 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 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.[148] 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 rendered effectively infeasible and socially undesirable takings will occur.

By contrast, under property rule protection of owners, there

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[147]The argument assumes that parties anticipate that damages will be too low. This is possible when damages are systematically too low or when damages on average are unbiased but parties are aware that damages are likely to be underestimated in their case.

[148]The argument suggests also the possibility that a potential taker would worry that the car would later be taken from *him*, and thus that his desire to take the car would be dulled. This complication can be understood as a variation on another problem with liability that we address next, in section III.D -- that of reciprocal takings.

is 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. And 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 property rules enjoy 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.

Last, we note that the problem with liability rules identified here 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.[149] When there are multiple injurers in the externality context, however, we do believe that bargaining will

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

frequently break down. But the reason will typically involve the free-rider problem when there is a multiplicity of victims (as when pollution victims free ride on each others' efforts to bribe polluters) rather than the difficulty due to a multiplicity of injurers analyzed in this section.[150]

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 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.

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[150]Suppose, though, that in the externality context there is only a single victim and multiple injurers, say a single victim of multiple polluters. Then bargaining may or may not be prevented 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 he 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, where 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 loss.

D. Reciprocal Takings

Another difficulty arises with the liability rule when damages are too low:[151] 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 the $75 he received as damages to the taker). 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 system of liability unworkable.

The only apparent solution to the problem of reciprocal takings lies in a mixed system of liability for a taking combined with property rule protection of the taker's possessory right afterwards. But this type of regime also 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. But the problems the courts would face

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[151]See the qualification in note 147 concerning parties anticipation that damages will be too low.

in selecting this fortunate taker are daunting.[152]

Finally, let us note that the analog of the problem of reciprocal takings does not arise in the case of harmful externalities. If an injurer is harmed because of pollution, 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 liability for harm due to its emissions 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. This solution to potential problems of reciprocal action can be adopted by the legal system because it can naturally distinguish between the victim of harm and the injurer.[153]

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[152]Imagine the difficulties courts would have were they to hold hearings at which anyone wishing to take a thing might attend. Or consider the problems that would be engendered were the policy to grant the right to take to the first to appear; there would be unproductive races to be first.

Also, 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 produces better incentives. See infra section III.E.

[153]Notice that the legal system might have difficulty in adopting the analogous remedy to the problem of reciprocal takings under a liability rule, namely, by giving property rights protection to either the taker or to the owner. If the law gave property rights protection to the taker (if the law gave the taker the freedom to act), we would face the problem of having to distinguish just one taker among many potential takers, as we discussed above. And if the legal system gave property rights protection to the owner (the

E. Effort to Protect and to Take Property

An additional factor that also works against the liability
rule is the effort that owners may make to prevent property from
being taken and the effort that potential takers may invest in
order to take things. Owners and potential takers will engage in
such activity under a liability regime, and the more so the
greater the probability that damages for taking would be less
than the value of things to owners.[154] When damages are expected
to be too low, owners will do things to prevent takings, such as
hiding or locking up assets. More generally, they will change
their investments in things (fail to make improvements to things
likely to be taken), patterns of purchase (decide against
acquiring things that can easily be taken), and their use of
things. Potential takers will invest effort in looking for
things because such takings amount to bargain purchases.

These efforts to protect and to take property are
economically sterile, a social waste, and thus constitute a
disadvantage of liability.[155] Of course, they also constitute the

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right to be free from takings), it would thereby have adopted the property
rule.

[154]In making this claim, we are assuming that owners and potential takers
are able to anticipate circumstances in which expected damage awards are below
the value of things. Circumstances in which damages are expected to exceed
the value of things will not influence behavior of owners: they will not try
to prevent a taking if they would make a profit from it. Nor would it tempt a
taker.

[155]Note that bargaining will not generally solve the sorts of problems
described here, because adverse effects will arise before parties bargain.
Cf. supra note 66. Indeed, individuals will protect their property to prevent
their having to bribe a prospective taker, because some surplus will typically
be lost in such a bargain 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

well-known disadvantage of theft. In fact, the difference

between the disadvantage of theft[156] and the disadvantage under a

liability rule under which damages are underestimated is only one

of degree.[157]

By contrast to the situation under a liability rule, no

wasteful effort is expended to protect property or to take it

under property rule protection of owners. (This assumes, as we

have throughout, that property rules are perfectly enforced.[158])

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.[159] But in the context of the taking

of things, owners are creators of value, so that it is best for

them to be compensated: this creates incentives for them to raise

the value of their things and also not to expend resources to

protect their things from being taken.

