PROPERTY AND PROPERTY RULES

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This Article builds on the literature generated by Calabresi and Melamed's framework for protecting entitlements through property and liability rules. Pointing to the gap between academic commentators' conclusions that liability rules are superior in most circumstances and the reality that property rules overwhelmingly predominate in the law, Professor Smith offers a theory of the advantages of property rules that is based on information costs. The starting point for this theory is the observation that assets are heterogeneous in ways that are economically significant but costly to identify and value; liability rules inevitably involve some need for an official to make such valuations. Professor Smith argues that the preference for liability rules rests on certain convenient but overly simple assumptions that elide the costs of producing information about assets and activities.

Second, Professor Smith explores the natural pairing between property rules and owners' rights to exclude others from their property. The "exclusion strategy" for protecting property rights relies on simple on/off signals such as the boundary around a parcel of land to communicate rights and duties to the rest of the world. Within this protected zone, owners have open-ended choices of how to invest in or consume the asset. This Article shows how pairing property rules with an exclusion strategy has advantages that stem from saving information costs, deterring opportunism by potential takers, and discouraging owners from engaging in wasteful self-help.

Finally, this Article shows how the information-cost theory illuminates the connection between property rule protection and traditional notions such as residual claimancy and property in the sense of an in rem right to a thing.

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I
INTRODUCTION

How entitlements should be protected has preoccupied scholars in law and economics for over thirty years, but the gap between theory and reality is large and growing. Most theorists have built on the framework of liability rules and property rules proposed by Guido Calabresi and A. Douglas Melamed in their landmark article over thirty years ago.[1] In the domain of transferable entitlements, they provided a framework for understanding the variety of remedies for protecting entitlements by distinguishing property rules from liability rules. They noticed that some remedies are set at such a high level that they would in theory deter all takings of entitlements without the owner's consent. Such "property rules" would include injunctions and supracompensatory damages that would make a nonconsensual taking of an entitlement less attractive than bargaining to a consensual price with the present owner. By contrast, liability rules rely on officially determined non-market "prices," and allow others to take the owner's entitlement as long as these officially determined damages are paid. The level of the damages is set to compensate the owner, but leaves room for nonconsensual takings by actors who value the entitlement more than the current owner.

Contrasting these two types of remedies leads to some very basic questions. Does the law follow any economic logic in its use of compensatory damages in some contexts and injunctions or punitive damages in others? What does economic analysis tell us about the

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[1] Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972). Calabresi and Melamed also identified and discussed inalienability rules, but, like much of the literature, this Article will focus on property rules and liability rules as alternatives for entitlements that are transferable in principle.

desirability of the one versus the other? Although Calabresi and
Melamed stressed that the appropriate form of protection would
depend on numerous considerations of efficiency and justice, they
offered a generalization that property rules are preferable in situa-
tions of low transaction costs, and liability rules should be used where
transactions costs—exchange costs, holding out, and free riding—are
so high as to preclude a wealth-increasing transfer of an entitlement.[2]
Since the publication of Calabresi and Melamed's article, the conven-
tional wisdom among law-and-economics scholars had long been that
property rules are superior when transaction costs are low.[3] But such
scholars also noted with approval the tendency towards giving dam-
ages in the case of nuisances with widespread effects like pollution.[4]
This initially favorable but limited view of liability rules has gathered
steam, and over the years most commentators theorizing about enti-
tlement protection have come to conclude that liability rules are gen-
erally preferable to property rules in achieving an efficient allocation
of resources.[5] Property rules find relatively few defenders among

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[2] *Id.* at 1106–08, 1127 (arguing that liability rules are preferable in situations of high
transaction costs and that property rules are preferable in situations of low transaction
costs); *id.* at 1110 (discussing efficiency and distributional goals in choice between property
rules and liability rules); *id.* at 1093–1105 (discussing considerations of economic efficiency,
distributional goals, and other justice reasons).

[3] *Id.* at 1106–10; *see also, e.g.*, ROBERT COOTER & THOMAS ULEN, LAW AND ECO-
NOMICS 104–06 (4th ed. 2004) (suggesting refinement of traditional argument); Ian Ayres
& Paul M. Goldbart, *Correlated Values in the Theory of Property and Liability Rules*, 32 J.
LEGAL STUD. 121, 123–24 (2003) (noting conventional wisdom and summarizing criticism);
Daphna Lewinsohn-Zamir, *The Choice Between Property Rules and Liability Rules Revis-
ited: Critical Observations from Behavioral Studies*, 80 TEX. L. REV. 219, 219–21 (2001)
(discussing traditional view and citing literature).

[4] Calabresi & Melamed, *supra* note 1, at 1105–06, 1115–24 (arguing for liability rules   **R**
in pollution context). The leading cases for this literature are *Boomer v. Atlantic Cement
Co.*, 257 N.E.2d 870 (N.Y. 1970), and *Spur Industries, Inc. v. Del E. Webb Development
Co.*, 494 P.2d 700 (Ariz. 1972). For a discussion of the positive reaction to *Boomer* and
Spur, and for an argument that this praise is overstated and that the presumption in favor
of injunctions should be stronger than the current consensus suggests, see Henry E. Smith,
Exclusion and Property Rules in the Law of Nuisance, 90 VA. L. REV. 965, 1037–45 (2004).

[5] *See, e.g.*, Ian Ayres & Eric Talley, *Solomonic Bargaining: Dividing a Legal Entitle-
ment to Facilitate Coasean Trade*, 104 YALE L.J. 1027, 1036–72 (1995) (arguing that liability
rules facilitate bargaining); Louis Kaplow & Steven Shavell, *Property Rules Versus Lia-
bility Rules: An Economic Analysis*, 109 HARV. L. REV. 713 (1996) (arguing that liability
rules are superior to property rules even when courts are uncertain about magnitude of
harm, and concluding that there should be prima facie case favoring liability rules for con-
trolling harmful externalities, but noting there is strong theoretical case for property rule
protection of possessory rights in things); *see also* A. Mitchell Polinsky, *Controlling Exter-
nalities and Protecting Entitlements: Property Right, Liability Rule, and Tax-Subsidy
Approaches*, 8 J. LEGAL STUD. 1, 42–48 (1979) (comparing property rules, liability rules,
and tax subsidies, and using proposed framework to rank approaches under various condi-
tions). The literature advocating a liability rules solution in particular contexts includes a
wide range of situations in which holding out and other strategic behavior are thought to

legal economists, which is all the more surprising since property rules abound in the law.[6] If anything, the law treats property rule protection as the norm and liability rule protection as the exception—the opposite of what the bulk of recent economic commentary would lead one to expect.

In this Article, I will argue that the preference for liability rules rests on certain overly simple assumptions about how assets and activities are individuated and evaluated. Recent commentary has argued that one of liability rules' chief advantages is that they economize on the information that officials need in order to ensure efficient allocation. Liability rules achieve this happy state of affairs because they "harness" the information that private parties have about the value of assets and activities.[7] As a result, liability rules are sometimes said to be superior even where transaction costs are low enough that the parties could bargain consensually.[8] These arguments are all the more

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be severe. *See* James E. Krier & Stewart J. Schwab, *Property Rules and Liability Rules: The Cathedral in Another Light*, 70 N.Y.U. L. Rev. 440, 452 & n.44 (1995) (describing survey of legal literature from 1975 to 1986, in which some dozen proposals for liability rules in high-transaction-costs settings were proposed, and giving examples). More recently, liability rule proponents have explored rules that decouple the functions of choosing who will have the entitlement and who is compensated; liability rules advocated include put-style rules as well as traditional call-style rules. Ronen Avraham, Modular Liability Rules 6–7 (John M. Olin Center for Law & Econ., Paper No. 01-003, 2001), *available at* http://www.law.umich.edu/centersandprograms/olin/papers.htm; Ian Ayres & Paul M. Goldbart, *Optimal Delegation and Decoupling in the Design of Liability Rules*, 100 Mich. L. Rev. 1, 51–54 (2001); Krier & Schwab, *supra*, at 471 (proposing rule under which *A* can stop activity and require *B* to disgorge damages that *B* will now not have to suffer); *see also* Madeline Morris, *The Structure of Entitlements*, 78 Cornell L. Rev. 822, 854–56 (1993) (developing possibility of put-style rules).

6 *See, e.g.*, Richard A. Epstein, *A Clear View of* The Cathedral*: The Dominance of Property Rules*, 106 Yale L.J. 2091, 2093–96 (1997) (arguing that undercompensation concerns usually outweigh hold-out problems, making property rules dominant); Carol M. Rose, *The Shadow of* The Cathedral, 106 Yale L.J. 2175, 2194–97 (analyzing liability under average harm rule as common-pool problem in some circumstances); Henry E. Smith, *Ambiguous Quality Changes from Taxes and Legal Rules*, 67 U. Chi. L. Rev. 647, 683–96, 706 (2000) (showing that quality changes can make property rules superior). Some authors argue that high administrative costs, and valuation costs in particular, may cause property rules to be superior to liability rules in some contexts. *See, e.g.*, Richard R.W. Brooks, *The Relative Burden of Determining Property Rules and Liability Rules: Broken Elevators in the Cathedral*, 97 Nw. U. L. Rev. 267, 289–90 (2003) (arguing that comparative evaluation required under property rule can be easier than absolute valuation under liability rule); Krier & Schwab, *supra* note 5, at 459–64 (arguing for property rules when administrative costs are high); Smith, *supra*, at 685–86 (suggesting variable measurement costs may favor property rules). *But see, e.g.*, Kaplow & Shavell, *supra* note 5, at 729, 750–51 (arguing that information about average harm can be developed at low cost and that information required for property rules is costly).

7 *See* Kaplow & Shavell, *supra* note 5, at 725.

8 *See* Ayres & Talley, *supra* note 5, at 1036–72 (arguing that liability rules facilitate bargaining).

striking because they run counter to the intuition that liability rules are more demanding on officials and less respectful of individual valuations.

The new wisdom in favor of liability rules also runs counter to strong tendencies in the law. Property rules are prevalent in the law and are by no means exceptional. Basic actions like trespass protect entitlements by means of injunctions and punitive damages in the civil law and penalties in the criminal law. If *A* owns Blackacre and *B* enters without *A*'s consent, *A* can get an injunction against *B* and can seek both compensatory and punitive damages. *B* might even be liable for criminal trespass. It will not help *B* to claim that the actual damage to *A* was small or even that he tried bargaining with *A* but that *A* refused all reasonable offers.[9] Further, when liability rules are used, as in eminent domain or in the law of necessity, they are often hedged about with conditions and restrictions that are hard to justify if liability rules are to be preferred as a general matter.[10]

This gap between theory and law leaves two main choices. One possibility is that the law needs a major overhaul to make it conform more closely to the normative conclusions in favor of liability rules in the literature. Alternatively, one could bring theory and law closer together by seeking an account of why property rules are often preferable to liability rules, despite the many benefits of liability rules identified by commentators. A theory of the advantages of property rules might also allow an explanation of why property rules tend to be associated with entitlements that we label "property." Taking this latter approach, this Article will offer a defense of property rules that avoids the difficulties raised in the pro–liability rule literature. The account of property rules offered here will rest on the costs of producing information about assets and activities. Information production includes delineating and evaluating assets and activities, and is sometimes called "measurement" in the economic literature.[11] As we will see, the information thus obtained may be of a very approximate sort (making the term "measurement" sound overly exact), because the production of information consumes resources—it is costly.

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[9] For a dramatic example, see *Jacque v. Steenberg Homes, Inc.*, 563 N.W.2d 154 (Wis. 1997), in which the court upheld a verdict of punitive damages of $100,000 on nominal compensatory damages. Even though the plaintiffs, motivated at least in part by the mistaken belief that prescription might result, had refused all offers to bargain, the defendants had moved a trailer home across the plaintiffs' land.

[10] *See, e.g.*, Epstein, *supra* note 6, at 2092–94, 2106, 2111, 2120; *see also infra* Part II.A.

[11] This use of the word "measurement" is characteristic of the work of Yoram Barzel, who points out that measurement is the operationalization of information. *See* Yoram Barzel, *Measurement Cost and the Organization of Markets*, 25 J.L. & Econ. 27, 28 & n.3 (1982).

The preference for property rules can be understood as a response to the information costs that shape other aspects of entitlement delineation. First, in what I will call the argument from "delegation," I will show that property rules are naturally paired with the rights to exclude that are typical of property law. Property rules benefit from the savings in information costs that are made possible by rights to exclude as opposed to more tailored use rights.[12] Second, and consistent with the information-cost point, exclusion and property rules will allow less room for opportunism on the part of potential takers of entitlements. Third, on the owner's side, exclusion and property rules obviate the need to expend resources on wasteful self-help. I will show that property rules are more closely bound up with the traditional notion of property in the sense of an in rem right to a thing once the information-cost advantages of classic property-law methods of delineating rights are properly understood.

All three of these arguments can be seen as consequences of the costliness of acquiring and acting on information. The problem of information in protecting property is characterized not just by risk but also by varying degrees of uncertainty. First-order production of information on the relevant asset or class of assets involves not only managing risk, but also turning uncertainty into more manageable risk. According to Frank Knight's classic distinction, risk is variability in outcomes that can be captured by a probability distribution, but uncertainty cannot be quantified in this way.[13] Consider risk first. If an asset might be worth $100 in situation type 1 but only $40 in situation type 2, and if situation type 1 will occur with 75% probability and situation type 2 with 25% probability, then the asset's expected value is the sum of the values discounted by their probabilities, i.e., $85 = (.75 \times \$100) + (.25 \times \$40)$. The asset is risky but there is no uncertainty: All the possible states, their probabilities, and their pay-off values are known. Uncertainty involves the lack of such knowledge. If in this example one did not know the values in the states, did not know the probabilities, or, most radically, did not know the set of possible future states of the world, the problem would be one of uncertainty rather than risk. In the real world, there is a spectrum running from uncertainty to risk depending on the degree of ignorance of probabilities and states (and, for this reason, most of the argument I will make could be recast in terms of greater and lesser amounts of

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[12] I will call this the "exclusion" strategy for delineating rights. *See infra* Part III.A.

[13] FRANK H. KNIGHT, RISK, UNCERTAINTY AND PROFIT 19–21, 197–232 (1921).

"risk").[14] Turning uncertainty into risk is a matter of gathering the information that would allow events to be grouped into classes over which ever-more-accurate actuarial statements can be made. This process occurs most obviously in insurance, but Knight argued that it is pervasive in economic life. As Knight recognized, entrepreneurs in particular profit from opportunities afforded by uncertainty.[15] In a world where people share identical information about risk, the entrepreneur's opportunity to profit from discovering new opportunities would vanish. People differ in their ability to make sense of situations, and the same situation might be closer to the risk end of the spectrum for some, especially entrepreneurs, while it is characterized by uncertainty for others.

Much of recent economics, including the literature on liability rules, explicitly or implicitly reduces all uncertainty, in Knight's sense, to risk as a (very simple and convenient) theoretical assumption. This simplification can be accomplished in several ways, but I will argue that all of them miss a major part of the picture. One method is simply to assume that all knowledge problems involve a known state space and subjective knowledge about probabilities and values.[16] When we act on the best such knowledge, we are doing the best we can and there is no point in considering what we do not know. This is easiest when commentators assume that a special sort of dichotomy holds: Either an actor (a judge, for example) has perfect average actuarial knowledge of *the* class that an event falls into, or one has full knowledge of the particulars of the event itself.[17] For example, it is assumed that a polluter knows the distribution of victim harm or at least the average harm of the "type" of victim—in Louis Kaplow and Steven Shavell's formulation, the polluter knows "the average harm for cases characterized by the facts the court observes."[18] A second

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[14] Although much of Knight's discussion is couched in terms of a clear distinction between risk and uncertainty, he eventually comes to the conclusion that situations vary by degree along a continuum from pure risk to pure uncertainty. *Id.* at 199.

[15] *Id.* at 264–90; *see also, e.g.*, ISRAEL M. KIRZNER, DISCOVERY AND THE CAPITALIST PROCESS 40–67 (1985).

[16] *See* Leonard J. Savage, THE FOUNDATIONS OF STATISTICS 69–104 (2d rev. ed. 1972) (expounding subjective expected-utility approach).

[17] A particularly explicit example of these assumptions is Louis Kaplow, *The Value of Accuracy in Adjudication: An Economic Analysis*, 23 J. LEGAL STUD. 307, 312–13 (1994). As Dan Ortiz points out in his response to Kaplow's article, this kind of actuarial information is not easy to come by and, as in insurance problems, leaves room for moral hazard and adverse selection. Daniel R. Ortiz, *Neoactuarialism: Comment on Kaplow (1)*, 23 J. LEGAL STUD. 403, 403–06 (1994). Ortiz's insight that the average-harm approach poses the problems of actuarialism in Kaplow's approach to accuracy in adjudication dovetails with the uncertainty argument for property rules I present in Part III *infra*.

[18] Kaplow & Shavell, *supra* note 5, at 719.   **R**

method is to assume that whatever we do not know will be no more likely to bias outcomes in one direction than another, so that treating unknown probabilities as equal does not lead us to do any worse than if we worried explicitly about uncertainty. This "principle of insufficient reason" or "equal assignment rule" allows uncertainty to be treated as if it were risk.[19]

If, as commentators routinely assume, pure risk were all that is involved, many problems disappear. As long as a court can achieve an unbiased estimate of average value or some more sophisticated variant, then over the long run more pervasive employment of liability rules will improve allocation in the sense that more transfers to higher-valuing users will occur.[20] The problem is that uncertainty does not allow for this thinking in terms of averages because we do not know what is supposed to be averaged. The equal-assignment rule presupposes risk as opposed to uncertainty. There are methods for turning uncertainty into risk, by aggregating instances such that numerical trends in likelihoods emerge. But this collection of information is not costless; owners, takers, and officials have different abilities to define the appropriate classes for evaluating average harm. In particular, damages based on average harm presuppose that officials are able to cost-effectively aggregate instances into actuarially sensible classes. As I will argue, this will often not be the case. The general question is who is in the position to best deal with uncertainty: owners and markets on the one hand, or juries, judges, and other officials on the other.

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[19] *See*, *e.g.*, DAVID M. KREPS, NOTES ON THE THEORY OF CHOICE 146 (1988) (explaining that "the principle of insufficient reason . . . says that if I have no reason to suspect that one outcome is more likely than another, then by reason of symmetry the outcomes are equally likely, and equally likely probabilities may be ascribed to them"); R. DUNCAN LUCE & HOWARD RAIFFA, GAMES AND DECISIONS: INTRODUCTION AND CRITICAL SURVEY 284–86 (1957) (discussing principle of insufficient reason); STEPHEN M. STIGLER, THE HISTORY OF STATISTICS: THE MEASUREMENT OF UNCERTAINTY BEFORE 1900, at 111–12, 117, 127–29 (1986) (discussing history of principle of insufficient reason); Craig K. Ihara, *Maximin and Other Decision Principles*, 12 PHIL. TOPICS 59, 63 (1981) ("The 'principle of insufficient reason,' otherwise known as the Bayles, or LaPlace criterion, states that if we have absolutely no information about the relative probabilities we must assign equal probabilities to alternatives and then adopt the course of action whose expected utility is the highest." (citation omitted)). Not surprisingly, Knight explicitly questions the value of this assumption. KNIGHT, *supra* note 13, at 222.   **R**

[20] *See* Kaplow & Shavell, *supra* note 5, at 719 (discussing average value). More sophisticated variants include measures such as common value plus average idiosyncratic value, or mean expected victim value conditional on taker's actual value at the point where this conditional mean equals taker's actual value. Ayres & Goldbart, *supra* note 3, at 135–36 (setting forth latter, fixed point, result); Kaplow & Shavell, *supra* note 5, at 762 n.157, 789–90 (mentioning but not pursuing possibilities of damages rules other than average damages, such as setting damages at highest possible common value plus owners' mean idiosyncratic value).   **R**   **R**   **R**   **R**

These assumptions for treating uncertainty as risk are sometimes very useful, but I will argue that they are very unhelpful when it comes to explaining property rules and liability rules. Property itself is a response to uncertainty, and property rules derive some advantage as a response to uncertainty. In this Article, I will present three related arguments based on information costs for the superiority of property rules. All three information-cost arguments for property rules can be seen as effects of uncertainty.

First, exclusion, property, and property rules fit together. Resources in the world are multidimensional and not homogeneous from one token to the next. But producing information about the things in the world is costly and thus things tend to be grouped by type, even though the tokens in those types are not equally suited to various uses. An asset like a plot of land is easily seen to involve many attributes (soil nutrients, water, mineral deposits, surface support, etc.) and the presence and proportions of such attributes vary from one specimen to the next. If delineation and evaluation—the production of information—were costless, then the response to the problem of heterogeneous tokens would be to measure the valued attributes of the tokens—at zero cost—and set up new, more fine-grained types. This process would continue until marginal benefit declined to zero. At this point, the homogeneity of assets and services would be reestablished, with smaller groupings of assets and services under one price. Bins of oranges will be smaller, or oranges might be individually priced, the way original works of art are. Human minds, however, cannot know or process every detail of the environment; the mind segments the environment into things and things into classes based on similarities.[21] Thus, in many cases, significant differences exist among the seemingly interchangeable assets and services, from the oranges in a grocer's bin to toasters to haircuts, that are grouped under the same type. These differences are economically significant because the attributes are valued; the different levels of these attributes in the tokens cause the various tokens to differ in value.[22] How

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[21] *See, e.g.*, KNIGHT, *supra* note 13, at 205–06 (1921) (noting that finite intelligence requires classification and fundamental role that it has played in thought and theory of thought); 2 JOHN LOCKE, AN ESSAY CONCERNING HUMAN UNDERSTANDING 15–16 (John W. Yolton ed., J.M. Dent & Sons Ltd. rev. ed. 1964) (1689) (arguing that only particulars exist, but that having idea and word for every particular is beyond human capacity and would be useless even if it were possible); ALEXIS DE TOCQUEVILLE, DEMOCRACY IN AMERICA 437 (J.P. Mayer ed., George Lawrence trans., 1969) (1840) (discussing "general ideas," which group together particulars because of inadequate ability of human intelligence to hold all particulars in mind simultaneously).