F. Other Considerations

We comment here on several remaining considerations: the

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possible.

[156]See, e.g., Steven Shavell, Individual Precautions to Prevent Theft:
Private versus Socially Optimal Behavior, 11 Int'l Rev. L. & Econ. 123 (1991).

[157]Theft may be conceived to be a liability system in which damages for a
taking are zero, whereas what we have emphasized is that problems exist as
long as there is a probability of underestimation of value.

[158]See supra note 3.

[159]See supra section II.C.

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.[160] 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.[161]

With regard to administrative costs, observe that under property rules, the major administrative costs 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 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.) Moreover, when damages are underestimated, bargaining might take place between owner and taker to induce the latter to

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[160]See Calabresi & Melamed, supra note 1, at 1125 n.69.

[161]In particular, the thing taken could often be returned. (Of course, problems would 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 cannot be undone (in the way that a thing taken can be returned). Second, the harm can readily exceed the assets of the injurer.

refrain.[162] The costs of such bargaining would tend to make a liability rule administratively more expensive than a property rule regime.[163]

With respect to the risk aversion of owners,[164] we observe that they are well insulated from risk under property rule protection,[165] whereas they are not fully shielded under liability rules, assuming that there is uncertainty as to the magnitude of damages. But the risk of inadequate damages could in principle be insured.

With regard to the distribution of income, we note that property rule protection of owners favors owners of things 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.

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[162]In saying this, we are implicitly assuming that the multiplicity of takers problem and the reciprocal takings problem discussed in sections III.C and III.D for some reason do not prevent bargaining. That is, we are implicitly assuming some qualified form of liability regime in which a particular taker is allowed to take but is then protected by a property rule.

[163]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.

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

[165]There exists some uncertainty, as owners may be unsure of the surplus they will gain from a sale. (Also, values may change over time, although this risk is not directly affected by the choice of legal rule.)

Consequently, were one to assume that owners generally possess more wealth than takers, then property rule protection would favor richer individuals. But even if true, this should not be considered a disadvantage of property rule protection. As we said before, employing the income tax and transfer system is superior to using legal rules as a means of meeting distributional objectives.

Finally, for the sorts of reasons advanced previously, we do not believe that considerations of entitlement are likely to have independent relevance in the choice of rules. We do observe, however, that most views supporting protection of entitlements favor a property rule protecting possessors of property.[166]

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 the two contexts was self-evident. We have interpreted the taking of a thing to be an instance in which possessory rights in a physical thing are transferred from one individual to another, where the thing generally has been supposed to have a component of value common to the two individuals. And we have assumed a harmful externality to be an event adverse to a victim arising when an injurer takes some

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[166]This 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 16.

action from which he benefits but which only incidentally causes the adverse event.

We note, however, that not all cases can easily be placed into one of the two categories. For example, suppose that when apartment building A is erected in front of hotel B, it blocks B's view of the ocean.[167] 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 building A and to those who stay in hotel B.) Or should it be considered a harmful externality? (Note that the blocking of hotel B'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, though, make our analysis and conclusions problematic.[168] The

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

[168]The problems with the distinction between harmful externalities and the taking of things are reminiscent of the difficulty the Supreme Court has had in its takings cases with distinguishing between takings for which just compensation is required by the fifth amendment (a liability rule) and

main reason is that we identified in our analysis 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 (because the two have a common value). Hence, when considering the blocking of B's view by apartment building A, we can say from our analysis that, with respect to the question whether use of a liability rule will likely result in a more efficient allocation of the resource of ocean views, the answer is that it may not, because there is a common value of an ocean view 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.[169] However, unlike in our analysis of the taking of things, there is

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regulation for which no compensation is required (a property rule entitling the injurer to act freely). See, e.g., Jeremy Paul, The Hidden Structure of Takings Law, 64 **S. Cal. L. Rev.** 1393 (1991); Joseph 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. For purposes of determining whether government compensation is constitutionally required, the legal result follows directly from the categorization decision, and courts have not been clear or consistent about the underlying purposes of the distinction. We explain in the text to follow how our analysis addresses this problem.