[22] For example, the oranges in a grocer's bin may all be priced the same by the piece or by weight, but may differ in terms of texture, color, and other features that correlate with

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far to measure the attributes of any given asset and what it is best used for at any given time are subject to risk and uncertainty, and different actors will have differing abilities to develop and act on this information.

Property responds to uncertainty over uses by bundling uses together and delegating to the owner the choice of how to use the asset, thus avoiding the need to specify uses at any stage. I will argue that property rules have advantages that stem from this delegation to the owner of the tasks of gathering and acting on information about assets. Property gives the right to exclude from a "thing," good against everyone else. On the dutyholder side, the message is a simple one—to "keep out." In this way, the right to exclude simultaneously protects a reservoir of uses to the owner without officials needing to know what those might be.[23] This is what I have called elsewhere an "exclusion" strategy, in which very rough signals—like presence inside or outside a boundary line around a parcel of land—are used to protect an indefinite class of uses with minimal precision.[24] By contrast, what I call a "governance" strategy is one in which the internalization problem is solved on something close to a use-by-use basis; rights are delineated using signals (sometimes called "proxy variables" or "proxies" in the economic literature) that pick out and protect individual uses and user behavior. (Between these two extremes are strategies of a mixed sort that bunch uses together under variables of intermediate precision.) In this paper, I will argue that property rules have an advantage in implementing the exclusion strategy so that, where an exclusion strategy is called for, property rules will generally be superior to liability rules.

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juiciness and taste, the attributes that consumers value most. Barzel, *supra* note 11, at   **R**
28–32. Where every orange in a heterogeneous group is priced the same, people will search among the oranges using "proxy measures" or *signals* like texture and color to choose those oranges with more of the valued attributes—in this case juiciness and taste— per dollar of price than the average orange. Because the signal is imperfect, such search effort allows a consumer to take advantage of inaccuracy in pricing. The unpriced excess of valued attributes will invite consumers to expend costly effort at differentiating and evaluating the oranges. Barzel also examines the role of suppression of information, reputation, warranties, and other devices in reducing these costs. *See id*. at 32–39.

[23] Many theorists have noted the tight connection between the right to exclude and property. *See infra* note 250 and accompanying text. Building on the work of Steven   **R**
Cheung, Carol Rose develops a typology of pollution controls and uses the term "keep out" as a shorthand for simple rules of exclusion. Steven N.S. Cheung, *The Structure of a Contract and the Theory of a Non-exclusive Resource*, 13 J.L. & Econ. 49, 64 (1970); Carol M. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 Duke L.J. 1, 9–36.

[24] Henry E. Smith, *Exclusion versus Governance: Two Strategies for Delineating Property Rights*, 31 J. Legal Stud. S453, S454–56, S467–78 (2002).

Second, the advantages of delegation to the owner through exclusion avoid certain problems of opportunism that liability rules invite. Property rules can be superior to liability rules where this delegation is to someone—the "owner"—who has an advantage in dealing with uncertainty but cannot credibly communicate her information about the uncertainty. The problem with regarding everything as risk rather than uncertainty is that it suppresses the question of the nature of information and people's differential ability to discover and act on it. Owners are often in the position of the Knightian entrepreneur: Ownership concentrates on the owner the benefits of information developed about—and bets placed on—the value of the asset. Like Knightian entrepreneurs, such owners make bets in situations of uncertainty and are rewarded or punished depending on how those bets turn out later when the uncertainty is resolved. The owner develops information about the attributes and potential uses of the asset he owns, but he may not be able to communicate his prediction about future values to others at reasonable cost.

Thus, if someone believes that a rock formation on Blackacre will be a tourist site twenty years from now, one can buy Blackacre, become its Owner, and wait. If, in the meantime, someone (Taker) takes Blackacre and only has to pay damages, Owner will either have to convince a court that the rock formation is going to be valuable or will have to bribe Taker. Under some quite ordinary conditions, this situation will lead to social loss. Convincing a court will sometimes be infeasible (or not cost-effective) because it is not likely that a court can process the information about the rock formation better than potential trading partners of the owner.[25] The court has to be skeptical of the statements of both Owner and Taker. Owners have every incentive to inflate their values, and the bets any given owner has placed may fail; the point of property is that failure as well as success will be brought home to Owner. As for bribing Taker, the more that Owner has to share the gain from discovering the information, the less incentive there will be to develop it. While it is true that we could give extra damages to reflect the creation of the information or could use fancier liability rules proposed more recently,[26] we are then back with

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[25] Whether the benefits of conveying information credibly to a third party exceed the costs of doing so is called "verifiability" in the contract literature and is a matter of degree, although in contract theory it is often convenient to assume that conveying credible information is either costless or infinitely costly. *See, e.g.*, BERNARD SALANIÉ, THE ECONOMICS OF CONTRACTS: A PRIMER 175–89 (1997); Alan Schwartz, *Relational Contracts in the Courts: An Analysis of Incomplete Agreements and Judicial Strategies*, 21 J. LEGAL STUD. 271, 279–80 (1992).

[26] *See infra* notes 30, 102–10 and accompanying text.   **R**

the valuation problems facing a court. People will expend resources to exploit the arbitrage opportunity resulting from individual mispricings under a liability rule, leading to a deadweight loss.[27] More generally, it may be cheaper to protect the owner's bet on Blackacre and let the market value the information twenty years from now than to have officials try to settle up right now as between the owner and someone engaging in a nonconsensual taking.

Third, exclusion-style rights and property rules have advantages in situations where high-valuing owners can protect themselves outside the legal system. When these owners opt out in this way, they incur costs (for secrecy agreements, additional fences, alarm systems) in order to prevent takings that would be undercompensated under an average-harm liability rule. This opting out leads to an overall social loss if these additional costs of self-help under the liability rule cause the costs of the liability rule system to exceed those of the corresponding property rule system. This problem is aggravated where both potential takers and potential victim-owners can engage in an arms race of measures to maximize their value under the liability rule regime. In some respects, this problem bears a relationship to the much-debated question of why theft is considered inefficient.[28] As in the case of theft, the losses from allowing compensated takings include the costs of certain high-valuing owners opting out of the system through self-help measures and certain takers investing in opportunistic takings. Some pro–liability rule commentators see this as a problem limited to the case of the taking of "things."[29] But the purest pro–liability rule position reestablishes the puzzle of why property rules are needed to prevent wasteful self-help: "Dual-chooser rules," under which both parties have a say on how the entitlement is allocated, and "higher-order liability rules," which implement ascending damages for successive takings, can lead to single-price and ascending-price auctions, respectively, that harness private information and put the asset in the hands of the party that values it most.[30] But viewing assets as heterogenous multi-attribute collections that are

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[27] In this case, exploitation of the arbitrage opportunity does not lead to more accurate prices. Rather, actors can be expected to expend resources to effect a pure transfer.

[28] *See* Kaplow & Shavell, *supra* note 5, at 769 & n.178.   **R**

[29] *See id*. at 768–69.

[30] Ian Ayres & J.M. Balkin, *Legal Entitlements as Auctions: Property Rules, Liability Rules, and Beyond*, 106 YALE L.J. 703, 711 (1996) (noting that higher-order liability rules with ascending damages on successive takings create auctions); *see also* AVRAHAM, *supra* note 5 (proposing liability rules in which parties are allocated pairs of options); Ayres &   **R** Goldbart, *supra* note 5, at 51–61 (discussing higher-order rules and showing how allowing   **R** for multiple prices can never do worse than other rules, but alluding to practical problems with implementation).

costly to classify will in turn help explain why property rules solve the problem of wasteful self-help in a way that even sophisticated liability rule approaches cannot.

The advantages of exclusion and property rules become clearer when the full costs of the liability rules approach and the (post-)realist picture of property are taken into account.[31] The liability rule approach perpetuates law and economics' heavy reliance on the classic realist bundle-of-sticks approach to property. The context-specific tailoring of the sticks in the bundle is extended to the question of the scope and strength of entitlement protection through ever-fancier forms of liability rules (as opposed to the traditional layperson's view that property is a right to a thing).[32] In the liability rule literature, as in Coase's article on social cost, liability rules and property rules are compared as to how well they can choose allocation of a resource between two people who have announced incompatible uses.[33]

Part II will set up the problem of the production of information of assets, and Part III will develop a theory of how property rules handle these problems of information production and uncertainty. Part IV will show how the property rule versus liability rule controversy fits into the larger picture of the nature of property. Property rules and exclusion turn out to be closely related to the likelihood that an entitlement will be treated as property. The information-cost rationale for exclusion and property rules offered in this Article also helps explain and justify the absence of "put-style" liability rules that operate as forced sales of entitlements. And exclusion and property rules turn out to be very important in a central problem of property and organization alike, the delineation of residual claims. Part V concludes.

II
The Puzzling Persistence of Property Rules

Property rules present a puzzle. The commentary building on the property rule/liability rule framework has uncovered what appear to

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[31] The successors to various aspects of legal realism include such disparate movements as law and economics and critical legal studies, but when it comes to the bundle-of-rights picture of property most would say "we are all realists now."

[32] For a discussion of how law and economics has adopted the realist approach to property as a bundle of sticks, see Thomas W. Merrill & Henry E. Smith, *What Happened to Property in Law and Economics?*, 111 Yale L.J. 357 (2001).

[33] R.H. Coase, *The Problem of Social Cost*, 3 J.L. & Econ. 1, 15–28 (1960). For a discussion of how Coase presupposes that property can be treated as the list of use-rights that emerges from decisions of the type A versus B and how this approach is carried forward in the literature on property rules and liability rules, see Merrill & Smith, *supra* note 32, at 369–71, 379–83.   **R**

be overwhelming advantages for liability rules. This Part first sketches the prevalence in the law of property rules and surveys some of the long-standing justifications for property itself and some isolated recent pro–property rule commentary that draws on these traditional ideas. Next, I turn to the burgeoning pro–liability rule literature, which makes the heavy reliance on property rules in the law all the more puzzling. I then bring out some common informational assumptions upon which the pro–liability rule position rests. Third and finally, in order to set the stage for my information-cost theory of property rules, I break the choice between property rules and liability rules into three constituent problems. Property rules and liability rules reflect a choice of strength of remedy, the shape of the liability function, and the unit of concern. Later we will see how the resolution of these questions in property rules—a strong remedy that kicks in when rights to things are violated—solves a basic and widespread information-cost problem.

A.   *The Traditional Preference for Property Rules*

The arguments for liability rules challenge a long tradition of preference for property rules in the law and a line of traditional commentary that still resonates today. The traditional justifications for property point to property rule protection. Recently the pro–liability rule literature has challenged these positions by arguing that liability rules would be superior to property rules even in securing the traditionally cited benefits of property. Later I will show how the information-cost theory recasts and strengthens the traditional case for property rules.

Property rules abound in the law. In the law of real property, trespassers face injunctions and often punitive damages as well.[34] There is even a criminal law of trespass. Theft of personal property is a criminal offense, and on the civil side plaintiffs are given a choice of recovering the thing in replevin or damages (a forced sale) in trover.[35] Even in contracts, the area of law in which liability rules are thought to be most common, specific performance is arguably routine, despite the black-letter rule conditioning the availability of injunctions on

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[34] *See, e.g.*, Warren v. Parkhurst, 78 N.E. 579, 583 (N.Y. 1906) (upholding injunction against polluters of stream); Jacque v. Steenberg Homes, Inc., 563 N.W.2d 154 (Wis. 1997) (upholding award of punitive damages where only nominal compensatory damages were found).

[35] *See* WILLIAM B. STOEBUCK & DALE A. WHITMAN, THE LAW OF PROPERTY § 1.3, at 8–9 (3d ed. 2000).

"irreparable injury" and the inadequacy of damages.[36] In general, injunctions are widely available.[37]

The literature has identified the main types of situations in which current law relies on liability rules, and I will do no more than briefly summarize these. The two major classes of situations are those characterized by very high transaction costs and by hold-out and other strategic behavior.

Consider first the use of liability rules in situations of high transaction costs. In accidents, there is no feasible opportunity for the future defendant to locate and bargain with the future plaintiff—transaction costs would be prohibitive.[38] The use of a property rule might call forth excessive precautions; behind a veil of ignorance—for example, as to whether one would be a driver or a pedestrian—one might well choose, even for cases of negligence, a liability rule of some sort as a substitute for the ex ante transaction that cannot occur. The only alternative for such past harms would be a property rule implemented as extra damages or criminal sanctions;[39] if an accident has crushed the plaintiff's hand, courts usually cannot order it restored. Intentional torts are another matter; the suspicion here is that there is more going on than a missed transaction. Where torts are intentional, property rules, in the form of punitive damages, come back into the picture.[40]

The second major category of liability rules consists of those that counteract potential problems of hold-out behavior and strategic bargaining. Calabresi and Melamed themselves realized that hold-out behavior was a major motivation for liability rules.[41] Because someone can take the entitlement from its present holder and pay official damages, the present entitlement holder cannot hold out for more than that amount; no one would pay more in a consensual trans-

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[36] Douglas Laycock, *The Death of the Irreparable Injury Rule*, 103 HARV. L. REV. 687, 695 (1990) (noting rule's evolution into simple balancing test with de facto preference for remedy preferred by plaintiff).

[37] *See id.* at 701–22 (citing numerous decisions granting injunctions).

[38] *See* Calabresi & Melamed, *supra* note 1, at 1108–09.   **R**

[39] *See id.* at 1124–26.

[40] *See, e.g.*, Epstein, *supra* note 6, at 2099–2100. In the liability rule literature it is   **R** common to identify punitive damages as implementing a property rule, because punitive damages aim at deterring rather than pricing nonconsensual transfers. *See, e.g.*, Calabresi & Melamed, *supra* note 1, at 1126 & n.71 (arguing that property rules backed up by crim-   **R** inal sanctions and punitive damages are used to prevent thieves and intentional tortfeasors from being able to convert property rules into liability rules); Kaplow & Shavell, *supra* note 5, at 724 (noting that "a liability rule with very high damages is equivalent to property   **R** rule protection of victims").

[41] Calabresi & Melamed, *supra* note 1, at 1106–07.   **R**

action than she could pay in a nonconsensual transaction.[42] In the classic nuisance dispute, many commentators worry that the numerosity of the victims will lead to high costs of exchanging an entitlement to be free from pollution and will call forth undesirable hold-out behavior.[43] If so, then it would make sense to replace traditional injunctive relief with damages, an approach adopted in the case of *Boomer v. Atlantic Cement Co.*[44]

The prototypical example of liability rules comes from eminent domain. Eminent domain is at its least controversial in situations in which the ability of the owner to hold out is thought to be problematic. Although the U.S. Constitution and many state constitutions do require that taken property be put to a public use, the weakness of this requirement in the hands of many courts means that the main constraints on the use of the eminent domain power are its cumbersomeness and any political opposition aroused by the possibility of its exercise in a given situation.[45]

The law of private necessity bears some resemblance to eminent domain, especially in its reliance on liability rules, but private necessity is even more restricted by legal requirements. In the law of private necessity, a private party in mortal peril can take an owner's resource and pay damages later. In situations of necessity, requiring the person in peril to negotiate with an entitlement holder protected by a property rule is likely to lead to high, perhaps prohibitive, costs of exchange, and to a danger of hold-out behavior as well. The liability rule literature relies on two leading cases of necessity relating to

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[42] To be precise, the "price" under each system must include transaction costs in the case of the market price and the costs of using the judicial process in the case of damages under the liability rule.

[43] *See, e.g.*, ROBERT COOTER & THOMAS ULEN, LAW AND ECONOMICS 170–71, 175–81 (1988) (noting problem and suggesting damages as solution); RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 16, 68–69, 79–81 (5th ed. 1998) (same); Calabresi & Melamed, *supra* note 1, at 1106–10 (same); *see also* Robert Cooter, *Unity in Tort, Contract, and Property: The Model of Precaution*, 73 CAL. L. REV. 1, 25–27 (1985) (describing potential inefficiencies of injunctive relief in nuisance disputes); Polinsky, *supra* note 5, at 4 (analyzing potential solutions to strategic behavior); A. Mitchell Polinsky, *Resolving Nuisance Disputes: The Simple Economics of Injunctive and Damage Remedies*, 32 STAN. L. REV. 1075, 1076 (1980) (discussing arguments against injunctions in nuisance disputes based on possibility of extortion and strategic behavior).

[44] 257 N.E.2d 870, 875 (N.Y. 1970) (ordering trial court to grant injunction to be vacated upon payment by defendant of permanent damages); *see supra* note 43. *But see* Smith, *supra* note 4 (claiming that usual argument for liability rules is overstated and that presumption for property rules in nuisance should be strong).

[45] U.S. CONST. amend. V ("[N]or shall private property be taken for public use, without just compensation."); Thomas W. Merrill, *The Economics of Public Use*, 72 CORNELL L. REV. 61, 77–81 (1986) (noting "due process" costs of exercising eminent-domain power).

ships in storms. In *Vincent v. Lake Erie Transportation Co.*,[46] the ship owner maintained a mooring to the dock after the discharge of cargo because of a storm, and the dock suffered damage as a result. The court held that although the ship owner acted reasonably and justifiably, it had to pay for the damage to the dock.[47] Thus, the dock is protected by a property rule most of the time, but in situations of necessity the level of protection drops to that of a liability rule. The one in peril can take and pay, but after the peril passes, the property rule reasserts itself. If in some sense part or all of the entitlement to the dock passes to the one in need, it is interesting to consider what the consequences would be if the dock owner tried to unmoor the ship.

In *Ploof v. Putnam*, the dock owner's servant did just that, unmooring the ship and causing it to be driven onto the shore and the people and cargo on board to be tossed into the water.[48] The court held that the ship owner could sue the dock owner, confirming that the one in peril has a right rather than a mere privilege to use the dock.[49]

Commentators have differed over the strength and scope of this right. According to Ayres and Balkin, there is a second-order liability rule under which the dock owner would have to pay damages to the ship owner for "retaking" the entitlement to the dock.[50] Richard Epstein counters that, during the peril, the ship's crew have the "entitlement" to the dock protected by a property rule, not a liability rule, because if the dock owner tried to unmoor the ship, the crew could defend with deadly force and, according to Epstein, the outside entrant becomes the owner of the dock for the duration of the necessity.[51] The court's decision itself only hints at the scope of the shifted entitlement in those on the ship. Because the opinion resolved only that the plaintiff had stated a case, we do not know whether punitive damages were granted. The fact that one of the ship owner-plaintiff's

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[46] 124 N.W. 221 (Minn. 1910).

[47] *Id*. at 222.

[48] Ploof v. Putnam, 71 A. 188, 188–89 (Vt. 1908).

[49] *Id*. at 189. Because the right here correlates with a duty in the dock owner to allow the ship to moor, this is a true claim-right in the Hohfeldian sense, as opposed to a mere privilege. WESLEY NEWCOMB HOHFELD, FUNDAMENTAL LEGAL CONCEPTIONS AS APPLIED IN JUDICIAL REASONING 36–39, 71–72 (Walter Wheeler Cook ed., 1919).

[50] Ayres & Balkin, *supra* note 30, at 715–16.   **R**

[51] Epstein, *supra* note 6, at 2108–09. As Epstein points out, the owner could not   **R** "retake" the entitlement, but rather the property rule protection temporarily shifts to the boat owner because protecting life is more important than a refined "auction" of the dock. *Id*. at 2109–10.

counts sounded in trespass suggests, however, that property rule protection was available.[52]

Liability rules are used only in narrow settings like necessity, and they are further hedged about with institutional limitations. Epstein emphasizes that liability rule–type regimes in takings law, nineteenth-century mill act legislation, the law of common carriers, and related regulatory regimes require a public body to set rates and protect the "takee."[53] The mill acts, which used liability rules to overcome potential hold-out problems, are famous in the liability rule literature for their provisions allowing those building mills to flood upstream land but requiring the payment of 150% of the market price as officially determined damages.[54] Ayres and Balkin interpret this provision as reflecting an effort to estimate the average value that upstream landowners place on their land.[55] But as Epstein points out, the mill acts were far from a pure liability rule regime.[56] There were two types of mill acts. Some statutes conferred the power of eminent domain on riparian landowners, which allowed the mill builder to pay the value of the condemned land as determined by a jury and then to receive title.[57] In these acts, mill builders were not allowed to flood and pay, but had to get prior authorization from the authorities after showing that the proposed mill was in the public interest. Other mill acts gave owners of riparian land the right to proceed at their peril to build a water mill, but allowed an objecting landowner not only to sue for damages but also to seek a determination that the mill was not in the public interest.[58] If the mill were found not to be in the public interest, presumably the adversely affected owner could then sue for an injunction to have it torn down. As is true generally, the entitlement of the neighboring landowners here is protected by a hybrid of

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[52] *Ploof*, 71 A. at 189.

[53] Epstein, *supra* note 6, at 2111–20.   **R**

[54] *E.g.* Act of July 3, 1868, ch. 20, § 3, 1868 N.H. Laws 152, 152–53; *see also* Head v. Amoskeag Mfg. Co., 113 U.S. 9, 10 n.* (1885) (quoting New Hampshire mill act). *But see* John F. Hart, *The Maryland Mill Act, 1669–1766: Economic Policy and the Confiscatory Redistribution of Private Property*, 39 AM. J. LEGAL HIST. 1, 4 (1995) (noting that 1669 Maryland mill act authorized transfer "for compensation that was below the value of the land").

[55] Ayres & Balkin, *supra* note 30, at 742 ("The legislature might have believed that the   **R** average upstream landowner (who has not sold her house) has an average value which is fifty percent above the market price."). Epstein argues that the statute ensures that in the usual case only farmland, not houses, would be flooded. Epstein, *supra* note 6, at 2115.   **R**

[56] Epstein, *supra* note 6, at 2114.   **R**

[57] John F. Hart, *Land Use Law in the Early Republic and the Original Meaning of the Takings Clause*, 94 Nw. U. L. REV. 1099, 1116 (2000). The New Hampshire mill act in *Head v. Amoskeag* appears to be of this second type. *Head*, 113 U.S. at 10–11.

[58] Hart, *supra* note 57, at 1116.   **R**

property and liability rule protection, and liability rule protection is a grudging exception.

Likewise, the liability rule literature could cite various private eminent domain–like mechanisms prevalent in western states, but these too are highly circumscribed. The high stakes involved in water rights led states to adopt statutes granting those with insufficient stream access easements for ditches to streams over intervening land. From early on, liability rule protection for the owner of the servient estate has been common; the irrigator has to pay for damage caused by the ditches through the servient land.[59] But these regimes are not pure take-and-pay court-administered liability rules; prior application to officials, hearings, bonds, and compensation are required.[60] Similarly, because of the "checkerboard" method by which the federal government disposed of lands,[61] easement-by-necessity doctrines giving landlocked owners nonconsensual access through neighboring private lands are common in the western United States, but here too institutional safeguards as well as compensation requirements apply.[62] (By contrast, the more familiar doctrine of easement by private necessity in eastern states only applies between parcels that were once

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[59] *E.g.* Act of Nov. 5, 1861, §§ 5–7, 1861 Colo. Sess. Laws 67, 68. Note that in the Idaho statute quoted in note 60 *infra*, the safeguards of eminent domain are incorporated by reference to the law of eminent domain. The Wyoming statute, also quoted in note 60, *infra*, incorporates the elaborate procedural safeguards and compensation requirement of the procedure for opening private roads. **R** **R**

[60] *See, e.g*., IDAHO CODE § 42-1106 (Michie 2003) ("In case of the refusal of the owners or claimants of any lands, through which any ditch, canal or conduit is proposed to be made or constructed, to allow passage thereof, the person or persons desiring the right of way may proceed as in the law of eminent domain."). For example, Wyoming law provides that:

> Upon the presentation of a petition signed by at least five (5) freeholders of any neighborhood, praying for passage to any watercourse for the purpose of watering livestock, or for the convenient access to timber, the board of county commissioners may, in their discretion, establish such water or timber way as provided in W.S. 24-9-101 through 24-9-103 relating to the opening of private roads.

Wyo. Stat. Ann. § 24-9-104 (Michie 2003).

[61] The checkerboard pattern results from federal grants of alternate 640-acre sections of the public lands to various private and state parties, notably from federal grants to railroads of over 100 million acres between 1850 and 1872. The railroads received the odd-numbered sections and the United States retained the even-numbered sections, leading to acute access issues today. *See, e.g.*, Act of July 1, 1862, ch. 120, § 3, 12 Stat. 489, 492 (granting land to Union Pacific Railroad); Leo Sheep Co. v. United States, 440 U.S. 668, 672–77 (1979) (recounting history of railroad land grants); PAUL W. GATES, PUB. LAND LAW COMM'N, HISTORY OF PUBLIC LAND LAW DEVELOPMENT 357–68, 371–80 (1968) (same).

[62] *See, e.g.*, WYO. STAT. ANN. §§ 24-9-101, 24-9-103 (Michie 2003); *see also Leo Sheep Co.*, 440 U.S. at 679–80 & n.16 (discussing law of easement by necessity and "private" eminent domain in western states).

united and so governs relations between a grantor and his successors on the one hand and a grantee and his successors on the other, as a default rule in a situation already governed by contract.[63]) Both the mill acts and the western easement–liability rule regimes are narrowly tailored to situations of high hold-out potential and are subject to elaborate safeguards for the benefit of the owners of the proposed servient land.

Another almost forgotten example of exceptional but limited replacement of property rules with liability rules is the regime governing farmer-miner conflict in mid-nineteenth-century California.[64] Would-be gold miners often entered agricultural land and discovered minerals. Although these disputes occurred on public lands, the policy at the time called for disposition to private parties. (Most of the lands had not yet been classified as mineral or nonmineral; if they had been classified as the former, then agriculturalists would have had no right to claim them under the state Possessory Act of 1850.)[65] The farmers could argue that, in the common law, first in time is first in right, and that they had invested in valuable improvements.[66] On the other hand, the miners could argue that mining—even the chance of finding minerals—was more important than farming in the area, and at first the California Supreme Court (to which Justice Field was not yet appointed) agreed.[67] As a compromise, the California Legislature passed the Indemnification Act of 1855, which allowed miners to enter and search for minerals and pay for any damage—a liability rule regime.[68] But, as in many of the mill acts and western provisions for

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[63] *See, e.g.*, Goulding v. Cook, 661 N.E.2d 1322, 1323–25 (Mass. 1996) (holding that court could not order one landowner to grant another easement for compensation because this would amount to private eminent domain). On easements by necessity in grantor-grantee situations, see, for example, *Hollywyle Ass'n v. Hollister*, 324 A.2d 247 (Conn. 1973), and 4 RICHARD R. POWELL, POWELL ON REAL PROPERTY § 34.07 (Michael Allan Wolf ed., 2004).

[64] *See generally* Charles W. McCurdy, *Stephen J. Field and Public Land Law Development in California, 1850–1866: A Case Study of Judicial Resource Allocation in Nineteenth-Century America*, 10 LAW & SOC'Y REV. 235 (1976).

[65] The Possessory Act, like the Homestead Act, permitted settlers to occupy up to 160 acres of public lands but forbade settlement upon mineral bearing land. Act of Apr. 11, 1850, ch. 83, §§ 1–2, 1850 Cal. Stat. 203, 203. This provision was amended in 1852 to allow miners to prospect on agricultural land. Act of Apr. 20, 1852, ch. 532, § 1, 1852 Cal. Stat. 158, 158–59; *see* McCurdy, *supra* note 64, at 246.   **R**

[66] *See* McCurdy, *supra* note 64, at 247–48.   **R**

[67] McClintock v. Bryden, 5 Cal. 97, 101–02 (1855) (equating "interests of the people" with interests of "the mining public").

[68] Act of Apr. 25, 1855, ch. 119, § 2, 1855 Cal. Stat. 145, 145. McCurdy notes that "[t]he Indemnification Act had ample precedent in French and Spanish, if not in Anglo-American law," but also notes that on the continent the state owned subsurface precious metals. McCurdy, *supra* note 64, at 249 & n.72.   **R**

easements by necessity, the California legislation required prior approval from a justice of the peace.[69] Even this protection was not enough for Justice Field and other California Supreme Court justices, who were alarmed by the potential destabilizing effects of the quasi–liability rule system on the general property regime. After construing the Act as narrowly as possible, they finally held it invalid in the 1860 case of *Gillan v. Hutchinson*.[70]

There are (at least) two stories that could be told about this episode, one about rent-seeking and another about efficiency.[71] From the former perspective, the miners were a very organized lobby group that sought and gained rents in the legislative arena, which were later lost in the courts. In striking down the legislation, the court was representing the public interest in a stable property system or responding to the needs of other property owners, and farmers in particular. Alternatively, to be more optimistic about the legislation, one might argue that California in the 1850s was exceptional in that it was abundantly clear that mining was generally the highest-value use of land. The liability rule legislation then indeed would function as a temporary transaction-cost-lowering device. (One might even search for some evidence that farmers were working the land in order to gain the hold-out power.) But, as information improved as to which lands were likely to contain minerals, general norms of property protection reasserted themselves. No doubt a variety of factors played a role here, but the fate of this legislation in the hands of Justice Field and the California Supreme Court only underscores the exceptional status of liability rule regimes in the law. That this particular regime is largely forgotten and never served as much of a precedent for other conflicts over land use also reinforces this point.

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[69] The Indemnification Act provided that:

> Whenever any person, for mining purposes, shall desire to occupy or use any mineral lands of this State, then occupied by . . . improvements, [or] property of another, such person shall first give bond to the owner of the . . . improvement[s], to be approved by a Justice of the Peace of the township . . . in a sum to be fixed by three disinterested citizens . . . .

[70] § 2, 1855 Cal. Stat. at 145.

16 Cal. 154, 157 (1860); *see* McCurdy, *supra* note 64, at 250–51 (discussing California   **R**
Supreme Court's narrow interpretation and eventual invalidation of Indemnification Act).

[71] *See, e.g.*, Saul Levmore, *Two Stories About the Evolution of Property Rights*, 31 J. LEGAL STUD. S421 (2002) (arguing that virtually any transition to or from private-property regime can be explained by either optimistic transaction-cost-lowering story or competing suspicion-inducing interest-group story); *see also* Stuart Banner, *Transitions Between Property Regimes*, 31 J. LEGAL STUD. S359, S369–71 (2002) (arguing that oligarchs are in position to overcome obstacles in way of transitions between property regimes, and why this would or would not tend toward efficiency).

Property scholars have advanced a number of justifications for property rules that reflect the same traditional concerns about stability of ownership and incentives to invest that concerned the Field court. Richard Epstein argues that any rule system must balance the opposing risks of undercompensation and hold-out behavior, and that in practice the undercompensation concerns usually outweigh the hold-out problem. If so, this would account for the widespread use of property rules.[72]

Carol Rose also presents a defense of property rules by pointing out that different areas of the law, and property in particular, call for different treatment in terms of liability and property rules.[73] She argues that the implicit motivating example—the "shadow" paradigm—in the liability rule literature is the law of accidents and the law of contracts.[74] Property rules tend to be associated with property, and liability rules do not adequately protect the incentives for planning and investment.

Rose distinguishes between two types of transaction costs. Type I transaction costs are the costs of finding and assembling the large or indefinite class of potentially interested parties, and Type II transaction costs are the costs of bargaining, such as strategic behavior.[75] One branch of the liability rule literature focuses on Type II costs, but there may be antecedent costs in just setting up the bargaining problem. To this we might add that the entitlements—and liability rule versus property rule is part of the contour of the entitlement—will present a more or less costly message to those who must respect the right.[76] Note that the class Rose identifies in her Type I transaction-cost situation as "numerous or indistinctly definite" corresponds well with the characteristics of in rem dutyholders.[77] Property is an in rem right and the need of third parties—potentially the "rest of the world"—to incur information costs in dealing with these rights will be an argument for keeping them simple and standardized.[78] As I will argue, property rules do a better job of that.

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[72] Epstein, *supra* note 6, at 2094–95.   **R**

[73] Rose, *supra* note 6, at 2176–77, 2179–80, 2187.   **R**

[74] *Id.* at 2187, 2196–97.

[75] *Id*. at 2184.

[76] *See infra* notes 173–74 and accompanying text.   **R**

[77] *See* Thomas W. Merrill & Henry E. Smith, *The Property/Contract Interface*, 101 COLUM. L. REV. 773, 783–86 (2001) (breaking notion of in rem legal relation into elements of numerosity and indefiniteness of dutyholders).

[78] *See* Thomas W. Merrill & Henry E. Smith, *Optimal Standardization in the Law of Property: The* Numerus Clausus *Principle*, 110 YALE L.J. 1, 24–42 (2000); Merrill & Smith, *supra* note 77, at 799–809.   **R**

B. *The Case for Liability Rules*

In their article, Calabresi and Melamed went beyond classifying remedies and proposed some criteria for choosing between property rules and liability rules. They suggested that property rules are superior where transaction costs are low and liability rules are preferred where transaction costs are high; this has been the traditional approach taken in law and economics.[79] Recently many commentators have questioned this division of labor and have pointed to the advantages of liability rules even where bargaining is feasible. I will call this more pro–liability rule position the "modern" one.

Underlying the traditional emphasis on property rules in situations of low transaction costs, first articulated by Calabresi and Melamed and prevalent until the 1990s, is a preference for voluntary transactions; liability rules are a substitute for prices where transactions are too costly.[80] Of course, if the administrative costs of a liability rule also outweigh the benefits, then the liability rule is not warranted.[81] Consider a situation in which a transfer of an entitlement (or a piece of an entitlement) would produce a gain of $100, say because the asset is worth $100 more in *B*'s hands than in *A*'s. Then any institutional arrangement that can capture the $100 benefit at a cost of less than $100 would potentially increase efficiency. The traditional view recognizes two methods by which this might occur: (i) a voluntary transaction between *A*, whose entitlement is protected by a property rule, and *B*, who pays a price in a consensual transaction of up to $100 minus the costs of transacting, and (ii) a taking from *A*, whose entitlement is protected by a liability rule, by *B*, who pays the officially determined compensation to *A*. This compensation might be derived from the market price of *A* in some other context or from some estimate of harm to people like *A*. Again, on the traditional view, the choice between (i) and (ii) turns largely on the level of transaction costs; when they are low there is no need for a court to determine a "price" for the taking because the parties will bargain to one anyway.

The modern view challenges this picture in several respects. First, it questions whether property rules are superior where transaction costs are low. Why wouldn't *A* and *B* negotiate in the shadow of the

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[79] *See supra* note 3 and accompanying text.   **R**

[80] *See supra* notes 2–3 and accompanying text.   **R**

[81] Courts' determinations of damages may be costly in just those situations in which transaction costs for a voluntary exchange would be high. *See* Krier & Schwab, *supra* note 5, at 453–54.   **R**

liability rule?[82] At least *A* would not be able to hold out as easily under the liability rule because *B* could take and pay the officially determined damages. More generally, liability rules may force one party to reveal something about its valuation, thereby alleviating problems of asymmetric information.[83] The modern liability rule literature further complicates the traditional approach by placing liability rules and property rules on a spectrum based on the level of the "compensation" to *A*.[84] Liability rules with more than market-level damages may be appropriate to compensate for subjective value in thin market settings. The term "property rule" then comes to be associated with very high levels of liability and injunctions that prevent all or nearly all involuntary takings.

The question then becomes what level of damages is appropriate in order to give the correct ex ante incentives and achieve allocative efficiency. Louis Kaplow and Steven Shavell, building on work by A. Mitchell Polinksy, argue that liability rules are generally superior if compensation is pegged at average harm to victims.[85] As long as the harm to *A* is not correlated with the benefit to *B*, and a court's estimate of the average harm to those in *A*'s position is not systematically biased, then making *B* face the average harm will get *B*'s incentives exactly right. Kaplow and Shavell conclude that liability rules are superior to property rules "on average . . . regardless of how imperfect the state's information is about harm or prevention cost."[86] Also, in Kaplow and Shavell's view, the need to estimate average harm is not a significant barrier to using liability rules. They believe that this can be done with minimal information, and, as long as there is no systematic bias, the *B*s of the world will expect the average damage award to be equal to the average harm of victims and will act efficiently.[87]

One great attraction of this result is that it would appear that, informationally, liability rules must be superior to property rules. In what I have termed elsewhere the "information subset" argument, liability rules on this account require only a subset, most probably a

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[82] *See generally* Ayres & Talley, *supra* note 5, at 1032; *see also* Ian Ayres & Eric Talley, **R** *Distinguishing Between Consensual and Nonconsensual Advantages of Liability Rules*, 105 Yale L.J. 235 (1995); Louis Kaplow & Steven Shavell, *Do Liability Rules Facilitate Bargaining? A Reply to Ayres and Talley*, 105 Yale L.J. 221 (1995). For an argument that liability rules can be less efficient because they remove the incentives that harsh property rules gives parties to bargain cooperatively, see Krier & Schwab, *supra* note 5, at 464. **R**

[83] Ayres & Talley, *supra* note 5, at 1032. **R**

[84] *See* Kaplow & Shavell, *supra* note 5, at 756–57. **R**

[85] *See id.* at 727–28, 776–79; *see also* Polinsky, *supra* note 5, at 24–30; Polinsky, *supra* **R** note 43, at 1093–95, 1100–02. **R**

[86] Kaplow & Shavell, *supra* note 5, at 727 (emphasis omitted).

[87] *See id.* at 728, 776–79.

proper subset, of the information that property rules require.[88] On the information-subset argument, to decide whether *A* or *B* should get property rule protection one must know which party values the entitlement more, which will often require one to know both their values.[89] By contrast, with liability rules, one need know only the average harm of the victim and then can let the potential tortfeasor compare the potential damages he would have to pay with the benefits of the taking (or refraining from taking). If the average damages for a person like *A* are $60, then *B* will take if and only if *B*'s value exceeds $60 and not otherwise.

But the information-subset argument does not hold if the property rule can be based on rougher information than the liability rule, although Kaplow and Shavell seem to discount this possibility in an empirical guess.[90] The information-subset argument also assumes a static world and fails in a dynamic world in which parties can change their activities to avoid the costs of liability rules. In such a dynamic world, it is possible that takers can anticipate and respond to the informational factors that a court will use to value an entitlement, in order to make damages appear to be less than they really are. And if takers are able to do this more easily under the liability rule than under the corresponding property rule, the property rule can come out ahead.[91] Once again, the responsiveness of various kinds of behavior is an empirical matter.

Nevertheless, Kaplow and Shavell recognize that liability rules are not as widespread as their information-harnessing result implies they ought to be. They develop two exceptions to the pro–liability

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[88] *See* Smith, *supra* note 6, at 684–86. Kaplow and Shavell make what I call the "information-subset argument" in response to the possible objection that courts may not have enough information on average harm for the liability rule and that the property rule avoids the need for this estimate:

> But this view is specious. It ignores the fact that a court must make some estimate of harm in selecting which property rule to apply: to decide whether it is victims or injurers who are to be accorded property rule protection, courts must determine whether the harm or the prevention cost is greater, which requires that the court estimate both. Whatever the court's estimate of harm is, the same estimate can be used to set damages under a liability rule. And, as we have explained at length, this rule will be superior to a property rule based on the same information (essentially because errors in estimating harm plague both rules but errors in estimating prevention costs hinder only property rules).

Kaplow & Shavell, *supra* note 5, at 729 (citation omitted).

[89] For the view that it may not, see, for example, Brooks, *supra* note 6, and Smith, *supra* note 6, at 685–86.

[90] Kaplow & Shavell, *supra* note 5, at 729 n.49.

[91] *See* Smith, *supra* note 6, at 686–96 (arguing that when quality is variable, informational-subset argument favoring liability rules no longer holds).

rule prescription, which lead to what might be termed an "interme-diate" position that retains elements of the traditional view. They make an empirical claim that liability rules tend not to be used to protect tangible assets.[92] They ask why the information-harnessing of the average-expected-harm approach to liability rules does not work well in general for tangible assets, as opposed to intangible rights such as their canonical example of rights to pollute or to be free from pollu-tion. They assert that tangible assets are not protected by liability rules because of the problems of repeated, reciprocal takings and cor-related values.[93] Multiple or reciprocal takings can arise when A and B both value the asset more than the average. If the average harm to people like A is $50 but A's actual value is $75, then a B with a value of $60 will take even though the asset should remain in A's hands. A might then respond by taking from B, and B from A, etc. This will often be possible in the case of tangible assets if they have not been consumed yet and many potential takers have access to the thing.[94] By contrast, in the pollution case when B "takes" A's entitlement, A may not be in any position to physically take it back and only one or a few potential takers are in a position to take.

Kaplow and Shavell's second qualification is that liability rules break down in the face of common or correlated values, which tan-gible assets, in their view, often present.[95] If A and B value the asset for the same reasons, then the harm to A and the benefit to B will be correlated and the average-harm principle will lead to too much taking. Thus, the intermediate position tries to explain the prevalence of property rules for protecting entitlements to tangible assets on the grounds that wasteful multiple takings and excessive takings based on correlated values will dissipate the general information-harnessing advantages of liability rules.[96] In the presence of correlated values and multiple takings, owners' incentives to invest in assets will be diminished, thus capturing part of the traditional concern among property theorists with the need for security and the ability to reap where one has sown.[97]

It should be noted that Kaplow and Shavell's intermediate posi-tion does not extend as far as traditional property theory—or as the

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[92] *See* Kaplow & Shavell, *supra* note 5, at 758, 771–74.   **R**
[93] *See id.* at 767–68.
[94] *Id.* at 759–63.
[95] *Id.*
[96] *Id.* at 762.
[97] *Id.* at 765–77; *see also* Lucian Arye Bebchuk, *Property Rights and Liability Rules: The Ex Ante View of the Cathedral*, 100 MICH. L. REV. 601, 619–32 (2001) (showing that in comparison to traditional liability rules, property rules can induce under- or over-invest-ment ex ante); *infra* note 109.   **R**

information cost theory presented below—would suggest. For Kaplow and Shavell, the things rightly protected by property rules are tangible things, as opposed to "externality" problems and intangible entitlements. Traditional property theory would not draw such a sharp distinction between intangible externalities and conflicts over tangible things.[98] A pollution nuisance interferes with the victim's right to a thing—her land. As I argue elsewhere, the law of nuisance is not the free-floating balancing of uses implemented by liability rules that the Kaplow and Shavell analysis and other liability rule proposals would suggest.[99] Furthermore, the opportunism problem identified by Kaplow and Shavell is too limited; it puts great weight on the possibility of multiple takings, which they believe do not generally occur in the "externality" context.[100] I will argue, however, that the problem of opportunism is a general one that includes a risk of extortion by even a single potential taker,[101] and that the exclusion strategy plays an important role in protecting owners from such opportunism. More generally, I will argue that our talk of "things" is epiphenomenal to a delegation of use-choice to owners through the exclusion strategy, making the property rule approach more widely applicable than Kaplow and Shavell are willing to concede: In ordinary legal discourse we speak of things and rights to them when, partly for reasons of information costs, we have chosen to employ the exclusion strategy rather than a governance strategy focused on activities and "externalities."

Another instability in the intermediate pro–liability rule position is that more recently commentators have questioned this intermediate position by showing that properly tailored damages can avoid the problems with both multiple takings and correlated values. One way around the problem of multiple takings is to have the liability rule protecting *A* be protected in turn with another liability rule with a higher "exercise price." According to Ian Ayres and J.M. Balkin, the takings and retakings will not go on indefinitely but will produce ever-better information about values.[102] The retakings will stop once one party, in our example *A*, values the entitlement more. In effect, the system of takings and retakings works as an auction, and it is an empirical question whether this mechanism is worth its cost. Ayres

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[98] Smith, *supra* note 4, at 999–1000 (describing more- and less-tangible invasions and harms); *see also* Rose, *supra* note 6, at 2188–97 (noting common value problem in common pool externalities).   **R** **R**

[99] Smith, *supra* note 4.   **R**

[100] Kaplow & Shavell, *supra* note 5, at 771–73.   **R**

[101] *See infra* Parts III.A–B.