[169]We note, however, that unless one is willing to assume that those who arrive first generally have higher values, it need not follow that the original possessor, the hotel, on average would be expected to have a higher idiosyncratic value.

no problem of reciprocal takings in respect to ocean views, because hotel B can hardly take back the ocean view from apartment building A. In this regard, therefore, the situation is like that of harmful externalities. It is of course quite 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 thing. We can profit well enough from our analysis by drawing on its elements in Parts II and III.[170]

In any case, we emphasize that the distinction between harmful externalities and the taking of things is useful even if imperfect. First, the distinction often is readily made, including in the important contexts of industrial pollution, automobile accidents, and transfers of things -- indeed, in most of the cases explored in prior literature. Second, 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 pointed to very different conclusions, so that the distinction was analytically useful. Thus, we believe that introducing the distinction is a constructive addition to prior literature in which commentators have often mixed the two contexts in the

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[170]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 161.

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 expected harm is unambiguously superior to property rules even though actual harm in a given case may be difficult to estimate.[171] This result is significant in light of the importance of contexts, like those of automobile accidents and industrial pollution, where parties are practically unable to bargain because potential victims are strangers to injurers or are numerous. When we then considered other factors, we found that some (the possibility of bargaining, administrative costs) did not systematically favor either type of rule, and some (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 where property rule protection might be desirable, even though the liability rule enjoys an underlying advantage.

Our analysis of possessory interests in things differed in

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[171]This assumes that there is no systematic bias in damage awards. We discussed in subsection II.A.3 the possibility that damages might be too low and offered possible solutions to this problem.

substantial respects from that of externalities, as did our

conclusions. We emphasized that, contrary to traditional

thinking, property rule protection of possessory interests does

not uniquely induce 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. To be sure, most have probably

felt that this property right is explained in relation to the

alternative of anarchy, but the property right has not previously

been rationalized with regard to the alternative of a liability

rule, permitting takings upon the payment of damages.[172]

We hope that our analysis here will serve to clarify

conceptual understanding of property rules versus liability rules

-- especially to make apparent that the functions and

desirability of property and liability rules are almost entirely

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[172]We comment on Calabresi and Melamed's brief discussion of the issue in
notes 5 and 6. We also note that a liability rule has long been considered a
serious alternative to property rule protection in the case of eminent domain.
See supra notes 126 and 168.

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, for instance with assessments of the desirability of liability rules and pollution taxes regardless of how difficult the calculation of harm may be.

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.[173] 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 and 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 ≤ h. (For convenience, we say that when c = h it is optimal to prevent harm.)

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[173]We discuss this assumption further in subsection I.A.2, comment d.

We consider two legal rules. Under the *property rule,* the state, given its information, either assigns the entitlement to be free from harm to the victim or it assigns the entitlement to cause harm to the injurer. 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 where d equals h, if the state can observe h, or, if not, where d equals the mean of h, E(h). This is because, as was noted in the text, in reality 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 = ∞ (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: where there is no bargaining between a victim and an injurer and where there is bargaining.

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, the property rule and the liability rule with d = h are equivalent.*

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To demonstrate this, observe that under the property rule, the first-best outcome can be achieved: because the state observes c and h, the state can assign the entitlement to victims when c ≤ h (so harm will not occur) and to injurers otherwise (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 ≤ 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 h and prevention cost c, then (a) the liability rule with d = E(h) is superior to the property rule. Also, (b) the liability rule with d = E(h) is superior to the liability rule with any other d.*

Under the property rule, 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) ≤ E(h). Under the liability rule with d = E(h), an injurer will incur c and prevent harm if and only if c ≤ E(h), so that social costs will be

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

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 interval $E(h)$ to ∞, $c > E(h)$. 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 $c \leq d$, social costs given d are

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

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 $d = E(h)$. ◄

Comments. (a) Part (a) of the proposition actually follows from part (b). This is because, as we remarked above, the property rules correspond to liability with $d = 0$ or $d = \infty$, yet we showed in (b) that the optimal d is $E(h)$. Furthermore, the property rules are the *worst* possible rules in the sense that social costs are strictly decreasing as d increases from 0 to $E(h)$, and social costs are strictly increasing as d rises from $E(h)$.[174]

(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

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

entitlement to injurer if and only if $E(c) \leq h$. In either case, the outcome will sometimes deviate from the first-best. But under liability, the outcome will 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, the property rule and the liability rule are equivalent. Under the property rule, the state will assign the entitlement to the victim if and only if $E(h) \geq c$. Under liability, since $d = E(h)$, the same outcome will occur. But a reverse liability rule, under which victims pay c, would be superior to either property rule.