[102] Ayres & Balkin, *supra* note 30, at 709–14.   **R**

and Balkin, like Kaplow and Shavell, are optimistic that administrative costs will not be so high as to make their scheme unrealistic.[103]

Turning to the claim about correlated values, Ian Ayres and Paul Goldbart argue that Kaplow and Shavell are mistaken about correlated values because they did not consider a wide enough range of tailored liability rules.[104] Kaplow and Shavell did suggest a couple of alternatives, such as damages of shared value plus average idiosyncratic value, but they did not pursue the matter.[105] Ayres and Goldbart show that property rules are less efficient than a rule of damages set at the mean expected victim value conditional on taker's actual value at the point where this conditional mean equals taker's actual value.[106] This is an extension of Kaplow and Shavell's expected average harm approach in that the new Ayres and Goldbart rule reduces to an average-victim-harm rule in the special case of uncorrelated values.[107]

One theme that emerges from the pro-liability literature is its heavy reliance on the ability of actors—takers, takees, and officials—to collect information about the distribution of values and to estimate averages. If the resulting averages are not biased, ex ante efficiency can be ensured if actors face liability based on these averages. Put differently, proponents of liability rules assume that the estimated averages for purposes of damages will be equal to the expected values that primary actors should act on. If so, everyone will have efficient incentives ex ante and property rules cannot improve on matters; indeed, they can only make things worse. If actors can correctly ascertain probability information about payoffs, then an inability to gather other information does not prevent the optimal result from being reached.

This pro–liability rule position is meant to defuse the defenses of property rules. To the concern about investment incentives, a pro–liability rule commentator might respond that there is no reason that investment cannot be protected by a liability rule. Pro–liability rule commentators also tend to disagree with those in the pro–property rule camp on the relative magnitudes of both the hold-out and undercompensation problems. First, they see widespread problems of strategic behavior, including holding out and the withholding of private information.[108] Further, the pro–liability rule com-

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[103] *Id.* at 733–36.
[104] Ayres & Goldbart, *supra* note 3.   **R**
[105] Kaplow & Shavell, *supra* note 5, at 762 n.157.   **R**
[106] Ayres & Goldbart, *supra* note 3, at 134–39.   **R**
[107] *Id.* at 136.
[108] *See* sources cited *supra* note 5.   **R**

mentators do not see any principled reason why liability rules should be undercompensatory. In particular, incentives would not change on an expected basis if the average expected harm rule or one of the more sophisticated variants were used in place of the law's present undercompensatory objective-market-damages approach. In a conflict between *A* and *B* over a resource, if *A* is the owner and has invested in the asset, to the extent possible damages should reflect the efficient level of investment by *A*.[109] More particularly, by giving damages measured in the amount of average harm (or based on Ayres and Goldbart's more elaborate conditional average expected victim value) investment can be built into the notion of value. If the level of damages is the correct one, then ex ante investment incentives will be neither too great nor too small. A very analogous debate has raged in the patent literature, where many commentators have argued that protecting a patent holder's entitlement with a liability rule—through forced buy-outs or compulsory licensing—can give the correct incentives to invest resources in producing and commercializing inventions.[110]

As in the patent context, I will argue that these critiques of the property rule paradigm miss something.[111] In a world in which uses were known (or at least their average values were known), we might

[109] Lucian Bebchuk analyzes the ex ante incentives for investment of property rules and liability rules. Bebchuk, *supra* note 97. Bebchuk does not include the more tailored damages considered by Ayres and Balkin, *supra* note 30, Ayres and Goldbart, *supra* note 3, at 134–39, or Avraham, *supra* note 5. Further, from the present point of view, Bebchuk's article, like the rest of the liability rule literature, treats property as a list of use rights and the conflict between A and B as one of two preselected uses. But on the traditional understanding, property reflects a decision—ex ante to Bebchuk's ex ante—to delegate the choice among an indefinite set of uses to the owner. As I will show, this second-order choice of the chooser has to be protected by a property rule. *See infra* Part III.A.

[110] *See, e.g.*, LAWRENCE LESSIG, THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD (2001); Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 Q.J. ECON. 1137 (1998). *But see, e.g.*, F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697 (2001) (arguing that commercialization function requires property rule protection for patents). Interestingly, the most well-developed proposals for patent prizes explicitly rest on the notion that those who might engage in innovation will face an unbiased, ex ante, corrected expected reward. *See* Michael Abramowicz, *Perfecting Patent Prizes*, 56 VAND. L. REV. 115, 123–24 (2003); Steven Shavell & Tanguy van Ypersele, *Rewards versus Intellectual Property Rights*, 44 J.L. & ECON. 525, 534–35 (2001). This result is vulnerable, however, to actors' abilities to anticipate and manipulate the criteria used by officials to value inventions, in a way I discuss in Part III.B *infra*. For a discussion of compulsory licensing in other countries' patent systems and the general lack of compulsory licensing in U.S. patent law despite numerous proposals, see Joseph A. Yosick, *Compulsory Patent Licensing for Efficient Use of Inventions*, 2001 U. ILL. L. REV. 1275.

[111] *See* Henry E. Smith, Intellectual Property as Property: An Information Cost Approach (Feb. 7, 2004) (unpublished manuscript) (on file with *New York University Law Review*).

expect the law to rely a great deal more on liability rules than it does. But in our world, even specifying uses and gathering them into appropriate "classes" for purposes of averaging is a complex and costly task. These difficulties lead directly to the information-cost advantage of property rules.

There is a tension between the assumption that actors can use probability distributions on the one hand and positive transaction costs on the other.[112] In particular, dividing the world up into "classes" for actuarial purposes is an example of transaction costs in the broad sense.[113] Resources must be consumed to produce this kind of information, and actors—owners, potential takers, and officials— may differ systematically in their ability to produce this information.

In the following section, I will argue that, in suppressing this actuarial dimension of the information problem, the pro–liability rule literature is correct on its own terms but misses important advantages of property rules, advantages that allow us to explain why property rules are so prevalent. In particular, I will question the assumptions that an official's task is to evaluate preselected uses and that the values of these uses can be treated in sensible actuarial classes with nonbiased averages. Instead, property rules will be advantageous precisely where the set of relevant uses is indefinite and actors differ in their ability to generate information, actuarial or otherwise, about those assets.

C.   *Three Aspects of Remedies*

Although most of the law-and-economics literature speaks of property rules and liability rules as alternatives for defining and protecting entitlements, there are actually several related distinctions between more robust and less robust remedies. These include (i) how strong the remedy is, (ii) what shape describes the overall function from activity levels to liability levels, and (iii) whether the "unit of concern" of the regime is prices or quantities. These three aspects are related to each other, but distinguishing them will set the stage for a theory of the advantages of property rules.

The literature on property rules versus liability rules mostly focuses on the first of our three questions, the robustness of the

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[112] Maskin and Tirole point out a similar tension in the incomplete-contracts literature between the assumption of positive transaction costs and the assumption that parties are able to perform dynamic programming. *See* Eric Maskin & Jean Tirole, *Unforeseen Contingencies and Incomplete Contracts*, 66 REV. ECON. STUD. 83, 84 (1999).

[113] For an argument that transaction costs are better defined as the costs of establishing property rights (in the economist's sense) rather than narrowly as the costs of exchange, see Douglas W. Allen, *What Are Transaction Costs?*, 14 RES. L. & ECON. 1 (1991).

remedy and its consequences for the probability of consensual versus nonconsensual transactions. According to Calabresi and Melamed's original definition, a property rule is designed to force a potential taker to pay what the owner asks in a consensual transaction, whereas liability rules give the taker an option to take and pay officially determined damages.[114] Usually these damages are designed to mimic a hypothetical market price, but they may be pegged at average harm or some other nonpunitive level.[115]

Property rules and liability rules are properly thought of as different ways of defining the scope of entitlements in the domain of transfer, rather than simply as "remedies" protecting entitlements.[116] But property rules and liability rules do tend to be associated with different remedies, which can be distinguished as prices or sanctions. Robert Cooter uses "price" to refer to a payment that must be made to do something permitted, and "sanction" to refer to a payment or other punishment for doing what is not allowed.[117] Because a nonconsensual taking is prohibited under a property rule but allowed by a liability rule, it is no surprise that property rules are backed by sanctions and liability rules by prices.

But Cooter also usefully distinguishes sanctions and prices based on an answer to the second of the three questions above—what shape the liability function takes. Actors may face different levels of liability for different levels of activity. One way to distinguish different liability functions is to focus on their shape.[118] Some liability regimes impose a continuously increasing level of liability for increasing levels of harmful activity, and Cooter identifies these as prices.[119] Other rules, including the sanction rules that prohibit a wrongful act, are

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[114] *See* Calabresi & Melamed, *supra* note 1, at 1092. **R**

[115] Kaplow & Shavell, *supra* note 5, at 756–57. **R**

[116] *See* Jules L. Coleman & Jody Kraus, *Rethinking the Theory of Legal Rights*, 95 YALE L.J. 1335, 1345 (1986) (arguing that property, liability, and inalienability rules are usefully viewed as mathematical functions ultimately specifying content of entitlement over domain of transfer); Dale A. Nance, *Guidance Rules and Enforcement Rules: A Better View of the Cathedral*, 83 VA. L. REV. 837, 840–41 (1997) (arguing that traditional formulation of distinction between property rules and liability rules conflates guidance and enforcement rules); Jeanne L. Schroeder, *Three's a Crowd: A Feminist Critique of Calabresi and Melamed's* One View of the Cathedral, 84 CORNELL L. REV. 394, 412–17 (1999) (providing feminist critique of view that liability rules and property rules are alternate methods of protecting same entitlement).

[117] Robert Cooter, *Prices and Sanctions*, 84 COLUM. L. REV. 1523, 1524–25 (1984); *see also* GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS 68–69 (1970) (outlining scheme of price-like specific deterrence and sanction-like general deterrence).

[118] *See* Cooter, *supra* note 117, at 1525–31. **R**

[119] *See id.* at 1528.

associated with a bent curve; liability takes a jump at a certain level of activity.[120]

Consider a case of prices, which impose a continuously increasing private cost on the actor that corresponds to the external harm, thereby internalizing it to that actor. The price allows individuals to perform the relevant cost-benefit analysis, and officials need to know the external cost of the activity but not the optimal level of the activity. Strict liability in tort and Pigovian taxes both are systems of (nonmarket) prices. Sanctions, by contrast, impose a cost described by a bent function; the private cost to the actor jumps at the point where behavior fails to meet the standard. Sanctions are best employed where the standard of proper behavior is known but the level of external harm is not.[121] The use of the sanction (or a subsidy) with a jump will also be favored where the choices involved are discontinuous and the rulemakers know which of the discontinuous choices is better.[122] The remedies for trespass, including punitive damages and injunctions, are sanctions that kick in only when a boundary has been crossed. Many pollution regulations involve fines for exceeding a certain level of emissions. Even the negligence standard in tort is associated with a sanction because actors can escape liability by exercising reasonable care; once care falls below that standard, actors suddenly become liable for victims' injuries.[123]

In addition to the different shapes of their cost functions, prices and sanctions are distinguished to a lesser extent by the level of damages: Sanctions sometimes involve supracompensatory remedies, even on an expected basis, whereas prices set damages equal to harm.[124] Consider a supracompensatory remedy, which is what will be associated with a property rule. If those meeting the standard defined

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[120] *See id.* at 1526–27.

[121] For example, this can be true when a community standard has developed. *Id.* at 1532–37.

[122] *Cf. id.* at 1548–50 (adapting model to criminal laws aimed at discontinuous choices with optima at corners).

[123] *Id.* at 1538–40.

[124] If the probability of detection is less than 100% then to get the correct price on an expected basis one would have to divide the compensatory damage level by the probability of detection. *See, e.g.*, Robert D. Cooter, *Punitive Damages for Deterrence: When and How Much?*, 40 ALA. L. REV. 1143, 1149–66 (1989); Dorsey D. Ellis, Jr., *Fairness and Efficiency in the Law of Punitive Damages*, 56 S. CAL. L. REV. 1, 25–26 (1982); A. Mitchell Polinsky & Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARV. L. REV. 869, 887–96 (1998); *see also, e.g.*, POSNER, *supra* note 43, at 77–78; Jeremy Bentham, *Principles of Penal Law*, *in* 1 THE WORKS OF JEREMY BENTHAM 365, 401–02 (John Bowring ed., 1962); Keith N. Hylton, *Punitive Damages and the Economic Theory of Penalties*, 87 GEO. L.J. 421, 423 (1998) (arguing that multiplier approach is appropriate when offender's gain probably exceeds victim's loss, but that otherwise damages should aim to remove offender's gain).

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in the rule are charged zero, and those not meeting the standard are charged a supracompensatory amount, then by definition we have what Cooter would call a sanction; the costs imposed on actors must take a jump. In the case of liability rules, liability can jump from zero to the value of the harm (as in negligence), or it can rise continuously along with marginal harm (as in strict liability).

Closely related to the shape of the liability function is the third question above, the informational focus of the liability regime. Cooter points out that prices require knowledge of marginal harm whereas sanctions require knowledge of the standard of behavior.[125] The liability rule literature also addresses this question when it speaks of information harnessing: Under liability rules, courts are said not to need to know the right level of an activity but only the external harm (or some more sophisticated variant).[126] This concern about the information required for legal regimes surfaces very explicitly in the environmental-economics literature where the problem is whether to couch rules in terms of "prices" or "quantities."[127] Property rules and sanctions will thus require different information from that needed for liability rules and prices. Liability rules and prices often require signals or proxies that measure marginal harm, whereas property rules and sanctions depend on signals that correlate with a standard of behavior. For this reason, rules of access (exclusion) are property rules backed up by sanctions; the signals involved in defining property rights on the basis of access are not related to the marginal value of harm but are closer to being binary. Does the actor have permitted access or not?[128] By contrast, use rules (governance) employ signals related to activities and actors. These may relate to level of harm or they may define a standard of proper use that does not tell us directly about the level of harm. Thus, governance rules may be associated either with liability rules and prices or with property rules and sanctions.

Nonetheless, the creation of more detailed use-based rules may be complementary to gathering information about marginal harm, so

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[125] Cooter, *supra* note 117, at 1532–37.   **R**

[126] *See supra* notes 90–91 and accompanying text.   **R**

[127] *See, e.g.*, Martin L. Weizman, *Prices* vs. *Quantities*, 41 REV. ECON. STUD. 477 (1974) (presenting model of when regulation in terms of prices or quantities will be superior, and finding quantity regulation to be superior in some circumstances of uncertainty); Gary W. Yohe, *Towards a General Comparison of Price Controls and Quantity Controls Under Uncertainty*, 45 REV. ECON. STUD. 229 (1978) (extending Weitzman model to incorporate distortions in output); *see also* WILLIAM J. BAUMOL & WALLACE E. OATES, THE THEORY OF ENVIRONMENTAL POLICY 21–35, 42–47 (2d ed. 1988) (discussing optimal pricing of externalities).

[128] *See* Robert C. Ellickson, *Property in Land*, 102 YALE L.J. 1315, 1327–28 (1993).

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we might expect some tendency for detailed governance rules to be associated with liability rules and prices.[129] With a price, actors are in equipoise with respect to costs; each actor must find where marginal benefit equals marginal cost (including liability). By contrast, cruder signals (informational variables, proxies), which characterize delineation strategies—toward the exclusion end of the spectrum—tend to be backed up with sanctions rather than prices. Crude variables will bunch a lot of attributes in an all-or-nothing way; monitoring for the zero-level of attribute A is likely to be complementary to monitoring for the zero-level of attribute B. For example, in the case of a plot of land one can monitor an actor's location as being inside or outside a fence and can thereby simultaneously ensure zero-level use of soil nutrients, standing crops, the drainage properties of the soil, etc. Situations in which a single measured variable picks out the optimal amount of various uses—say fifty units of soil nutrients and twenty-three square feet of surface area—are not as likely.[130] If a user takes both soil nutrients and surface area as inputs into his or her consumption or production, then a rule that aims for nonzero-level of use would either have to prescribe the optimal use of the two attributes at once (perhaps by using two separate signals) or else there will be substitution and distortion among the uses. Also, if the harm from using the attributes changes over time but not in tandem, then the signals employed will have to adjust to two changes. This is difficult for the precise variable in a system aiming at a nonzero-level.

But a rough signal aiming at a zero-level can be backed up by a sanction, which will not need to be changed as the level of harm changes. Instead the owner can adjust among the uses; a single central nervous system can engage in the substitutions and will face the full costs and benefits. Notice that if the owner seeks to capture any gains from having different actors specialize in different, potentially conflicting uses, the required contracting over these uses will entail some delineation and evaluation of uses for enforcement of the contract. The contracting parties may on their own initiative come up with new use-oriented signals to implement their contract. And, as parties close to the situation, they will often have an advantage in devising new finely tailored signals for optimal use. Consider a grazing commons, in which rules of proper use include those allowing

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[129] Multipliers may be needed to adjust for less than certain detection of violations. *See supra* note 124.   **R**

[130] Such situations are possible when the use of the attributes is likely to be in some fixed proportion, but this requires knowledge of the use that involves fixed proportions.

commoners to graze animals in proportion to their land holdings or to how many could be kept over the winter.[131]

Put differently, the point of using access-based rather than use-based rules in the first place is to avoid the need for officials to measure the full range of uses of the asset. Access-based exclusion rules do not require courts and other officials to separate out—or even know about—uses in a way that would, however, be required in setting up the actuarial classes and probability distributions upon which the entire liability rule approach rests. A taker who faces a liability rule and a price can in effect force officials to make those measurements that the access rule was chosen to avoid. An access rule should be chosen where further precision in officials' measurement of activities is not cost-effective. As I will argue, this is apt to happen where use is difficult to measure in the sense that signals relating to use are subject to deterioration. And the more dimensions there are to measure, the more likely it is that signals will be subject to deterioration. Thus, in situations where use is hard to measure in this way, liability rules will be under- or overcompensatory, or accuracy will be achieved at excessively high cost.

III
THE INFORMATION COST ADVANTAGES
OF PROPERTY RULES

Why are property rules so pervasive in the law? This Part gives several reasons for the law's reliance on property rules that are rooted in information costs and specialization in information production.

First, and most basically, I will show that for reasons of information cost it is often advantageous and almost inevitable that rights will be delineated by means of what I have called an "exclusion strategy." Such a strategy relies on rough and low-cost signals that are not tied to use in order to protect indirectly a large and unspecified set of uses. The boundary around a parcel of land is the classic example, as are the physical contours of other things in personal property. Because the signals used in the exclusion strategy are on/off, they are naturally

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[131] *See, e.g.*, W.O. AULT, OPEN-FIELD FARMING IN MEDIEVAL ENGLAND: A STUDY OF VILLAGE BY-LAWS 123, 137, 141 (1972) (describing stinting of sheep); ROBERT McC. NETTING, BALANCING ON AN ALP: ECOLOGICAL CHANGES AND CONTINUITY IN A SWISS MOUNTAIN COMMUNITY 61 (1981) ("An important regulation of alp rights in 1517 laid down the principle that 'no one is permitted to send more cows to the alps than he can winter.'") (citation omitted); GLENN G. STEVENSON, COMMON PROPERTY ECONOMICS: A GENERAL THEORY AND LAND USE APPLICATIONS 215 (1991) (noting that, because amount of grass consumed does not significantly increase if animals are left on field longer, regulating number of animals fixes intensity of harvest in all but easily adjusted-to long run).

paired with property rules. Thus, property rules gain favor as a result of their association with the exclusion strategy, which has information-cost advantages in a wide variety of very basic and especially impersonal settings. Contrary to the thrust of recent pro–liability rule commentary, it is property rules rather than liability rules that truly decentralize decisionmaking. This decentralization has a variety of advantages in terms of information cost and simplicity.

Second, I will show that this delegation through exclusion and property rules has advantages in deterring opportunism by potential takers. Plausible and widely accepted assumptions about the relative abilities of owners, takers, and officials to generate information about assets—and, as I emphasize, assign them to actuarial classes—provide a clear rationale for protecting owners with property rules. Liability rules, by contrast, either leave owners with too little protection for investments in information, or such rules require supraoptimal information gathering by officials.

Third, I likewise will show that viewing property rules as an essential part of the delegation to owners through the exclusion strategy allows us to extend arguments that property rules economize on wasteful self-help measures by owners. The delegation to owners protected by law furnishes a reason to favor property rules even in the face of the strong case that has been made for liability rules.

A. Property Rules and Exclusion in Property

The problems of uncertainty and possible owner self-help are part of the reason why property rules protect different *kinds* of entitlement than do liability rules. The intuition that property rules are particularly suited to the protection of things—and, unlike some, I include here intangible things—is no accident. Protection of a large and indefinite class of uses by delineating a thing and giving the owner a right to exclude others from the thing is a strategy well suited to situations in which it is not economical to decide first-order questions of use on a use-by-use basis. Instead, the right to exclude from a thing—property in the classic sense—is the result of a second-order delegation to the owner to choose among any uses, known or unknown, of the thing. To be sure, refinement in high-stakes border-line cases will be necessary, and liability rules have their place there, as in the law of nuisance.[132] But these refinements are just that; they rest on a basic exclusionary system, backed up by property rules, that avoids the cost of use-by-use delineation in the majority of situations.

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[132] For an argument that this role of liability rules in nuisance has often been overstated, see Smith, *supra* note 4.   **R**

The bundle-of-use-rights approach pursued in the liability rule literature—even when issues of investment are the focus[133]—makes liability rules seem deceptively attractive.

1. Decentralization and Delegation to Owners

Property rules thus do preserve a "transaction structure," but on the theory offered here, that structure consists of a delegation to owners of the function of gathering information about uses. Traditionally, one of the purposes of property is to internalize the costs and benefits of a wide range of uses of an asset on the owner. The owner then has an incentive to maximize the value of the asset, and, to the extent that internalization has been successful, the owner's maximization of private value will at the same time maximize the social value of the asset.[134] Part of the function of owners is to be a broker between the present and the future; if future values are capitalized into present price or if owners can wait until their investments in assets accrue, then a present owner makes choices that reflect future values as well.[135]

Elsewhere I have argued that different strategies for delineating property rights rely to varying degrees on this type of delegation to owners.[136] In an *exclusion* strategy, the law sets up rough signals (informational variables, proxies) defining the boundaries of the asset. Within this zone of protection, owners have the choice of how to invest in or consume the asset. For example, an owner has the right to exclude from a column of space around a parcel of land as defined in the *ad coelum* rule.[137] Monitoring need only focus on the location of other actors and objects, not on others' activities with respect to the resource, and certainly not on the value of such activities. By contrast, under a *governance* strategy, uses of assets are picked out and evaluated. For example, farmers with a right of access to a grazing commons might be subject to time and manner restrictions, such as

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[133] *See* Bebchuk, *supra* note 97 (assessing effect of allocation of entitlements on investment).   **R**

[134] For a classic statement, see generally Harold Demsetz, *Toward a Theory of Property Rights*, 57 Am. Econ. Rev. 347 (Papers & Proc. 1967).

[135] *Id.* at 355.

[136] *See* Smith, *supra* note 24, at S468–71; Smith, *supra* note 4 at 1018–40.   **R**

[137] The full statement of the maxim is *cujus est solum, ejus est usque ad coelum et ad inferos* (he who owns the soil owns also to the sky and to the depths). The maxim is routinely followed in resolving issues about ownership of air rights, building encroachments, overhanging tree limbs, mineral rights, and so forth, and is subject to certain limited exceptions, such as for airplane overflights. *See* Brown v. United States, 73 F.3d 1100, 1103 (Fed. Cir. 1996); Thomas W. Merrill, *Trespass, Nuisance, and the Costs of Determining Property Rights*, 14 J. Legal Stud. 13, 26–35 (1985) (discussing airplane overflights and other exceptions to *ad coelum* rule).

requirements to keep animals tethered.[138] Given an asset or resource of a particular size, the exclusion and governance strategies just described form two ends of a spectrum from very crude methods of measurement that delegate to an owner control over a wide and indefinite class of uses to increasingly fine-grained types of delineation that directly prescribe proper use.

Both the exclusion and governance strategies, and those in between, are methods of internalizing costs, but, given an asset definition, they represent different approaches to the question of precision and delegation.[139] The exclusion strategy bunches together a lot of uses and does not inquire into details; it lacks the benefits of precision in terms of maximizing the value of individual uses, say from specialization by different actors in different uses of the same asset. At the same time, the exclusion strategy avoids the costs of precision. By contrast, governance captures the benefits of precision but at a higher cost. Governance deals directly with problems that are left to the owner to handle under exclusion. Thus, exclusion and governance have characteristic and different cost (supply) curves. Given a resource, this simple model can be depicted as in Figure 1, with W(ealth) on the y-axis and precision on the x-axis.[140] Exclusion has lower marginal cost (MCE) where the optimal level of precision is low, but rapidly becomes high cost. Using fences to modulate complex questions of use—such as proper grazing technique or optimal noise levels—would be prohibitively costly. Governance, by contrast, starts out with high marginal cost (MCG)—imagine regulating the "use conflict" between the owner and all possible encroachers by a set of spelled-out use rights—but becomes the lowest-cost method where

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[138] Smith, *supra* note 24, at S459–60, S480–81 (describing historical development of grazing rights through exclusion and governance models). For a dramatic example of rising pressure on grazing land leading to increasingly strict and detailed governance rules about tethering in traditional Danish agriculture, see Karen J. Friedman, *Fencing, Herding, and Tethering in Denmark, from Open-Field Agriculture to Enclosure*, 58 Agric. Hist. 584, 593–94 (1984).   **R**

[139] In an insightful book review, William Powers makes the point that the law proceeds in two "methodologically" very different ways, which he terms "ownership" and "reasonableness." William C. Powers, Jr., *A Methodological Perspective on the Duty to Act*, 57 Tex. L. Rev. 523, 526–27 (1979) (reviewing Marshall S. Shapo, The Duty to Act: Tort Law, Power, & Public Policy (1977)). His taxonomy is similar to that between what I am calling exclusion and governance, but Powers does not analyze the distinction further in terms of costs and benefits beyond noting the traditional justifications for ownership, such as stability and incentives for investment. *See id.* at 527.

[140] Precision can be operationalized in several related ways. *See* Smith, *supra* note 24, at S471–74. Among these would be the quantity of information, in the Shannon-Weaver sense, per unit of delineation cost?what I have elsewhere called information intensiveness. *See* Henry E. Smith, *The Language of Property: Form, Context, and Audience*, 55 Stan. L. Rev. 1105, 1126–28 (2003).   **R**

stakes are high enough to require precision in delineating uses. The "supply" of property rights is the envelope of the two curves, formed by taking the lowest point on the individual supply curves:[141]

FIGURE 1.—EXCLUSION AND GOVERNANCE FOR A RESOURCE
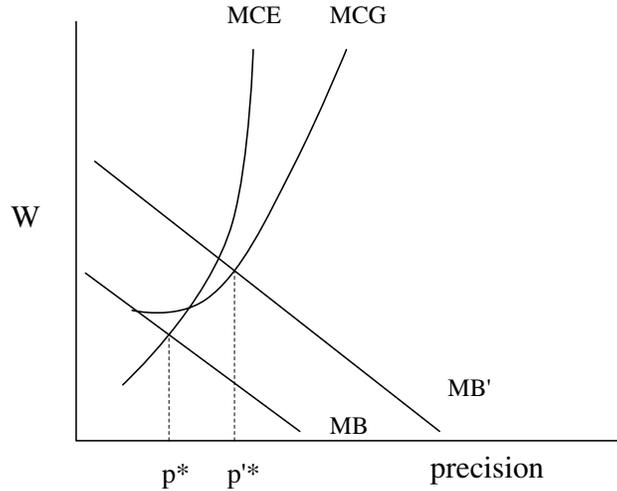
MCE = marginal cost of exclusion

MCG = marginal cost of governance

MB = marginal benfit of precision

Although it is largely beyond the scope of this Article, the model depicted in Figure 1 can be used to predict how changes in asset value will lead to greater or lesser reliance on exclusion or governance, and these predictions have implications for property rule versus liability rule protection. Thus, as the marginal benefits of precision rise (as with rising resource value) from *MB* to *MB'*, the model suggests that there will be a greater reliance on governance rules to protect a given asset.[142] Whereas exclusion has the lowest marginal cost at *p**, governance has the advantage after the two supply curves cross, before we reach *p'**. Because governance regimes have a greater tendency than exclusion regimes to be associated with liability rules, we would expect a tendency to adopt new liability rules as the stakes in partic-

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[141] In a more detailed model, there would be curves for a wide range of rule types ranging along the spectrum from exclusion to governance, and the supply of property rights would be the envelope of all these curves. *See* Smith, *supra* note 24, at S474–78.   **R**

[142] The qualification "given an asset definition" is necessary because the marginal benefits can call forth effort at defining assets in a more fine-grained way?for example smaller plots?thus moving towards a more fine-grained exclusion system. For these details and their implications, see Smith, *supra* note 24, at S475–77.   **R**

ular use conflicts become higher.[143] The story of pollution control, with the development of nuisance law and later environmental regulation, broadly conforms to this picture.[144] Conversely, when the stakes in use conflicts fall, we expect, for any given asset, an eventual shift to greater reliance on exclusion and property rules. Sometimes the shift between exclusion and governance according to conditions of scarcity is built into the law itself. Thus, in water law under riparianism, and even many prior appropriation systems, complex evaluations of the nature of use (natural versus artificial, etc.) come into play when—and only as long as—water is unusually scarce.[145]

Recall from the earlier discussion of prices and sanctions, that the information-cost theory leads one to expect that property rules will be strongly associated with sanctions and that liability rules will be weakly paired with prices.[146] Consider what types of information gathering will be complementary. Property rules are used as part of exclusionary regimes, and, as I argued, the signals for a zero-amount of one use are likely to be strongly complementary to those for the zero-level of another use: Location on the other side of a fence will ensure a zero-level of a large range of uses. By contrast, if a governance regime already requires evaluation of individual uses, it may not cost much more to gather the information about marginal harm or individuals' valuations (or their distributions) that liability rules require.

Liability rules inevitably involve some need for an official to evaluate the uses of an asset. At the very least, the distributions of values that commentators typically assume are within officials' knowledge are based on the possible, and in particular the best, use that the owner and the taker might make of the asset. In this sense, despite the "harnessing of private information," liability rules delegate less to owners and put more choice among uses in the hands of courts.

A legal regime that simply supplies an exclusion regime does not foreclose all kinds of governance rules: On the contrary, exclusion also delegates to owners the decision of whether to contract for a gov-

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[143] These governance rules need not be supplied by the state. Contracting and social norms will become increasingly precise as stakes rise.

[144] *See* Rose, *supra* note 23, at 8–36. Rose argues that pollution control has moved from a pure "keep off" strategy based on exclusionary trespass-like norms, through a "right-way" regime of regulations of proper use, to, more recently, the beginnings of a property regime based on tradable permits. The latter involves more fine-grained asset definition, in my terms. Smith, *supra* note 24, at S475–77.   **R**

[145] *See, e.g.*, COLO. CONST. art. XVI, § 6 (establishing hierarchy of riparian rights: domestic, agricultural, manufacturing); Evans v. Merriweather, 4 Ill. (4 Scam.) 492, 495 (1842) (adopting system of riparian rights based on reasonable use).

[146] *See supra* Part II.C.

ernance regime. An owner with the right to exclude is not required to exclude others: Where the law does not supply a governance regime, owners and others can, transaction costs permitting, devise and implement a precise use-based regime over the assets in question—as where developers or neighboring landowners subject a group of parcels to interlocking real covenants. Alternatively, neighbors can adopt norms of proper use that are more informal than real covenants.[147] If the law itself involves a choice between an exclusion and a governance regime, the exclusion regime is likely to involve less centralization, because it delegates more choices to owners.

It might be objected that a property rule also involves a choice between the plaintiff and the defendant. But this misunderstands the nature of property. Much of the literature since Coase's seminal article on social cost assumes that resource disputes—and nuisance suits in particular—involve a choice of who gets the entitlement as between two parties whose uses reciprocally interfere with each other.[148] As Merrill and I have argued, this approach misses something essential about property: It is a right to a "thing" good against the world.[149] Typically, things are defined in a rough exclusion-like way, and this sends a simple message to the world to "keep off." Talk of things reflects a choice to view a situation at least partly in terms of exclusion—using the simple signals, often borrowed from our everyday knowledge, that set one thing apart from another.

The law does not spell out a list of use rights beforehand but specifies an open-ended set of uses *implicitly* by giving the owner the right to exclude others from the asset. This idea that property specifies a set of use rights implicitly and open-endedly has long roots tracing back at least to Austin, who believed that "indefiniteness is of the very essence of the right [of property]; and implies that the right . . . cannot be determined by exact and positive circumscription."[150]

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[147] *See, e.g.*, ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES (1991).

[148] Merrill & Smith, *supra* note 32, at 370–71, 378–79.   **R**

[149] *Id*. at 391–94.

[150] 2 JOHN AUSTIN, LECTURES ON JURISPRUDENCE 827 (photo. reprint 1996) (Robert Campbell ed., 4th ed. 1873); *see also* RESTATEMENT (FIRST) OF PROP. §§ 5 cmt. e, 10 cmt. c (1936) (noting that totality of rights, privileges, powers, and immunities associated with property ownership vary over time and that owner's status does not change even if owner parts with many of these rights); Bernard E. Jacob, *The Law of Definite Elements: Land in Exceptional Package*s, 55 S. CAL. L. REV. 1369, 1388 (1982) (discussing how Restatement definition of complete ownership requires "not only reasonably exclusive present control, but also an indefinite reservoir of potential uses"). Another writer who comes close to sharing this view is Savigny, who considered the hallmark of possession to be that it protected a right. After noting that, in Roman law, possession "refers only to *property* and *jura in re*," he states that, "the whole right of Possession consists in the protection against

When the realist, or bundle-of-rights, view treats property as a list or bundle of use rights, it is leaving something fundamental out of the picture. Delineation does not proceed use by use. As William Markby analogized, ownership "is no more conceived as an aggregate of distinct rights than a bucket of water is conceived as an aggregate of separate drops."[151]

The owner of a house can use it for cooking dinner or reading a book, but these uses are not specified beforehand. Trespass law and much of nuisance law thus need not evaluate the uses that plaintiff and defendant are proposing; many cases will be mechanically decided on the basis of an invasion by defendant of plaintiff's asset.[152] There is no need to balance uses and no need to specify them beforehand. In some cases, the stakes will be high enough that it will be worthwhile to focus in on particular uses, and the rest of the law of nuisance does function as a public governance regime.

Thus, posing the problem as a conflict between two discrete uses already obscures much of the purpose of property. Evaluating uses can be thought of as a first-order problem of gathering and acting on information about a resource. Depending on the size of the parcels of property, there will be a range of uses, the effects of which are internalized to the owner. Property law delegates the choice among these to the owner, without the need for the law to evaluate or even to specify in advance what these uses are. When a use falls squarely within this implicitly defined set, the question is not evaluating use A versus use B, but whether officials are well-placed to do this first-order decisionmaking at all. Instead, officials can enforce the law's second-order decision to delegate the first-order decision to the owner.

And it is likely that when the law is being set up in the first place, legislators or judges would be in a better position to make this second-order decision about whether to delegate to owners than the first-order decisions about assets themselves. The exclusion strategy is low cost at low levels of precision because it can give rough protection to a wide range of uses about which officials need know little. How rough the total set of institutions surrounding the asset will be depends also on the costs of contracting. Overall, the question is between two

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certain kinds of disturbance given to the mere exercise of the right, without any reference to the existence of the right itself." FRIEDRICH KARL VON SAVIGNY, VON SAVIGNY'S TREATISE ON POSSESSION 391 (Hyperion Press, Inc. 1979) (Erskine Perry trans., 6th ed. 1848).

[151] WILLIAM MARKBY, ELEMENTS OF LAW 158 (6th ed. 1905).

[152] For a further discussion of the use of exclusion as well as governance in the law of nuisance, see generally Smith, *supra* note 4.   **R**

modes of decisionmaking: (i) a decentralized one based on the exclusion strategy, in which the benefits of tailoring are not captured by the law and may or may not be captured by contracting, and (ii) a centralized one based on an off-the-rack publicly provided governance strategy, in which these benefits are captured but at greater delineation cost than in a more exclusion-based strategy. If courts take the realist view that each use conflict is an occasion to rethink the distribution of sticks in the parties' bundles, we are with the second mode. But there is no a priori reason for mode (ii) to be more cost-effective than mode (i). And as a matter of empirical guesswork, the advantages in mode (i) of not having to constantly delineate uses seem to be large much of the time.

And so it comes as little surprise that the law makes widespread use of the exclusion strategy. At the time of a suit, the decision facing a judge is whether it is better to stick to the original second-order decision to delegate or to seize the first-order decision from the owner(s) and decide it directly.[153] The Coasean tradition as developed in the property rule/liability rule literature simply assumes that courts are making first-order decisions without taking into account the savings from decentralization and delegation made possible by traditional in rem rights to things—in other words, property.[154]

Thus, in a wide range of cases from falling rocks to building encroachments, the only relevant question is whether the defendant has invaded the column of space defined by the *ad coelum* rule. The plaintiff's rights are measured by a signal based on spatial location. Elaborate balancing of the utility of uses or distributions of private values is not required. As commentators have noticed, courts do not require (or inquire into) reasonable behavior in suits in which landowners are tort victims, by contrast to the doctrines of contributory or comparative negligence in accident law. Landowners are generally not required to take precautions against the wrongful acts or torts of

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[153] The governance strategy involves use of more information and will probably require reliance on information that is hard to use. In Ronald Heiner's framework for decisionmaking under uncertainty, where the first-order information becomes more difficult to use ("distant" from the decisionmaker, in Heiner's terms), we would expect a tendency to avoid use of this information by moving towards the exclusion strategy. *See, e.g.*, Ronald A. Heiner, *The Origin of Predictable Behavior*, 73 AM. ECON. REV. 560, 565–67 (1983).

[154] It is probably no accident that law-and-economics scholars and liability rule proponents are not generally in favor of compensation for reliance interests where laws have retroactive effects. If all decisions are first-order and involve the full range of possible uses, a benevolent government has little reason to give compensation. *See, e.g.*, Louis Kaplow, *An Economic Analysis of Legal Transitions*, 99 HARV. L. REV. 509 (1986). Where an owner's reliance is part of a scheme of second-order delegation, the "new view" arguments against compensation do not suffice. I leave the detailed implications of the information-cost theory for questions of retroactivity to further work.

others.[155] From the point of view of traditional law and economics, this degree of absolutism in entitlements is deeply puzzling.[156] In the case of land, property rules are associated with an entitlement that does not involve judicial evaluation of landowner choices. Land is both a resource subject to multiple uses and is also a very convenient focal point for broadcasting duties to far-flung third parties (especially to keep off).[157] The second-order delegation is very strong.

Such delegations may seem inefficient in the context of the foregone benefits in an individual case, but which approach is better in general is an empirical question. The first thing to notice about this question is that at a stage prior to a lawsuit or to any of the primary conduct leading to the dispute, the law often has already made a very simple (second-order) decision to delegate the (first-order) choice among a wide and indefinite set of uses to the owner. This set of uses was defined implicitly—through the *ad coelum* rule—because any use that is protected though the vindication of the right to exclude is implicitly included in the set of uses the owner controls. At no stage of the dispute does the law have to specify or evaluate these uses.

Now consider property rules. When a court applies a property rule, it vindicates only indirectly the plaintiff's interests in any particular use. For example, in trespass the set of uses implicitly swept in under the *ad coelum* rule receives protection without the uses needing to be specified or evaluated even at the remedy stage. By contrast, a liability rule requires some measure of damages that will compensate the plaintiff. At the least, this valuation requires one to know the plaintiff's value, or some fancier variant such as the owner's average value conditional on the taker's actual value at the point where the two are equal. Even though this taking at an officially determined "price" can substitute for a transaction and can harness private information, it is a partial abandonment of the second-order decision to

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[155] *See* LeRoy Fibre Co. v. Chi., Milwaukee & St. Paul Ry., 232 U.S. 340 (1914). Wood's treatise gives a classic formulation:

> It is the duty of every person or public body to prevent a nuisance, and the fact that the person injured could, but does not, prevent damages to his property therefrom is no defense either to an action at law or in equity. A party is not bound to expend a dollar, or to do any act to secure for himself the exercise or enjoyment of a legal right of which he is deprived by reason of the wrongful acts of another.
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> 1 H.G. Wood, A Practical Treatise on the Law of Nuisances in Their Various Forms § 435 (San Francisco, Bancroft-Whitney Co. 3d ed. 1893).

[156] *See, e.g.*, Susan Rose-Ackerman, *Dikes, Dams, and Vicious Hogs: Entitlement and Efficiency in Tort Law*, 18 J. Legal Stud. 25, 35–38 (1989); *see also* Mark F. Grady, *Common Law Control of Strategic Behavior: Railroad Sparks and the Farmer*, 17 J. Legal Stud. 15 (1988).

[157] *See* Merrill & Smith, *supra* note 32, at 393–94; Smith, *supra* note 4.   **R**

delegate first-order information gathering to parties. Of course, on the Coasean approach, we are asked to think always in terms of individual uses anyway, and if so, the virtues of a second-order delegation and the implicit delineation of use rights under the exclusion strategy simply do not arise.

2. Delegation and the Timing of Valuation

Delegation to owners of information gathering is closely related to the economics of the passage of time. In the case of a decision delegated to an owner of an asset, it may be cheaper to wait and see how his bet on the future will pay off rather than settling up now, as would be required under a liability rule. An owner can be expected to choose the set of uses of his asset that will afford him the highest of all the alternative streams of income.[158] The owner acts as a "broker" who has an incentive to take into account the needs of the present and the future.[159] But it may take markets as well as courts some time to catch on to the wisdom—or lack thereof—in the owner's choice. It may be cheaper to wait and see. Use C, chosen by the owner of the asset, may have an optimal time in the future. The current owner in that case is making a bet on the future. Courts will have the most difficulty evaluating the competing evidence of owners and takers on questions of valuation precisely where owners are at their most entrepreneurial—finding opportunities for profit presented by uncertainty.

Waiting and seeing under a property rule is a cheap method of internalizing the benefits and costs to the owner. Liability rules share with market transactions the feature of settling up now, which involves attaching public valuations to the asset. The optimal time for this determination may be in the future, but under a liability rule regime, the taker can force a court to engage in the settling up and to perform a public valuation at any time, even if the optimal time is in the future. By contrast, an owner whose entitlement to an asset is protected by a property rule is in some sense also delegated the choice

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[158] Demsetz, *supra* note 134, at 355. To what extent remote contingencies provide a **R** reason for courts to be more interventionist ex post will depend on a variety of factors including any psychological biases of transactors and courts. *See, e.g.*, Merrill & Smith, *supra* note 78, at 53 (discussing legal intervention to prevent fragmentation for future); **R** Glen O. Robinson, *Explaining Contingent Rights: The Puzzle of "Obsolete" Covenants*, 91 COLUM. L. REV. 546, 572–73 (1991) (documenting law's seeming inconsistency in level of contingency of various rights); Jay Weiser, *The Real Estate Covenant as Commons: Incomplete Contract Remedies Over Time*, 13 S. CAL. INTERDISC. L.J. 269 (2004) (analyzing factors including investment and changed circumstances as bearing on property rule versus liability rule protection).

[159] Demsetz, *supra* note 134, at 355.   **R**

of the best time to put a public, shared valuation on the asset. The benefits of getting this right and the costs of error are internalized to the owner, in a way that they are not internalized to the taker (or to a court) under a liability regime.