(d) The assumption that c and h are independent was used where 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.[175]

If c and h are not independent, then the liability rule may not be superior to the property rule. 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% x 100).

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[175]As noted earlier, see note 40, this assumption is plausible because we would 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. 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.

Under liability, 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% x 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 harm. Our model for the taking of things, in subsection II.A.2 of this appendix, is another illustration of how the lack of independence can change the result that the liability rule is more efficient than the property rule.

(e) Our conclusion that a liability rule -- which as we discuss in subsection II.E.1 includes the use of pollution taxes -- is optimal may appear to be inconsistent with arguments such as Martin Weitzman's claim that either price or quantity regulation may be optimal.[176] Weitzman's argument for the plausible desirability of quantity regulation 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, so the optimal price or tax will depend on the quantity of pollution. (If there is a single level of harm, as in our model, a price approach will clearly be optimal.[177]) But second, he assumes that a single price (pollution tax rate, or damage level per unit of effluent) must be set once and for

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[176]See Weitzman, supra note 39.

[177]See Marc J. Roberts & Michael Spence, Effluent Charges and Licenses under Uncertainty, 5 J. Pub. Econ. 193, 202 (1976).

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

restriction in cases of interest, simply because it is not

administratively difficult to change a price, tax rate, or damage

level.[178] Pollution regulators might announce a tax _schedule_ at

the outset, indicating the tax due as a function of the amount of

pollution.[179] Alternatively, if they used a permit scheme of the

sort we describe in note 110, they could associate fees with

permits or vary the quantity of permits (such as by selling more

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[178]Weitzman motivates his restrictive assumption with examples involving emergencies. _See_ Weitzman, _supra_ note 39, 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 177, 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 presumably instant responses are not more feasible if injurers are ordered to pollute in an amount not in excess of a stated quantity. (Presumably they envision an initial announcement, that will be adhered to of necessity for years; but there could be an initial announcement of a pricing scheme that depended on the quantity of total pollution, as we describe in the text to follow.)

[179]_See, e.g._, J. Stiglitz, _supra_ note 99, at 193-94. Roberts and Spence, _supra_ note 177, propose a scheme under which prices (the pollution tax) need not be constant. In their appendix, _see id._ at 204-208, they show that by allowing the price schedule to adjust gradually with the quantity, the first-best scheme can be implemented. (In their model, harm is known with certainty; our analysis shows that if harm were uncertain, the pricing scheme would still be best, although it would not be first-best.)
In a sense, we believe that the debate about whether one should use price or quantity regulation misstates the issue. When harm varies with output, the optimal scheme is a _quantity-dependent price_. The relevant point for present purposes is that such a pricing scheme allows the regulator to make use of injurers' information about avoidance costs. But if one sets quantities, this information is not used, unless one adjusts quantities in the manner described in note 110, which amounts to setting a price-dependent quantity, a scheme equivalent to the quantity-dependent pricing mechanism.

or repurchasing some) to ensure that the net price polluters paid was equal to expected harm at the observed level of pollution.

B. Bargaining[180]

We will 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 -- the interpretation of x will be discussed below. (The assumption that the victim makes the demand is made for concreteness and simplicity; for the most part, it does not affect the qualitative nature of our analysis.[181])

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 there is bargaining between victims and injurers and that they have perfect information about each other. Then a property rule and the liability rule with any level of damages d are equivalent -- regardless of whether the state has perfect information about c and h.*

Suppose that a property rule applies and that the victim has

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[180]This section is based on Shavell, <u>supra</u> note ?.