3.   *Manipulation and the Deterioration of Liability Signals*

Exclusion and governance are also different strategies for solving the problems of parties' adjustment of the behavior to courts' rules and the consequently greater need for courts to gather information. Information gathering is indirect in the sense that various imperfect signals will be used that correlate more or less closely with the valued attributes of the asset. Because parties control the asset and their actions, they may manipulate these signals to their advantage.

As a result of such manipulation, various signals may be subject to deterioration but not equally so. A classic hypothetical example is the redness of apples.[160] Consider a situation in which redness initially correlates strongly with tastiness. Consumers (usually) cannot taste the apples in the store and so must rely on more indirect tests like color, which is an imperfect but low-cost signal for the attribute—taste—in which they are interested. Consumers will pay more for red apples, because they expect to get better taste. Growers and sellers in turn have an incentive to increase the redness of apples, say by using a certain chemical, even if it does not increase their tastiness. Where this manipulation increases redness enough to affect the price and simply increasing the desired attribute (taste) would be more expensive, apples will get redder but less tasty at every level of redness. The signal provided by color thus deteriorates in several respects. First, there is a problem of dynamic waste. Consumers (users of the signal or proxy variable) must expend resources to constantly update their estimates of the correlation between redness and taste. Or they must abandon the color signal in favor of a less cost-effective one. Second, compression along the measured margin—here color—can reduce its informational value. In the example, if the use of the chemical increases the redness of untasty apples more than that of already tasty apples, the compression in the range of color means that the informational value of the signal is reduced.[161]

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[160] Barzel, *supra* note 11, at 42–46.   **R**

[161] *Id.* at 43. This is similar to the real problem with "grade inflation." Because A (or A+) is the highest possible grade, grades lose their informational value because they are *compressed* at the upper end. Pure grade inflation, where grades higher than A+ could be added, would not lead to a lessening of information if all grades shifted upward in tandem and users of the grades kept their information about the scale updated.

Examples of the informational deterioration of signals abound.[162] One example from the history of patent law is an invention for putting flecks on tobacco leaves, which, when occurring naturally, are a signal of high quality.[163] Again, signals that do not deteriorate are better but may not be available at reasonable cost. The optimal amount of deterioration may be positive, and the law would make a major contribution by facilitating the use of the most cost-effective set of signals over time.

Property rules are common because of their use in the basic and widespread—and stable—exclusion strategy. The signals upon which exclusion relies are typically less subject to deterioration than those associated with more finely tailored governance rules. Because the exclusion approach implies the use of property rules, property rules gain an advantage. An exclusion regime can capture implicitly many uses without separate delineation, but if these uses fall in the center of a broad exclusionary right, they are also likely to be captured regardless of manipulative behavior by owners and takers.[164] That property is a right to a thing has important consequences for information cost; the exclusion-type regime will tend to be less subject to manipulation. As Emily Sherwin points out, "[t]he reason for the special respect given to physical objects may be that the objects themselves provide an excellent form of fixed rule. The contours of an object . . . establish a boundary that is highly resistant to revision in a particular dispute."[165] In the case of land, by means of the *ad coelum* rule, trespass law will easily and stably capture uses requiring presence on the land, such as stealing crops.

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[162] Another familiar one is the effort of sellers of houses to make cosmetic changes to houses they are selling. *Id*. at 45. Even though buyers are aware of this practice, it survives and an individual seller would be worse off not engaging in it.

[163] Rickard v. Du Bon, 103 F. 868 (2d Cir. 1900) (finding tobacco-flecking invention unpatentable for lack of utility since its only purpose was to deceive). *But cf*. Juicy Whip, Inc. v. Orange Bang, Inc., 185 F.3d 1364 (Fed. Cir. 1999) (holding that patent for machine dispensing premixed soda that gives appearance of mixing soda was valid).

[164] Manipulation may cause more peripheral uses not to be captured. For example, trespass does not deal as well with conflicting uses by those on adjacent parcels or use by people merely trying to look in. Gary Washburn & Matt O'Connor, *Cubs Hurl Federal Suit at Rooftop Owners*, CHI. TRIB., Dec. 17, 2002, at 1 (describing suit alleging misappropriation of baseball games); *see also* Quincy Cablesystems, Inc. v. Sully's Bar, Inc., 650 F. Supp. 838 (D. Mass. 1986) (holding that satellite TV system owner stated cause of action for interference with contract, interference with advantageous business relations, and conversion against tavern owners intercepting satellite signal and exhibiting programs to customers, but holding conversion claim preempted by copyright). On the debate over whether exploratory trespass can occur from an adjacent parcel, see *infra* note 241.   **R**

[165] Emily Sherwin, *Two- and Three-Dimensional Property Rights*, 29 ARIZ. ST. L.J. 1075, 1091 (1997).

With governance, on the other hand, more fine-grained picking out of uses means that more examples of the uses will be near the edge of the signal, such that at low cost the use could be changed and would no longer be associated with the signal. For example, governance rules among those with access to a common fishery can be based on the weight of fish caught, but the danger is that fishers will "high-grade" by dumping smaller (but already dead) small fish out of a catch to make room for larger fish that are more valuable per pound.[166] Other governance rules based, for example, on restricting times for fishing can lead to overcapitalization in larger boats and better equipment in a race to make more individually effective but socially wasteful use of permitted fishing times.[167] Thus, governance regimes have more delineation to police; this is one of the reasons why precise rules, like those characteristic of governance regimes, have high costs. If the benefits from delineation are high enough as well, then the optimal degree of precision can be high enough that it becomes worth policing governance-style signals or tolerating some deterioration (or both). But this will be reserved for special situations where the basic exclusionary regime is not enough.

Because liability rules are typically not used for exclusion regimes, the fact that potential deterioration makes exclusion cheap for the most basic problems of property rights delineation is an additional argument for property rules. Liability rules themselves presuppose a picking out of specific uses, and this in turn requires fine-grained measurement. If fine-grained signals tend to be more subject

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[166] *See* Shi-Ling Hsu & James E. Wilen, *Ecosystem Management and the 1996 Sustainable Fisheries Act*, 24 ECOLOGY L.Q. 799, 809 (1997) (describing highgrading); Carol M. Rose, *Expanding Choices for the Global Commons: Comparing Newfangled Tradable Allowance Schemes to Old-fashioned Common Property Regimes*, 10 DUKE ENVTL. L. & POL'Y F. 45, 60 (1999) (noting that limits based on catch measured in pounds can encourage destruction of low-value fish); Carol M. Rose, *The Several Futures of Property: Of Cyberspace and Folk Tales, Emission Trades and Ecosystems*, 83 MINN. L. REV. 129, 170–71 (1998) (same).

[167] *See, e.g.*, Frances R. Homans & James E. Wilen, *A Model of Regulated Open Access Resource Use*, 32 J. ENVTL. ECON. & MGMT. 1, 17 (1997) ("[R]egulated fisheries are likely to attract even more redundant capital than was predicted by Gordon's unregulated open access model."); Scott C. Matulich et al., *Toward a More Complete Model of Individual Transferable Fishing Quotas: Implications of Incorporating the Processing Sector*, 31 J. ENVTL. ECON. & MGMT. 112, 120 (1996) (noting time limits for fishing lead to race to process and overcapitalization); Anthony Scott, *Development of Property in the Fishery*, 5 MARINE RESOURCE ECON. 289, 296 (1988) ("[L]icense limitation without other reinforcing measures induced such a sickening excess of investment in individual fishing capital, such excessive preoccupation with racing and rivalry, and such costly dependence on public enforcement that analysts were challenged to look for something else."); *see also* Jonathan H. Adler, *Conservation Through Collusion: Antitrust as an Obstacle to Marine Resource Conservation*, 61 WASH. & LEE L. REV. 3, 16–17 (2004) (summarizing studies that conclude that fishing regulation leads to racing and overcapitalization).

to deterioration, then potential deterioration is a reason to favor property rules in the normal course. This explains why property rules are used in the most basic and widespread types of situations.

The advantage of property rules can also be cast in terms of agency theory. The problem of entitlement protection can be likened to a multitask agency problem. Recent literature has shown that under a variety of circumstances, high-powered incentives may produce worse results than lower-powered ones.[168] In our terms, liability rules provide high-powered, finely-tailored incentives, but this may not be optimal under certain conditions where owners and takers act along various margins that are not all equally costly to measure. For reasons of information cost, property rules are used where a broad and indefinite reservoir of uses is involved, and these property rules will be associated with a sanction.

An analogy to income taxation is instructive. Economists have pointed out that one factor in the choice of optimal taxation rules is that a broader tax base—in this case a definition of taxable income that embraces more ways of becoming better off—will lead to a lower elasticity of income.[169] Put differently, where more welfare-increasing activities are captured under the signals or "proxies" used to measure income for tax purposes, there will be less incentive to adjust one's activity by shifting into nontaxed activities. Lower elasticity of income implies less distortion. Similarly, in property, the use of exclusion together with a property rule sweeps a broad class of uses into the definition of the entitlement. By contrast, the kind of individualized use-by-use approach under liability rules can be expected to leave the owner with a greater elasticity of use choice: Owners who can anticipate systematically over- or undercompensatory liability awards will be elastic in their choice of use and opt for different ones from those they would choose when faced with a broader entitlement-defining rule.

The taxation analogy can be carried further. As in taxation, owners and takers may anticipate the rule.[170] Thus where uses do

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[168] For example, rewarding workers by output may lead them to abuse their machines where part of the problem is to get them to maximize output along both the output and machine wear dimensions. Bengt Holmstrom & Paul Milgrom, *Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design*, 7 J.L. ECON. & ORG. 24, 25 (Special Issue 1991).

[169] *See, e.g.*, JOEL SLEMROD & WOJCIECH KOPCZUK, THE OPTIMAL ELASTICITY OF TAXABLE INCOME 14 (Nat'l Bureau of Econ. Research, Working Paper No. 7922, 2000) http://www.nber.org/papers/w7922.

[170] *See, e.g.*, David A. Weisbach, *Formalism in the Tax Law*, 66 U. CHI. L. REV. 860, 872–75 (1999) (discussing ability to anticipate application of rule and resultant opportunity for arbitrage).

need to be individually delineated and evaluated, the law often does so through standards—which are vague ex ante, and only filled in ex post—rather than through bright-line rules.[171] The law of negligence and parts of nuisance law are paradigm cases of the use of standards. Broad, bright-line rules of trespass and narrower, more use-based standards of nuisance are to be expected, and in such a world, property rules have a major place.

4. *Property Rules and the* Numerus Clausus

The information-cost implications of property rights for third parties also furnish a reason for limiting the kinds of liability rules the law will allow. The exclusion strategy has advantages in keeping rights simple for third parties, which is a major consideration for property, less so in torts and much less so in areas like contracts. Property rights are in rem—they avail against the "rest of the world"—and for this reason these types of rights tend to be subject to mandatory limitations, including the fixed and limited menu of basic property rights: the *numerus clausus* (closed number) of property rights.[172] Under the *numerus clausus*, parties cannot create new idiosyncratic property rights but must stick to the basic building blocks defined by the law. The *numerus clausus* is a limitation on the types of rights, including ways of dividing rights.

The choice between liability rules and property rules, and between types of liability rules, is in part a choice among different ways of dividing entitlements and how many different types of divided entitlements there should be. As Merrill and I have argued, this question turns on information costs, in particular those incurred by third parties.[173] Information costs include the cost of producing and verifying information about the scope and security of rights.[174] In the case of contracts, where the consequences of complexity and idiosyncrasy

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[171] *See, e.g.*, *id.* at 875–77 (discussing how tax law can use standards in response to abuses under rules). On rules versus standards, see, for example, Louis Kaplow, *Rules versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 568–88 (1992).

[172] Merrill & Smith, *supra* note 78, at 24–42.   **R**

[173] *Id.*

[174] Information costs include but are not limited to verification costs, and the theory of the *numerus clausus* sketched in the text and set out more fully in Merrill's and my article is based on a broad notion of notice and information cost (sometimes called measurement cost). *See id.* at 30 n.117, 32–33, 43–51. Hansmann and Kraakman propose a supposedly different approach to the *numerus clausus* based on "verification," without recognizing that verification costs are a (proper) subset of the information costs upon which our theory is based. *See* Henry Hansmann & Reinier Kraakman, *Property, Contract, and Verification: The* Numerus Clausus *Problem and the Divisibility of Rights*, 31 J. LEGAL STUD. S373 (2002); *see also* Smith, *supra* note 140, at 1125–26 (discussing types of information and information cost).   **R**

are mostly of concern to the parties, we expect a low degree of intervention to keep things simple and standardized.[175] In the case of property, the fact that the rights avail against the world and persist over longer periods of time implies that a wide and indefinite group of people, including potential violators and purchasers of rights, will have to incur information costs in their encounters with property rights. Particularly in impersonal settings in which a large and indefinite group will have to acquire and act on these types of rights, there is a rationale for keeping them simple and standardized. One method for doing so is to subject them to a fixed and finite menu—a *numerus clausus* of in rem rights. If so, then in those settings in which in rem rights are involved, we would expect a tendency to limit the number of types of divided entitlements, including the number of ways of delineating rights in the domain of transfer.

With property, then, we would not expect to allow every type of liability rule that might be cost-justified before taking into account third-party information costs. Instead, we should expect a limited number of rules, starting with the most useful. As it stands, the law allows property rules to protect basic rights, especially rights to exclude. Liability rules fine-tune this regime of property rules, in particular the conventional liability rule (Calabresi and Melamed's "Rule 2"), under which, for example, a polluter can take the pollutee's entitlement to be free from pollution as long as the polluter pays the officially determined damages.[176] But when it comes to in rem rights, the law largely goes no further than having one type of liability rule to modify the basic property rule protection, which is consistent with the other liability rules—purchased injunctions,[177] put-style rules,[178] dual-chooser rules, and higher-order liability rules[179]—being outside the *numerus clausus* because the extra third-party information costs they

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[175] This is not to say we expect no standardization in the case of contracts. Where the third parties have reason to incur information costs in interpreting contracts, the law may prescribe more formalistic modes of interpretation. *See* Smith, *supra* note 140, at 1177–90;   **R**
see also Alan [nmi] Schwartz & Robert E. Scott, *Contract Theory and the Limits of Contract Law*, 113 YALE L.J. 541 (2003) (arguing that formalistic contract interpretation is advantageous to third parties, including those who might adopt parties' contractual solutions). In general, the degree of intervention to keep down third-party information costs slides along a spectrum according to how numerous and indefinite is the class of third parties who will incur information costs. *See* Merrill & Smith, *supra* note 77, at 799–809.   **R**

[176] Calabresi & Melamed, *supra* note 1, at 1116–22. For more discussion of their four-   **R**
way typology, see Smith, *supra* note 4, at 1007–09.

[177] This is another term for Calabresi and Melamed's famous Rule 4, which I take up in greater detail in Smith, *supra* note 4, at 1007–21.

[178] On how the law does not employ in rem put-style liability rules, see *infra* Part IV.B.

[179] It is widely recognized that these more complex rules might entail higher administrative costs than property rules or conventional liability rules, and would be a factor pushing toward the adoption of simpler rules. Ayres & Balkin, *supra* note 30, at 748; Ayres &   **R**

entail outweigh the frustration costs in not allowing them. In this regard, note that while the law certainly allows all sorts of options to arise by contract, the law does not allow the creation of in rem rights with customized liability rules or remedies.[180]

5. *Exclusion, Property Rules, and Bounded Rationality*

The association of property rules with the exclusion strategy may reflect the limits of the human mind. The exclusion strategy is a useful shortcut for dealing with things that are the subject of resource conflicts.

Before turning to the beneficial heuristic value of exclusion and property rules, it is worth noting that the information cost theory suggests a different way of interpreting the relevance of findings in behavioral psychology to the question of legal remedies. In a recent paper, Rachlinski and Jourden ran an experiment in which they offer subjects various hypotheticals: Subjects are given an entitlement and asked what they would sell it for, or they are not given an entitlement and asked what they would spend to acquire it.[181] The authors find that entitlements protected by a property rule show the endowment effect, under which subjects are willing to pay less for the entitlement than they would have to be paid in order to give it up.[182] They then

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Goldbart, *supra* note 5, at 61. The third-party information costs would tend strongly in the **R** same direction.

[180] It is true that the law allows contract rights, including options contracts, to be treated as property for some purposes, coming under the heading "*chose* in action." When contract rights are treated as property, however, the law does treat them in a highly standardized way, as "things," and seeks to drain as much personal information from them before they can be treated as transferable choses in action. *See, e.g.*, Merrill & Smith, *supra* note 78, at 54–55; J.E. Penner, *The "Bundle of Rights" Picture of Property*, 43 UCLA L. REV. **R** 711, 802–03, 810–13 (1996).

[181] Jeffrey J. Rachlinski & Forest Jourden, *Remedies and the Psychology of Ownership*, 51 VAND. L. REV. 1541, 1559–66 (1998).

[182] *Id.* at 1566–72. On the endowment effect, see Daniel Kahneman et al., *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325 (1990) (arguing that endowment effects persist even in market settings where participants have opportunities to learn); Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979) (discussing basics of endowment effect); Jack L. Knetsch, *The Endowment Effect and Evidence of Nonreversible Indifference Curves*, 79 AM. ECON. REV. 1277 (1989) (reporting tests demonstrating endowment effect); Amos Tversky & Daniel Kahneman, *Loss Aversion in Riskless Choice: A Reference-Dependent Model*, 106 Q.J. ECON. 1039 (1991) (presenting theoretical explanation for endowment effect based on loss aversion). For a sympathetic summary of work in this area, see Richard H. Thaler et al., *The Endowment Effect, Loss Aversion, and Status Quo Bias*, *in* THE WINNER'S CURSE: PARADOXES AND ANOMALIES OF ECONOMIC LIFE 63–78 (Richard H. Thaler ed., 1992). For one exchange on the robustness and the scope of the endowment effect, see Jason F. Shogren et al., *Resolving Differences in Willingness to Pay and Willingness to Accept*, 84 AM. ECON. REV. 255 (1994) (finding, in contrast to previous studies, convergence between willingness to pay and willingness to accept for market

conclude that the endowment effect is largely a barrier to negotiations and that their study supports the emerging pro–liability rule consensus in law and economics.[183] There are two problems with this conclusion, apart from its translatability to real situations of entitlement holding and negotiation. First, the pattern of answers in the study could reflect subjects imagining developing subjective value in the entitlement if given property rule protection. Subjective value is not always a barrier to negotiation that ought to be overcome; in some situations, it ought to be accommodated.[184] Second, in the case of liability rules, subjects' willingness to sell may stem from the fact that they perceive themselves to have less leverage. Indeed, these problems affect Rachlinski and Jourden's interpretation of *Boomer*,[185] on which they conclude (from the fact that the resident-plaintiffs did not appeal the size of the damage award or ask for higher-than-market damages) that the endowment effect caused them to focus on an injunction.[186] A more mundane but likely reason is that, in the absence of (extremely rare) statutory directives, courts do not give damages higher than market value in these settings and, as a result, there is little point in asking for them.[187]

Instead, the delegation to owners through the exclusion strategy emphasizes different consequences of bounded rationality. If rationality is bounded, then the choice of who should gather and act on first-order information about assets matters, and the choice between first-

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goods with close substitutes but persistence of divergence for nonmarket goods with imperfect substitutes); Gwendolyn C. Morrison, *Resolving Differences in Willingness to Pay and Willingness to Accept: Comment*, 87 AM. ECON. REV. 236 (1997) (arguing that Shogren et al.'s results are insufficient to reject endowment effect); Jason F. Shogren & Dermot J. Hayes, *Resolving Differences in Willingness to Pay and Willingness to Accept: Reply*, 87 AM. ECON. REV. 241 (1997) (defending conclusions of earlier study and describing additional study).

[183] Rachlinski & Jourden, *supra* note 181, at 1574–76.   **R**

[184] Rachlinski and Jourden do assert that sometimes the endowment effect should be accommodated, but they do not give a criterion for deciding when the endowment effect is deserving of accommodation. *Id.* at 1576; *see also* Richard Craswell, *Passing on the Costs of Legal Rules: Efficiency and Distribution in Buyer-Seller Relationships*, 43 STAN. L. REV. 361, 387–91 (1991) (discussing how possibility of endowment effect can render efficiency analysis indeterminate).

[185] 257 N.E.2d 870 (N.Y. 1970).

[186] Rachlinski & Jourden, *supra* note 181, at 1543–44.   **R**

[187] *See* W. PAGE KEETON ET AL., PROSSER AND KEETON ON THE LAW OF TORTS § 89, at 637–40 (5th ed. 1984) (discussing types of damages available to nuisance plaintiffs, including diminution in market value and, under some circumstances, special damages, but not damages for subjective value); *see also Boomer*, 257 N.E.2d at 874–75 (discussing damages available and referring to diminution in objective value). The liability rule literature has focused on the mill acts with 150% damages as a possible example of damages for subjective value, but this example is open to other interpretations. *See supra* notes 54–58 **R** and accompanying text.

order and second-order decisions (choosing the chooser) may be very large. Further, some models of bounded rationality suggest, both theoretically and experimentally, that decisionmaking under uncertainty can sometimes be both easier and more accurate when information is ignored, especially if that information in its content or form is unfamiliar to the potential user—i.e., it is "nonlocal."[188] Although I leave the implications of this observation for further work, the information-cost theory here suggests that the exclusion strategy is the type of "fast and frugal heuristic" that allows boundedly rational beings to make surprisingly accurate decisions in a low cost way. The use of signals like boundary crossings as an indirect signal for a large and indefinite class of uses bears a strong resemblance to the successful heuristics that psychologists have identified as lying behind human decisionmaking.