[181]We note, however, that if injurers are the ones who make offers, the analysis would be more complicated in the case where 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 victims in responding, as it would tell them something about injurer's reaction (whether they would cause harm and pay damages were an agreement not reached). Under the assumption we make, by contrast, the analysis is simpler because the victim makes the offer and the injurer either agrees or reacts. <u>See also</u> <u>infra</u> subsection I.b.2, comment d.

the entitlement to be free from harm. One possibility is that c ≤ 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 would be accepted, a demand of c, for the injurer to be allowed to cause harm; the injurer will just accept this and the victim will be better off (because he will make a profit of h - c).[182] Thus, the outcome will be optimal after possible bargaining whether or not the assignment of the entitlement is optimal. The same type of logic shows that the outcome will be optimal if the assignment of the entitlement is to the injurer, or if a liability rule is employed, regardless of the relationship of d to c and to 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 he 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 obtains c - d, so loses d on net); the injurer would just accept, and the victim would be better off (he spends c - d, rather than suffering h).◄

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[182]Note here the role of perfect information. The victim can determine the highest demand 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 made the assumption that the victim makes single offers or demands; had we assumed that the injurer makes the offers or demands, his information would matter.

Comment. (a) As was 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 the property rule.

(b) That an optimal outcome results regardless of the legal rule (and regardless of the quality of information of the state) is a classic instance of the application of the Coase Theorem.[183]

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 variable. Also, suppose that the state knows only the distributions of c and h. For simplicity, we will 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 there is bargaining between victims and injurers and that their information is imperfect; they know only the distributions of each others' values. Then the behavior of parties is as illustrated in Figure 1:*

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

(b) Under the property rule where 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 $x_l(h)$ depends on whether h is below or above d. When h is sufficiently below d (that is, less than or equal to R_l), a

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[183]See Coase, <u>supra</u> note 16.

FIGURE 1
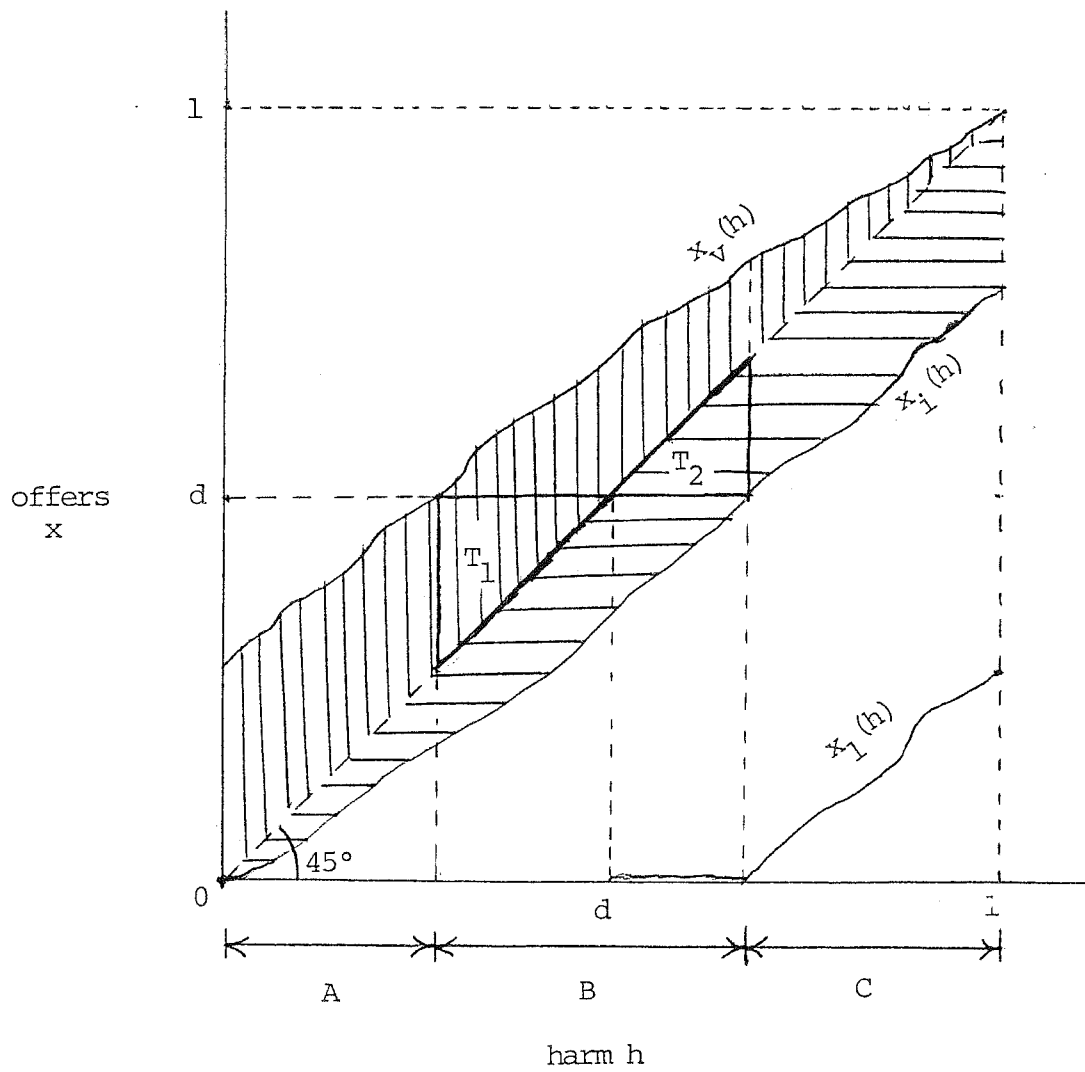
victim will offer $x_I(h) < d$ which the injurer can pay (rather than d) if he causes harm; the injurer will pay and cause harm if and only if $c > x_I(h)$ (if $d < c < x_I(h)$, the injurer will reject the offer and still cause harm). Further, it turns out that $x_I(h)$ coincides with $x_v(h)$. In region B, a victim will offer d (or equivalently, make no offer). When h is sufficiently above d (greater than or equal to R_2), a victim will offer $x_I(h)$ which he will pay to the injurer for him not to cause harm; the injurer will agree and collect $x_I(h)$ and not cause harm if and only if $c < x_I(h) + d$; and it turns out that $x_I(h) = x_i(h) - d$.