6. Information Costs and Justifications for Property

Finally, the information-cost theory of property rules ties in with another set of traditional views about property. Many, especially those with a libertarian orientation, have argued that property affords a sphere of liberty protected from intrusion by others, including the government.[189] Property rules reinforce this sphere of liberty because, as I have argued, they do not require an inquiry by courts into the uses that owners have in mind for their assets. And property rules discourage takers from intrusive investigation into these uses as well. If some of the activities that the owner can undertake while protected by a property rule have high value that is not quantifiable, it is not clear that an average-harm liability rule would work. On the lib-

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[188] *See, e.g.*, Daniel G. Goldstein & Gerd Gigerenzer, *The Recognition Heuristic: How Ignorance Makes Us Smart*, *in* GERD GIGERENZER ET AL., SIMPLE HEURISTICS THAT MAKE US SMART 37, 37–38 (1999); Ronald A. Heiner, *Imperfect Decisions and the Law: On the Evolution of Legal Precedent and Rules*, 15 J. LEGAL STUD. 227 (1986); Heiner, *supra* note 153, at 565–68.   **R**

[189] *See, e.g.*, RANDY E. BARNETT, THE STRUCTURE OF LIBERTY 139–42, 238 (1998) (discussing benefits flowing from sphere of autonomy secured by property rights); MILTON FRIEDMAN, CAPITALISM AND FREEDOM 7–21 (1962) (arguing that economic arrangements based on capitalism and private property are necessary conditions for free society); ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA 149–231 (1974) (sketching historical entitlement theory based on principles of justice in original acquisition of holdings, of transfer of holdings, and of rectification of injustice in holdings); RICHARD PIPES, PROPERTY AND FREEDOM 118–20 (1999) (arguing for close historical relationship between private property and notions of freedom). *But see, e.g.*, JEREMY WALDRON, THE RIGHT TO PRIVATE PROPERTY 289–322 (1988) (discussing relationship between private property and various types of liberty); G.A. Cohen, *Robert Nozick and Wilt Chamberlain: How Patterns Preserve Liberty*, 11 ERKENNTNIS 5, 21 (1977) (arguing that Nozick's libertarian capitalism "sacrifices liberty to capitalism").

ertarian view, the court's measurement is prohibitively expensive, and scrutiny itself could be damaging.

Property rules and sanctions protect the system of the delegation of information production. Calabresi and Melamed concluded that property rule protection is appropriate to deter theft because it protects against actors' attempts to convert property rules into liability rules,[190] but they did not explain why this is bad and many have puzzled over this question since.[191] Some have suggested that the problem is reciprocal takings or an asset's common value to taker and owner,[192] but, on these accounts, it is still not clear why properly set liability rules, in particular those with damages higher than under current law or under Kaplow and Shavell's average-harm approach, cannot be used to deter takings.[193] On the theory here, property rules and sanctions make sense as devices to protect against takers unilaterally forcing officials to perform this first-order information production. The need to protect the delegation of first-order information production to owners helps explain the intuition that liability rules are vulnerable to attempts to "game the system" where thin markets render difficult a court's estimation of what the current owner of an asset would receive in a hypothetical voluntary exchange.[194] And this approach dovetails with the point that liability rules do not protect exchange value; if a taker need only pay for the value of the entitlement-holder's current use, then the taker enjoys any extra exchange value, based on any other more valued use that might have become clear later.[195] In theory, courts could try to measure this value, but then we return to the problem of first-order information production.

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[190] Calabresi & Melamed, *supra* note 1, at 1125–26.   **R**

[191] For a discussion of this large body of literature, see David D. Haddock et al., *An Ordinary Economic Rationale for Extraordinary Legal Sanctions*, 78 CAL. L. REV. 1, 2–9 (1990).

[192] Kaplow and Shavell base their account of why property rules are used to deter the taking of physical assets on these considerations. Kaplow & Shavell, *supra* note 5, at   **R**
757–73. But since Kaplow and Shavell do not base their account on measurement costs, they cannot explain why property rules would be superior to liability rules based on something other than the average harm rules on which they concentrate. For example, Kaplow and Shavell note that a liability rule could provide for damages equal to the highest common value and the mean idiosyncratic value. *Id.* at 762 n.157. Although they note that damages would typically be high enough to approximate property rule protection (and would forgo many of the benefits in terms of takings under liability rules), *id.*, again the measurement required in the two cases would be quite different. Measurement by proxy leading to a rule of access avoids the need to measure uncertain and multidimensional uses making up common value and average idiosyncratic value.

[193] Ayres & Goldbart, *supra* note 3, at 149–50.   **R**

[194] Fred S. McChesney, *Tortious Interference with Contract Versus "Efficient" Breach: Theory and Empirical Evidence*, 28 J. LEGAL STUD. 131, 154–55 (1999).

[195] Haddock et al., *supra* note 191, at 16–17.   **R**

In such situations, officials will often find it cost-effective to rely on access-based rules of exclusion and so will need to use property rules and sanctions to protect that second-order choice.

B.   *The Avoidance of Opportunism*

This delegation to owners with property rules also has advantages where takers can exploit opportunities to engage in strategic behavior afforded by the uncertainty in identifying and evaluating uses of things. Owners, takers, and officials all engage in producing information about assets or activities in order to determine expected value. Owners invest in producing information about their assets in order to maximize their return. Takers invest in producing information about other people's assets in order to capture value by maximizing the return from acts of taking. And officials will evaluate assets and activities ex post in order to determine damages. Each of these actors has an information-production function. Information production includes evaluation of direct evidence about the value of an asset, as well as more indirect evidence such as the actions and statements of owners and takers. Problems with liability rules emerge where owners have an information-cost advantage over takers, but takers in turn have an information-cost advantage over officials. Under a broad range of circumstances, owners will be systematically undercompensated and will invest less in their assets, causing property rules to be preferable to liability rules.

Consider an asset with uses A and B. One can view the asset as a collection of valued attributes.[196] Different uses of the asset will typically consume different proportions of the attributes of the asset. What counts as an economically significant attribute depends on the uses to which the asset is or might be put. Thus, soil nutrients are an attribute of a plot of land because grain, pasturage, or trees—all of which are valued—might grow there. Use A will draw on one bundle of attributes, and use B will draw on a different but possibly overlapping bundle of attributes. Conflict over the use of the asset arises

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[196] *See, e.g.*, Barzel, *supra* note 11; Roy W. Kenney & Benjamin Klein, *The Economics of Block Booking*, 26 J.L. & ECON. 497, 500–16 (1983) (discussing valued attributes of diamonds as basis for buyer-oversearch problem and marketing practices to reduce it); *see also, e.g.*, JACK HIRSHLEIFER, PRICE THEORY AND APPLICATIONS 155–56 (3d ed. 1984) (describing theory of consumption based on consumer satisfaction through asset attributes); Kelvin J. Lancaster, *A New Approach to Consumer Theory*, 74 J. POL. ECON. 132, 133–35 (1966) (setting forth approach to consumer theory based on goods being collections of multiple valued characteristics); Sherwin Rosen, *Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition*, 82 J. POL. ECON. 34, 34–36 (1974) (introducing approach to discovering implicit prices of valued characteristics of multi-attribute products).

because use A interferes with use B and vice versa. Use A of the asset will consume attributes essential to use B or otherwise make them inaccessible to use B. For example, growing corn will draw (consumptively) on many of the same attributes (space, soil nutrients, water) as would growing hay or grazing animals, leading to use conflict. Growing corn would also conflict with many nonagricultural uses of the land such as operating a parking lot: A concrete parking lot with cars makes soil nutrients unavailable for growing corn (and vice versa).

In the multiple-attributes framework, the problem of allocative efficiency involves producing information about the costs and benefits of actual and potential uses of assets (including human capital). But not all uses of an asset are equally easy to assess. Say use A is easier to assess than use B; perhaps there is even a market price for the asset based on use A or a price for the products of use A, such that we can simply consult a relevant price to evaluate use A. Is this assessment or price the only information about the asset that is relevant to allocation? This depends on knowledge about alternative conflicting uses of the asset. There are several cases. First, A might be the only possible use of the asset, in which case an assessment of use A is effectively an assessment of the asset. To the extent that use A is monetizable, the value of the asset is simply the discounted stream of actual or hypothetical payments arising out of use A. Second, A might be the only known use of the asset, but there is another use B that has not been discovered yet. Third, there is another use B that has been discovered but the discovery cannot yet be credibly communicated to others at a reasonable cost. Fourth, there is another use B that is known and can be communicated but use B is more costly to assess than use A. Fifth, use A and use B are both known and equally susceptible to assessment.

Consider the situation in which the owner of the asset knows of use B but use B is unknown to courts and not easy to prove—its verifiability is relatively low. In the most extreme case, use B is the result of discovery information by its current owner. While A was the only use known by anyone, there was homogeneity in that type of asset. But with use B, this homogeneity may no longer hold: Some assets grouped into the asset type may be suitable for use B but some may not, thus destroying the homogeneity of the asset class. Or, less dramatically, examples of the asset type may vary in the proportions of attributes relevant for uses A and B, or may be otherwise more suitable for one use or the other than other members of the original asset type.

Someone who invests in information that increases the value of an asset faces the problem of how to protect that information. One way to protect such an investment in information is to own the asset. Let Owner (O) be the first person to think of use B. If Taker (T) takes the asset, the average-damages rule will give damages equal to the average damage to current owners. The "type" used in the rule here embraces assets defined by the known uses; this may include information about current owners. The other owners of the asset type do not value the asset for use B and, indeed, some of their assets may not be suitable for use B. Ideally, we would want to define asset type differently once O has discovered use B. The question is who will be able to perceive the new asset type and at what cost. This is an important question because if officials treat O's asset as belonging to the original type, the average value will be undercompensatory to O, and O will not have the incentive to develop the information in the first place.[197]

One great difficulty in assessing the optimality of entitlement protection is that we would need to know the optimal level of investment in information by owners in assets. The paradox is that one reason to favor property rules is to avoid having to know this, by simply delegating the decision to owners. What we need to decide on is the general rule that works in the long run.

A court with unlimited resources would figure out both what uses would be discovered with an optimal amount of resources and the level of harm to new use B once equilibrium is reached at various levels of liability, and would pick the level of liability reflecting the most cost-effective value creation. Various levels of liability that are too low will result in a situation that is without use B or that is moving slowly or in a costly (self-help) manner towards a new equilibrium. In addition, the necessary comparison is between the costs of self-help and the costs of the property rule. The level of liability will lead to equilibrium at various levels, all of which look optimal if the amount of information about uses is taken as fixed.

A further problem with the liability approach stems from its notion of value. Market prices make judicially determined damages easier to calculate, but they also usually indicate that a market transaction would be cheaper than official determination of a price in an

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[197] One might ask whether the problem would disappear if this average includes Owner's (O's) valuation. This scenario would only arise where courts knew that some use like B had been discovered but could not, at least for now, identify, even with the parties' help, which assets are susceptible of use B. Even in this semi-optimistic scenario, the average-damages rule would be undercompensatory to someone, like O, with an asset that in fact is valuable in use B.

involuntary transaction. But there is a deeper problem with the liability rule literature's approach to price. If the reason for there not being a price that reflects the parties' valuations is that there is no general equilibrium in the market, then evaluations of the parties' opportunity costs become problematic.[198] One of the problems with a static view of liability rules is that these rules can look optimal even in a situation in which cost-effective investments in information about uses are not being made. The liability rule will look efficient even where a higher level of liability (or even a property rule) would cost-effectively call forth more such effort.

Actually, courts will not engage in this type of inquiry about uses that would be discovered under alternative liability regimes. Instead, the court will delegate the information-gathering function to the parties. In the conventional liability rule literature, the values of the parties are taken as given, as drawn from a fixed distribution.[199] But these values depend in part on the choice of rule that protects the entitlement. It is not only the case that the greater protection of the property rules is worth something given an actor's plan for the asset, but that the actor will have more of an incentive to invest in enhancing the asset, including developing information about it, if his entitlement to that asset is protected by a property rule. In a sense the law reflects a choice of chooser.[200] I will argue that property rules in general do a better job of delegating the information-gathering function, even though delegation and information harnessing are among the primary arguments advanced for liability rules. To foreshadow, property rules serve the delegation function better when what is being delegated is the production of information about the asset. Courts are better at dealing at one remove—in producing information about information

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[198] *See, e.g.*, Mario J. Rizzo, *Uncertainty, Subjectivity, and the Economic Analysis of Law, in* TIME, UNCERTAINTY, AND DISEQUILIBRIUM 71, 79–81 (Mario J. Rizzo ed., 1979); Dieter Schmidtchen, *Time, Uncertainty, and Subjectivism: Giving More Body to Law and Economics*, 13 INT'L REV. L. & ECON. 61, 72–74 (1993); *see also* Martin Shubik, *The General Equilibrium Model Is Incomplete and Not Adequate for the Reconciliation of Micro and Macroeconomic Theory*, 28 KYKLOS 545, 558 (1975) ("In equilibrium (when plans do match) the rules and the mechanism provided by the financial infrastructure apparently vanish in that they are not *then* needed. However they remain present to provide the control system required when equilibrium is not present.").

[199] *See, e.g.*, Ayres & Goldbart, *supra* note 5, at 20–21, 23; Brooks, *supra* note 6, at 284–85; Kaplow & Shavell, *supra* note 5, at 725–28, 776.   **R**

[200] Guido Calabresi's proposal for placing liability on the cheapest cost avoider involves a more limited delegation, in that it focuses on a preselected activity or class of activities (such as driving or polluting), about which courts will need to develop information. *See* CALABRESI, *supra* note 117, at 136–73; *see also* Guido Calabresi & Jon T. Hirschoff, *Toward a Test for Strict Liability in Torts*, 81 YALE L.J. 1055, 1057–58 (1972). Elsewhere I argue that the type of informational "delegation" is one basic feature that differentiates between property and tort. *See* Smith, *supra* note 4.   **R**

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production rather than directly producing the first-order information itself. Courts need not know the details of each individual case, but one has to be able to make empirical judgments that will support rules of thumb.

At this point one might ask whether the answer to undercompensatory liability rules is simply to add some kind of extra liability to make up for estimated error. The problem here is not error per se but the type of bias that is introduced when both parties are better at producing information about the asset than is the court. There are dangers of overcompensation as well as undercompensation.[201] An overcompensatory liability rule might encourage original owners to game the system. This might happen if courts were overly credulous of owners' claims to have discovered uses of their assets. A taker who takes an "ordinary" member of the asset class would then have to pay too much for the asset.[202]

Courts can wind up over- or undercompensating speculating owners. For example, if allocation and distribution are decoupled,[203] the problem is that the reward to the current owner still has to be determined, which involves measuring the value of O's information. The point of speculation is that someone who specializes in discovering and evaluating attributes of assets will have the benefits and costs of that information production concentrated on himself. Court-imposed liability will require some type of information production, if only about the "relevant" class over which a probability distribution of harm can be developed. All modern liability rule approaches require courts to know enough about the relevant probability distribution to be able to establish an unbiased mean expected value, and the existence of a relevant "class" of assets over which this inquiry takes place implies some information about the likelihood and value of potential uses. In Ayres and Goldbart's words, their "dual-chooser rules represent a kind of centralized planning writ small," and in par-

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[201] There are dangers of owners and takers manipulating the rules to their benefit. Thus, assuming a tort has happened and a tort plaintiff can anticipate a court's overestimation of damages, a court will have to adjust downwards. *See* Eric Rasmusen, *Predictable and Unpredictable Error in Tort Awards: The Effect of Plaintiff Self-Selection and Signaling*, 15 INT'L REV. L. & ECON. 323 (1995) (modeling effect of plaintiff's overestimation on courts' damage awards). In the context of liability rules protecting property, the potential defendant also has the choice of whether and from whom to take, leading to similar problems even though the taker would likely be the defendant.

[202] "Put" rules under which the original owner could force a sale on another party could lead to overcompensation and excessive development of assets to match whatever criteria the courts are using. On the absence of in rem put-style liability rules, see *infra* Part IV.B.

[203] *See* Avraham, *supra* note 5; Ayres & Goldbart, *supra* note 5.

ticular resemble socialism with prices.[204] The problem is the incentive for coming up with the correct price. Unbiased estimates are not enough where asset classes are not internally homogeneous and are endogenous to the rule.

For a given asset with multiple, valued attributes the asset's value may be not just risky but uncertain. This uncertainty can be reduced by producing information about the asset, placing it in a class of similar assets, and then calculating the average value of that class. This function converts uncertainty into risk; by incurring information cost, additional valuable information about assets is obtained.[205] This is reflected in the greater accuracy of the average; there is less variance of the individuals from this average. If fruit is grouped for pricing according to taste, one could break the group into smaller and smaller subgroups, with individual fruit pricing at the limit. It might well be the case that the overall average for the large group of fruit was indeed the right average, but the distance of individual pieces of fruit from this average will tempt consumers to engage in costly picking and choosing.[206] By using the average, income has been left in the

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[204] Ayres & Goldbart, *supra* note 5, at 10. The comparison to central planning is instructive. The liability rule literature has much of the flavor of socialism with prices, in which central planners would use the best available information to determine and publish prices that would govern the workings of state-owned enterprise. *See, e.g.*, H.D. Dickinson, Economics of Socialism (1939); Oskar Lange & Fred M. Taylor, On the Economic Theory of Socialism (Benjamin E. Lippincott ed., 1939). Members of the Austrian School countered that neither central officials nor any one human mind could collect and act on the dispersed information that markets harness. *See* F.A. Hayek, *The Use of Knowledge in Society*, 35 Am. Econ. Rev. 519 (1945); F.A. v. Hayek, *Socialist Calculation: The Competitive 'Solution,'* 7 Economica (New Series) 125 (1940). Other Austrian economists argued that, without private property, central planners did not have the incentives to come up with correct prices. *See* Ludwig von Mises, Socialism: An Economic and Sociological Analysis 137–42 (J. Kahane trans., Yale Univ. Press rev. ed. 1951) (1922). For an introduction to the vast literature on the socialist calculation debate, see generally Don Lavoie, Rivalry and Central Planning: The Socialist Calculation Debate Reconsidered (1985); Robert Heilbroner, *Analysis and Vision in the History of Monetary Economic Thought*, 28 J. Econ. Literature 1097 (1990); Peter Lewin, *The Firm, Money, and Economic Calculation: Considering the Institutional Nexus of Market Production*, 57 Am. J. Econ. & Soc. 499 (1998). Interestingly, before the events of the late 1980s and early 1990s, the pro-socialist-calculation commentators were generally considered to have the superior analytical case, based on the mainstream Walrasian style of economics. *See, e.g.*, Heilbroner, *supra*, at 1098 (acknowledging that capitalism ultimately won in real world but that "the successes of the farsighted seem accounted for more by their prescient 'visions' than by their superior analysis").

[205] *See supra* notes 13–15 and accompanying text.

[206] On wasteful consumer efforts at picking and choosing, see Barzel, *supra* note 11, at 28–32.

public domain. The more fine-grained fruit groupings will afford smaller opportunities for capturing value by picking and choosing.[207]

The problem with liability rules is that they function like the price for the fruit in a large bin. If takers are better at measuring than courts, then courts will optimally sort assets into coarser categories than will takers. Once the average is used for damages, takers can then incur information cost in order to pick a more fine-grained subset for taking whose members have an average value that is higher than the one determined by the court. Not only is this picking and choosing nonproductive if it duplicates what the original owner has done, but it leads to systematic bias in the damage level in the court's liability rule.

The reason that liability rules seem to work so well on the conventional pro-liability analysis is that the background categories that assets fall into are taken as given. Basically, takers and courts draw from the same distribution. Besides this, Kaplow and Shavell assume that the average is not systematically biased and harm-prevention costs are not correlated with harm; if so, the ability of courts to get the average right is as good over the long haul as getting things right every time.[208] Actors will face the correct incentives on an expected basis, which cannot be improved upon. This may work in some contexts where one does not select victims in any more fine-grained way. For example, reckless drivers and polluters may be considered unable to know more about victim harm than is reflected in the average-harm liability rule, although this is an empirical question.[209] This assumption only works, however, as long as "average" means the average in both the context of official determinations of value and takers' and owners' determinations.

The average expected harm rule works best where activities and assets do not vary and are not endogenous to the rule. Thus, if an injurer does not know whom he will injure and hidden variations in the activity will not lead to a different average expected harm, then the expected harm will match expected liability in a stable way. But problems emerge where activities that seem to be in the same actuarial class really differ, but appear to be the same to a court using

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[207] In a consensual setting, other devices can be used to reduce wasteful picking and choosing. For example, an opaque bag for fruit sold by a seller with a good reputation might eliminate such opportunities altogether. *Id*.

[208] Kaplow & Shavell, *supra* note 5, at 725–27.

[209] *See, e.g.*, Kaplow, *supra* note 17, at 313–14. *But cf.* Stephen McG. Bundy, *Valuing Accuracy? Filling Out the Framework: Comment on Kaplow (2)*, 23 J. Legal Stud. 411, 421–22 (1994) (arguing that systematic bias can lead tortfeasors to take into account additional features of victims like race).

cruder informational signals. This will lead to systematic bias in the court's estimate of average harm. Kaplow and Shavell assume that precaution cost is independent of harm caused by an externality, and this makes sense if activities are rigid (in terms of overall activity level and precaution cost),[210] but the multiple-attributes framework points to a wide range of circumstances in which takers can gather information and alter their activities to capture value left unprotected by a liability rule.

Property rules are most called for where an entrepreneurial owner, broadly defined, is good at gathering information cost-effectively but results are not verifiable (entrepreneur makes bets), but a potential taker is good at informationally free-riding on the entrepreneur. Furthermore, the taker is better at doing this than courts. This scenario supports both an analytical and a rough empirical argument. Analytically, if it can be shown that property rules are superior in any situation, the most general case for liability rules is thereby rebutted. But, as an empirical guess, the notion that owners are usually in a better position to develop information about and increase the value of assets than are takers, and that parties have better information than courts, are standard ones in both the pro–liability rule literature and in traditional property theory.[211] The potential taker will be able to pick out a class of assets that has a higher mean value than the one that the courts have identified, and courts cannot cost-effectively keep up.