We demonstrate the claims in turn.

(a) We suppose first that victims possess the entitlement to be free from harm under a property rule. Under this regime a victim will make a demand x such that if the injurer pays x to the victim the injurer may cause harm. Because the injurer will pay x if and only if his prevention cost c exceeds x,[184] 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 offer 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

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[184]If $c = x$, the injurer will of course be indifferent between paying x and causing harm and preventing harm. For concreteness, however, it will be assumed that the injurer will not cause harm when $c = x$, and similar assumptions will be made below without further comment.

injurers who will just decide not to accept the offer of x when x is raised and x - h is what is lost if an offer is not accepted). The first-order condition determining x is[185]

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

The graph of offers 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.[186] (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, he will have to spend c to prevent harm. Since the injurer will accept if and only if $c \leq x$, 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) $F(x) + f(x)(x - h)$,

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

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

so that the first-order condition determining x is

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

and the graph of offers as a function of h, $x_i(h)$ ("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 will offer to accept as damages an amount x that is less than or equal to d, but greater than or equal to h, for this will increase the probability that the injurer will cause harm and pay the victim more than h.[187] If the victim offers such an x, 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 $x_l(h)$ ("l" standing for liability) coincides with the graph of $x_v(h)$ where the latter does not exceed d; otherwise, the victim's offer equals d, or equivalently, he makes no offer. See Figure 1. 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

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[187]The victim cannot ask for more than d since the injurer can always commit his act and pay only d. And, obviously, a victim with $h < d$ would never offer to pay an amount to the injurer not to engage in his activity. Thus the only possible type of offer is the type under consideration.

(9) $F(x + d)x + [1 - F(x + d)](h - d)$.

The derivative of (9) with respect to x is

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

yielding the first-order condition

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

This is of 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 (10). Thus as long as $x_i(h) \geq d$ -- so that $x_i(h) - d$ is non-negative -- we have $x_l(h) = x_i(h) - d$; when $x_i(h) < d$, $x_l(h) = 0$, or equivalently, no offer is made. Finally, if $h = d$, it is clear that the victim makes no offer (or equivalently, an offer of d).

From the last three paragraphs, it follows that the graph of $x_l(h)$ is as illustrated in Figure 1 for damages of d. Note that, in region A, the victim's offer and the outcome are the same as if he has property rights; in region B, no offers are made and the injurer commits his act if and only if b exceeds d; in region C, the victim's offer is $x_i(h) - d$ and the injurer commits his act exactly when he does if he possesses property rights.◄

We now compare social costs under property and liability rules.

PROPOSITION 5. *Assume that there is bargaining between victims and injurers 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 costs c. Then either the liability rule with damages d equal to E(h) or a property rule could be superior; the liability rule and the 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 rules.

Under the property rule where 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 but ought to cause harm. Thus, the inefficiency is the integral of $x_v(h) - c$ over the vertically shaded region.[188] Similarly, under the property rule where 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 to whom to give the entitlement optimally, that is, so that inefficiency is minimized.

Under the liability rule, the inefficiency to the left of region B corresponds to the vertically shaded area and to the right of region B to the horizontally shaded area. Within 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 over h in the left part of B, liability is superior to property with the entitlement protecting victims. Also, over h in the right part of B, liability is superior to property with the entitlement protecting injurers.

The liability rule will be superior to the property rule if and only if the inefficiency under the liability rule is smaller

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[188]That is, the deviation from first-best welfare is

$$\int_0^1 [\int_h^{x_v(h)} (x_v(h) - c) f(c) dc] g(h) dh.$$

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than that under the property rule (when the entitlement under the latter is given to minimize the inefficiency). It is apparent from Figure 1 that either the property rule or the liability rule could be superior to the other. Specifically, suppose that the distribution of h is concentrated in B about d.[189] (Note that the Figure applies regardless of the distribution of h, for the functions $x_v(h)$, $x_i(h)$, and $x_l(h)$ depend only on the distribution of c.) Then it is clear from the Figure that the inefficiency under liability (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.[190] Then liability must be inferior to a property rule. To amplify, suppose for concreteness that it is optimal for victims to enjoy the entitlement. The liability rule is equivalent to victims having the entitlement over h to the left of B, but is equivalent to injurers having the entitlement to the right of B. But to the right of B, the inefficiency with x_v is less than that with x_i, so that the liability rule is inferior to the property rule.◄

Comments. (a) We remind the reader that although the comparison of the liability rule with d = E(h) and property rules is ambiguous in theory, we offered a conjecture that the liability rule tends to be superior to the property rule. The

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[189]This is obviously consistent with d = E(h).

[190]This assumption too is consistent with d = E(h).

reasons that we gave there are complemented by the geometric

argument and Figure 1. Assuming that most distributions are

bell-shaped and are centered approximately at their means, the

implication is that most of the mass of a distribution of h would

be near d, which is where the liability rule is likely to be

superior to the property rule.

(b) 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 = .5 is superior to

either of the property rules.[191] Indeed, d = .5 is the optimal

level of damages, and the farther d is from .5, the lower is

welfare. (This, note, 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 .5.[192] In this instance, a property rule (in fact,

either property rule) is superior to the liability rule with d =

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[191]For this illustration and others that follow in the appendix, our
method of obtaining our results 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); (2) Solving the
expressions for social costs on a computer.

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

.5. Moreover, it can be shown that a property rule is superior to a liability rule with any d in (0,1), and that d = .5 is the worst d.

(c) We 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 concentrated around a central value.) In the symmetric case, in which both densities have peaks at .5, property rules are superior to the liability rule with d = .5. More precisely, social costs are lowest, and constant, for d in the range [0,1/3] and [2/3,1], and costs increase for d between these ranges, reaching a maximum at d = .5. If one or the other distribution is highly skewed, the optimal d is extreme, approximating zero or one. The triangular-distribution example thus raises questions about our conjecture that liability rules tend to remain superior when bargaining is imperfect. (Accordingly, we intend to carry out further investigation of examples to test the validity of the conjecture.)

(d) We briefly note how our conclusions relate to those in recent work by Ian Ayres and Eric Talley.[193] 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

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[193]See Ayres & Talley, supra note 10.

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 illustrate the possibility that property rules may be superior to the liability rule. However, in their original example (in which injurers' benefits are uniformly distributed), which they discuss but do not solve, it turns out that the property rule is superior to the liability rule.

Their article emphasizes, but never demonstrates, that liability rules enjoy a systematic advantage over property rules. The reason that they stress gives liability rules an advantage is that bargaining will be more efficient under liability rules than under property rules, but we do not understand why this should be so. Indeed, in the very example that they solve, their hypothesis about the advantage of the liability rule is contradicted. Under the liability rule, bargaining results in an increase in welfare of 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 as a conjecture the possibility that the liability rule with d = E(h) may have some advantage over property rules. The basis for this conjecture is simply that in the absence of bargaining the liability rule is definitely superior to property rules, so that the liability rule might be expected to retain its advantage in the presence of bargaining. (In the example that Ayres and Talley consider, this is indeed

the explanation for the superiority of the liability rule in the presence of bargaining. Social welfare under the liability rule in the absence of bargaining is 55 and 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, as just mentioned, but not quite enough to pass the liability rule.

In a separate paper, Talley considers outcomes under the "optimal mechanism."[194] The optimal mechanism is optimal in the sense that it is what would be imposed by a utilitarian dictator, who wishes to maximize the sum of 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.*[195] In any case, under the optimal mechanism and additional assumptions, Talley demonstrates that a liability rule with a properly chosen d is always superior to property rules. That there exist assumptions under which a liability rule with dome d is superior to property rules is entirely consistent with our arguments. We also observe, as mentioned in note 64, that Talley's analysis does not show that the optimal liability rule is more than trivially different from a property rule (for

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[194]See Talley, <u>supra</u> note 64, at 17-26.

[195]See, e.g., **Drew Fudenberg & Jean Tirole, Game Theory** 284, 289-90 (1991).

example, as we said, optimal damages might be $.01 and thus resemble a property rule giving the entitlement to owners).

II. The Taking of Things

There is a population of risk-neutral owners of things and of risk-neutral takers;[196] each owner faces a single taker.[197] 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 named as it is because it is the same for all individuals. (As explained in the text, it is derived from some feature that all 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 density of x will be denoted g(x) and that of y, 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). The justification for the latter assumption

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[196]We call the party that faces an owner a taker even though the latter may not in fact take a thing, and might better be called a potential taker.

[197]We emphasized in section III.C. of the article the importance of the possibility that there are multiple potential takers facing a particular owner, but in the appendix we abstract from this.

was discussed in subsection III.A.2 of the article. The total value of a thing to its owner is $v + x$, and to a taker it is $v + y$.

Each person knows v and his own idiosyncratic value but not necessarily another person's idiosyncratic value. The state may or may not know v, x, and y.

The social objective is maximization of the expected value of things.[198] This means that it is socially desirable for a thing to be possessed by its owner if and only if $v + x \geq v + y$, that is, if and only if $x \geq y$; otherwise it is best for it to be transferred to the taker.

We consider the property rule and the liability rule. Under the *property rule,* the state, given its information, either assigns the entitlement to possess the thing to the owner or else 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 where d equals the value to the owner, $v + x$, if the state can observe this, or if not, where d equals the mean of $v + x$.

We now compare property and liability rules where there is no bargaining between a victim and an injurer. (The case where there is bargaining was informally described in the text.)

A. State's Information Is Perfect

Here we have

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[198]Thus, we abstract from incentives to protect and to take things, and from other issues discussed in the article.

PROPOSITION 6. *Assume that there is no bargaining between owners and takers. If the state has perfect information about parties' values, the property rule and the liability rule with d = v + x are equivalent.*

Under the property rule, the first-best outcome can be achieved: the state can assign the entitlement to owners if and only if $y \leq x$. Also, the first-best outcome can be achieved 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 there is no bargaining between owners and takers. If the state knows only the distribution 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. Also, (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 liability rule is that the support of the distribution of y lies below E(x).*

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

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

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

Now there will be a difference between the outcome under liability and under the property rule if and only if the taker

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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
liability 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, liability 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) bear
comment. From (12), it is clear that if v is higher than its
estimated value E(v), 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 there will be takings when y
is low, less than E(x), the more negative the contribution to
(13), and the less well liability will perform. What makes
takings likely when y is low is the variability in v, which means
that the probability that v > E(v) is substantial. Because much
of the probability mass of the distribution of y lies below E(v),
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 harm in the
externality context. Unlike in the externality context, here the

total values of the two parties are correlated, for both the 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 property rule with entitlement to the owner.[199] Thus, the present result is consistent with the result in the externality context. (Recall also comment d in subsection 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 undesirable takings to the social benefits from inducing desirable takings (thus a ratio exceeding one indicates the superiority of the property rule).

Common Value	Idiosyncratic Owners'	Value Takers'	Costs/Benefits of Liability Rule
[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

It is plain that the property rule is superior unless, as in the final example, the range of the common value is small (within 5%

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[199]In (13), the lower limit of the second integral becomes E(x), so y − E(x) is positive for all y in (E(x),∞).

of its mean) and 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 139.) We would, however, interpret such a rule as more like
a property rule: even though damages are not infinite, they are
high enough to deter virtually all takings.