The problem with liability rules is a simple one of opportunism in the face of uncertainty. Returning to the scenario of O and T, consider now a case in which O has an asset that has uses A and B, which are generally known, and a use C that is foreseen by O. Benefits from the asset are $10 for use A, $20 for use B, and $30 for C. O discovers use C at a cost of $6, leading to a net gain of $4 for the discovery.[212] At a cost of $2, T can develop the information that on average assets of this type held by people like O are not worth the usual $20, but $25.

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[210] Kaplow & Shavell, *supra* note 5, at 727 n.43, 772, 777–78.   **R**

[211] *See, e.g.*, Ayres & Talley, *supra* note 5, at 1083–86 (noting tradeoff between informa-   **R**
tion-forcing advantages of liability rules and incentives to invest by owners); Kaplow &
Shavell, *supra* note 5, at 768–69 (discussing owners' special potential to increase value of   **R**
assets); Merrill & Smith, *supra* note 32, at 360–66 (discussing and quoting expressions of   **R**
concern for investment among traditional theorists). On parties' informational advantage
over courts, see, for example, Ayres & Talley, *supra* note 5, at 1030 (making assumption of   **R**
superior private information), and Kaplow & Shavell, *supra* note 5, at 725 (assuming   **R**
state's information is imperfect). *See also* Schwartz, *supra* note 25, at 273–74, 279–80   **R**
(noting that courts systematically tend to know less than litigants about facts of disputes).

[212] Benefit of C over B is $30 - $20 = $10; net benefit minus cost is $10 - $6 = $4.

Notice that for *T*, in her valuation of the asset, features of *O* or his activities become relevant. As we will see, this type of personal information about another actor is typically quite relevant in contract but is studiously suppressed in property. Indeed one of the functions of property, as opposed to contract, is precisely to make rights easy to process by third parties (like potential violators and courts) by suppressing a great deal of information "internal" to the property, including the identity and other features of the owner.[213] Dutyholders need to know just to "keep off" and do not need to know much else. Liability rules are inconsistent with this tendency toward information suppression in property. But, for now, we are considering whether in the situations in which liability rules or property rules might be used to shape the behavior of potential takers like *T*, this suppression of information is a good idea in the first place. Even if property rules will turn out to be closely related to the traditional notion of property, we need to consider here whether something like the familiar institutions of property *should* regulate the relation of *T* and *O*. To return to the example, provided that *T* can capture the return from the production of information (as she can under the liability rule but not the property rule), *T* can cost-effectively segment the class of owner-asset pairs until the average value for the class that this particular asset falls into is $25.

The third actor, the judge (or jury or administrative official), is faced with the asset, the parties *O* and *T*, and their behavior. If the court can cost-effectively segment the set of triplets of owners, takers, and assets only until the class containing this particular triplet has an asset valued at $22, then the taking will occur (*T* gets an asset worth $25 to her by incurring $2 in information costs and $22 in liability rule damages, for a profit of $1), and *O* will be undercompensated by $8 ($30 - $22). *O* has an overall loss of $4 and will not invest in the information.[214]

In the example above, under the liability rule, *T* gains $1 (say from selling back to *O* or someone like him or waiting until the conditions change and make obvious the bet *O* made), but *T*'s $2 information cost alone leads to a net societal loss even if the taking occurred. But if *O* fails to invest in the first place, the loss here is at least $4. The crucial question is how a court's cost of segmenting classes of trip-

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[213] *See, e.g.*, J.E. PENNER, THE IDEA OF PROPERTY IN LAW 29–30, 71 (1997); Merrill & Smith, *supra* note 77, at 794–95; Merrill & Smith, *supra* note 32, at 359; Smith, *supra* note 24, at S475; Smith, *supra* note 140, at 1151.

[214] *O* spends $20 to acquire the asset (the price being based on the highest widely known use, B), spends $6 developing the information about use C, and receives $22 in damages, for an overall loss of $4 ($22 – $20 – $6 = –$4).

lets compares to other costs of securing this benefit. The court's cost could include hiring government experts, etc.

Property rules reflect a decentralized solution to this problem. The example assumed that the court's marginal cost would equal marginal benefit where the apparent asset price of *O*'s asset is $22, $8 short of the mark. Property rules can be superior to liability rules if courts have a systematic disadvantage to parties in information gathering that leads to these problems of opportunism in the face of uncertainty.

Contrast this approach to that of Kaplow and Shavell. They assume that asset classes are known or at least can be cost-effectively determined.[215] (Recall that I am using a broad notion of asset not tied to tangibility but rather one that at least includes all the "things" that are protected by the exclusion strategy.) Actually they assume that asset classes are in effect the same for owners, takers, and courts.[216] This is a special case in which all uncertainty is costlessly turned into risk. Once this is so, *O* loses any advantage in the production of information and liability rules, not surprisingly, start looking better.

One might also think that property rules excessively discourage takers from investing in information about assets that they might take, but, as a matter of empirical guesswork, the number of situations in which the concern for taker investment predominates is likely to be small. Not only are owners likely to have had more opportunity to develop information about assets, the existing owner is likely to be the easiest person for potential trading partners to reach.[217] If in some context we thought that takers systematically had an advantage in developing an asset and that transaction costs were so high that the taker could not purchase the asset in a consensual transaction (or sell the information to the current owner), then there would be a reason to worry about property rules protecting an entitlement in existing owners.[218] In such a situation, a liability rule might make sense. But,

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[215] Kaplow & Shavell, *supra* note 5, at 727.

[216] *Id.* at 775.

[217] Buyers have no obligation to disclose their private information about assets to sellers, and it is highly unlikely that in the general case we would want to move from property rule to liability rule protection to save the costs of buyer efforts at maintaining that secrecy. Secrecy sometimes can be the lowest cost method of ensuring the appropriability of returns from investments in information. Trade-secret law requires reasonable efforts at maintaining a secret in order to qualify for legal protection. *See infra* note 233 and accompanying text.

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[218] This worry has been most prominent in the context of corporate takeovers, but the concern here is a special one: Agency costs may be so great that a rule mandating management passivity in the face of takeover bids would protect bidders' investment in information about targets that would otherwise be unrecoupable, especially in auctions. *See* FRANK H. EASTERBROOK & DANIEL R. FISCHEL, THE ECONOMIC STRUCTURE OF CORPO-

as I have argued, there is a basic asymmetry between liability rules and property rules: The former presuppose that we have selected out uses to be evaluated (A v. B), but property rules protect a delegation to the owner to select from (and even to develop) uses, which does not require courts to make such choices.[219]

A theory based on information costs can also account for some of the intuitions about property rules that have come into question in the recent literature. Indeed, the traditional intuitions that property rules afford stability of expectations, permit planning, and allow owners to invest in assets are incompletely theorized versions of the argument here.[220]

These traditional intuitions have been difficult to defend in the face of the liability rule literature, and property rules have thus acquired an air of paradox. But, as with most paradoxes, the problem lies in the assumptions one is making. The key to the paradox is the "modern" assumption that knowledge is static and is either knowledge of the average, here the average value, of a fixed "class" of assets or events on the one hand or knowledge of the full particulars of an individual asset or event on the other, with nothing in between. Instead, knowledge can range from perfect particularized knowledge to no knowledge; the knowledge of the averages of wider and narrower classes ranges along this continuum. As Knight recognized, there is a continuum from risk to uncertainty.[221] Moreover, different actors have different production functions for producing knowledge and for creating classes about which actuarial statements can be made, thus moving from uncertainty toward risk. For Knight, the entrepreneur gained profits from her advantage in fulfilling the function of assessing uncertainty and acting on her judgment.[222] By extension, ordinary people are "entrepreneurs" when it comes to those things that they

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RATE LAW 162–211 (1991). Even here, these concerns must be balanced against investments in information by current management and owners. *See* David D. Haddock et al., *Property Rights in Assets and Resistance to Tender Offers*, 73 VA. L. REV. 701, 709–17 (1987). Note that the pro-bidder commentators are not suggesting converting current shareholders' property rule protection to liability rule protection, even though current management's ability to benefit from the property rule would be curtailed by a management-passivity mandate.

[219] *See supra* Part III.A.

[220] *See* Merrill & Smith, *supra* note 32, at 360–64 (discussing view of Blackstone, Smith, **R** and Bentham, and mentioning antecedents in Hobbes and Hume); Rose, *supra* note 6, at **R** 2188.

[221] KNIGHT, *supra* note 13, at 199. **R**

[222] For Knight, uncertainty was a necessary condition of the entrepreneur's profit, and this takes the form of a residual claim. The notion of the residual claim has long been associated with property, and I will show how information cost contributes to an explanation for the tight connection between ownership and residual claimancy. *See infra* Part IV.C.

value most. The attraction of property rules is that they protect individuals' values without their having to be able to justify these values or even reason about them at a conscious level. On the information-cost theory of property rules offered here, property rules tend to be favored where owners produce information about assets and events more cost-effectively than takers, and takers produce information more cost-effectively than do courts or other officials.

C.   *The Problem of Self-Help*

Property rules and delegation to owners of information gathering under uncertainty also have advantages where owners would be able to take self-help measures to protect their entitlements. Much has been written about the question of why we have property protection rather than no protection and, in particular, why theft is thought to be inefficient.[223] A theme of this literature is that, without property protection, those in possession will take self-help measures to prevent the theft of their assets. Such efforts are inefficient if they are less cost-effective than government-supplied protection. The indirect costs of theft in terms of self-help measures have to be weighed against the costs of government-supplied protection and the costs of transactions that might be needed to move assets to higher-valuing users.[224] In those cases in which present owners place a high value on assets, the possibility of a higher-valuing non-owner is diminished and the willingness of such an owner to incur the costs of self-help is highest.

This concern about self-help extends to some of the situations in which the law faces a choice between property rules and liability rules.[225] David Haddock and Fred McChesney argue that conventional liability rules pegged at compensation will invite opportunism: Potential takers will invest in finding takeable assets and owners will incur costs to prevent takings.[226] In their analysis, the problem is that liability rules, by being undercompensatory—in that the amount of compensation they provide is less than the price that the parties would

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[223] These dynamic costs of theft were first raised by Gordon Tullock in *The Welfare Costs of Tariffs, Monopolies, and Theft*, 5 W. ECON. J. 224, 228–31 (1967). For more recent discussion and extensions, see, for example, Richard L. Hasen & Richard H. McAdams, *The Surprisingly Complex Case Against Theft*, 17 INT'L REV. L. & ECON. 367 (1997), and Fred S. McChesney, *Boxed In: Economists and Benefits from Crime*, 13 INT'L REV. L. & ECON. 225 (1993).

[224] *See* Hasen & McAdams, *supra* note 223, at 376.

[225] *See* Kaplow & Shavell, *supra* note 5, at 769 (problem of takings in absence of liability and under liability rules is matter of degree).

[226] David D. Haddock & Fred S. McChesney, *Do Liability Rules Deter Takings?*, *in* THE ECONOMIC CONSEQUENCES OF LIABILITY RULES: IN DEFENSE OF COMMON LAW LIABILITY 29, 38–39 (Roger E. Meiners & Bruce Yandle eds., 1991).

arrive at in a negotiated sale—will invite opportunism, with all its costs.[227] Property rules are better if the sum of extra administrative costs and opportunism costs under the liability rule exceeds transaction costs (including the foregone benefits of transactions that do not occur) under the property rule. If the liability rule does not provide enough protection for the owner's asset, then the owner will undertake self-help, and potential takers will invest in finding takeable assets and circumventing owners' self-help protections. The possibility of such opportunism has a number of troubling consequences, and I will argue that the concern about opportunism persists even under the more sophisticated variants of the expected-average-harm approach of the more recent pro–liability rule literature.[228]

As we have seen, the liability rule literature gets around the concern with high information cost by claiming that courts or other officials can use some variant of average or expected harm as the measure of damages. If, however, owners know their own values but cannot communicate them to a court cost-effectively and credibly, then those owners will be tempted to take measures to make their asset less susceptible to takings than other assets that appear to be similar to the court (i.e., that the court will group into the same actuarial class). Owners will invest in secrecy agreements, extra locks, and the like. Such actions are potentially wasteful in their own right.

Such self-help also means that the averages that the court calculates initially will be in need of frequent revision. If the court treats the members of a heterogeneous asset class uniformly and some high-value owners in effect opt out of the system through self-help, then the average harm that a taker inflicts will change over time. Takers on average will now impose less average harm—not counting the indirect harm of encouraging self-help by some high-value owners. Courts might lower their estimate of the average harm—at some additional administrative cost—but the waste from the self-help remains, and the court may incur additional costs in updating its estimates.

The analogy of takings under liability rules to theft also allows us to separate two issues. In the theft literature, explanations of why theft is inefficient have centered on two factors: that thieves on average value goods less than their existing owners, and that owners and thieves engage in unproductive rent-seeking type activities in order to prevent or effect theft, respectively.[229] The liability rule literature can be seen as focusing on the first, or value, question almost

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[227] *Id*. at 30, 33–36, 38–39.

[228] *See supra* Part II.B (discussing pro–liability rule literature).

[229] Hasen & McAdams, *supra* note 223, at 367–68.   **R**

exclusively. Concerns with allocative efficiency relate to whether an asset or activity will wind up in the hands of the highest-valuing party. But as the literature on theft has shown, the dynamic costs of self-help and efforts to effect nonconsensual transfers also loom large and probably present a better explanation for the criminal prohibitions on theft.[230] To be sure, whether these dynamic costs are important in any given situation or type of situation is an empirical matter. But existing evidence points to these costs' importance,[231] and the fact that liability rules are used as sparingly as they are is consistent with the importance of dynamic rent-seeking costs.

There may be situations in which the owner's self-help measures would be the most cost-effective way to protect investments in information. But this will not always, or even often, be the case. Instead, the entire property system rests on an assumption that government enforcement of entitlements is often superior to owner self-help.[232] Situations in which the law even requires reasonable care on the part of owner-victims are rare. As an unusual example, in trade-secret law, enforcement of a trade secret requires that the plaintiff have taken reasonable measures to keep the information secret in the first place.[233] But this is very unusual. Owners do not need to lock their

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[230] *See supra* note 223.   **R**

[231] *See* Hasen & McAdams, *supra* note 223, at 371–75 (discussing indirect evidence for costs of theft).   **R**

[232] *See, e.g.*, Yoram Barzel, A Theory of the State: Economic Rights, Legal Rights, and the Scope of the State 1–58 (2002); William M. Landes & Richard A. Posner, *The Private Enforcement of Law*, 4 J. Legal Stud. 1, 29–30 (1975). And in many contexts, the law increasingly prohibits owner self-help. *See* Douglas Ivor Brandon et al., *Self-Help: Extrajudicial Rights, Privileges and Remedies in Contemporary American Society*, 37 Vand. L. Rev. 845, 860–72 (1984) (documenting that legislative and case law tends towards restrictions on self-help in property area).

[233] *See* Rockwell Graphic Sys., Inc. v. DEV Indus., Inc., 925 F.2d 174, 178–80 (7th Cir. 1991) (discussing significance of requirement of owner precaution); E.I. duPont deNemours & Co. v. Christopher, 431 F.2d 1012 (5th Cir. 1970) (holding that blocking aerial photography of factory under construction was not required under reasonable precaution). The Uniform Trade Secrets Act defines a trade secret as

> information including a formula, pattern, compilation, program, device, method, technique, or process, that: (i) derives independent economic value actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and (ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

Unif. Trade Secrets Act § 1 (amended 1985), 14 U.L.A. 437, 437–38 (1990); *see also* Restatement (First) of Torts § 757 cmt. b (1939) ("[A] substantial element of secrecy must exist, so that, except by the use of improper means, there would be difficulty in acquiring the information."); Restatement (Third) of Unfair Competition § 39 cmt. f (1995) ("To qualify as a trade secret, the information must be secret. . . . [T]he requirement of secrecy is satisfied if it would be difficult or costly for others who could exploit the information to acquire it without resort to the wrongful conduct proscribed under § 40.").

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cars in order to sue for conversion or erect fences in order to sue in trespass. Ultimately, whether self-help measures are cost-effective is an empirical question, but the law is consistent with the view that they usually will not be. And, intuitively, it would seem that there are significant economies of scale in the enforcement of property rights,[234] making government provision more attractive.

Moreover, liability rules tend to be used exactly where we think people will not engage in costly self-help or extensive efforts at positioning themselves to engage in private takings under the liability rule. For example, the exception for necessity is so narrow that it is unlikely that people will do much to anticipate and foreclose the use of a dock or a mountain cabin by someone in dire need. Nor will many people put themselves in mortal peril just to be able to use these resources. Likewise, in the often-cited example of the mill acts, the provisions for public oversight (including some kind of a public interest requirement) and the requirement to get officials' permission are likely to obviate the need for much private self-help on the part of potential flooders and floodees.[235]

One form of owner self-help would be to retake the entitlement from the taker. Kaplow and Shavell, building on the traditional intuition about the stability afforded by property rights, suggested that this possibility of serial takings and retakings might be a reason for property rules in the case of tangible assets.[236] Subsequent commentators have supported a more sweeping case for liability rules by arguing that the mere possibility of multiple takings does not imply inefficiency and multiple takings do not necessarily distinguish between ownership of tangible assets and other kinds of entitlements.[237] But a dynamic theory of information costs favors the conclusion that is reached by traditional property theorists and reflected in Kaplow and Shavell's intermediate view. In terms of information costs, efficiency will depend on how production of information about the asset over the course of the series of takings compares with the production of information by the owner backed up by a property rule and (depending on the level of transaction costs) supplemented by voluntary transfers of the entitlement. It is true that takings and retakings will provide some information about value to a court, allowing it to refine the class into

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[234] *See, e.g.,* BARZEL, *supra* note 232, at 25; DOUGLASS C. NORTH, INSTITUTIONS, INSTITUTIONAL CHANGE AND ECONOMIC PERFORMANCE 58 (1990); Merrill & Smith, *supra* note 78, at 51.   **R**

[235] *See supra* notes 53–58 and accompanying text.   **R**

[236] Kaplow & Shavell, *supra* note 5, at 720, 757.   **R**

[237] *See supra* note 30.   **R**

which the asset is categorized. But it is not likely to be a cheap way of doing so.

Which method of information production is most cost-effective is an empirical question. Nevertheless, it is possible to venture some empirical guesses about the typical case. If the original owner *O* might now retake, the retaking is wasteful if the same result could have been achieved without this step. Further, under such a liability-rule regime, people with a talent at taking will be encouraged to prey on those with talent at discovering. And selling the information separately may not be feasible because of Arrow's paradox of information: Once a potential seller of information reveals information to a potential buyer, the buyer has the information and has no reason to pay for it.[238] This problem may be overcome in a variety of ways, including intellectual property rights, but one of the most basic methods of protection is ownership of an asset that is complementary to the information.[239] Thus, if a seller has information about the asset and has an entitlement to the asset backed up by a property rule, then the seller's entitlement to (and investment in) the information is automatically protected along with the asset.[240] In fact, for this reason, the crucial aspect of property rights in land or things is often informational. A classic example is the knowledge of whether there are minerals under the surface of a plot of land.[241] The key role played by a trespass in defining the scope of trade secret protection is another example: The

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[238] Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, *in* THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS 609, 615 (Nat'l Bureau of Econ. Research ed., 1962) ("[T]here is a fundamental paradox in the determination of demand for information; its value for the purchaser is not known until he has the information, but then he has in effect acquired it without cost.").

[239] David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RES. POL. 285 (1986) (arguing that firm's ability to innovate and profit from innovation may depend on ability to control assets complementary to its inventions).

[240] *See* Steven Shavell, *Acquisition and Disclosure of Information Prior to Sale*, 25 RAND J. ECON. 20, 33–35 (1994) (noting that rules requiring disclosure about assets in transactions have less effect on sellers because they control assets complementary to information); *see also* John Umbeck, *Might Makes Rights: A Theory of the Formation and Initial Distribution of Property Rights*, 19 ECON. INQUIRY 38, 38–39 (1981) (including within property rights expectation of value in coconuts on part of only one who can climb tree or expectation of value in fish on part of one with secret knowledge of their location).

[241] *See* Phillips Petroleum Co. v. Cowden, 241 F.2d 586 (5th Cir. 1957) (protecting owners of mineral estate against unauthorized explorers who were authorized by surface owners to locate their seismographic equipment on parcel surface). It is an open and debated question whether one can be liable for exploratory trespass if one has neither committed a physical trespass nor located the equipment directly above the targeted minerals?that is, whether one can trespass if one is exploring from an adjacent tract and one has permission from those with rights in that tract. *See* Owen L. Anderson, *Geophysical "Trespass" Revisited*, 5 TEX. WESLEYAN L. REV. 137, 162–63 (1999).

information entitlement is based in part on the enforcement of the physical boundary, for example around a factory.[242]

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The pro–liability rule literature makes liability rules look attractive by focusing on some "transaction costs" while ignoring or discounting others. The literature to date has taken transaction costs to be those of bargaining over the entitlement, including those preventing some wealth-increasing transfers altogether. These costs are important, because the costliness of transactions may indeed keep an asset from its highest use. The liability rule literature solves this problem by simulating a contract under which the takee will receive a proper reward for its contribution to value—as modified by considerations of fairness if these are being considered.[243] The natural next question is why the reward should take the form of an entitlement backed by a property rule rather than by a liability rule. But "transaction costs" broadly conceived also include a range of other costs of property rights and institutions left out in the course of making the case for liability rules.[244] As with all transaction costs, the Coase Theorem implies that if the cost of producing information were zero, then choice of liability rule or property rule should not matter; it is positive transaction costs, here information costs, that cause the law to matter.[245] Once we take account of the costs and benefits of discovering and choosing among uses of an asset and otherwise developing valuable information about it, property rules can be superior to liability rules. Moreover, under reasonable empirical assumptions, the range of cases in which property rules will be superior is quite large. This is encouraging from a descriptive point of view, because the law teems with property rules.

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[242] *See supra* note 233 and accompanying text.　　　　　　　　　　　　　**R**

[243] Calabresi & Melamed, *supra* note 1, at 1002–05, 1110, 1114–15 (discussing "other **R** justice" reasons for determining entitlements and method of protecting them); *see also* Ayres & Goldbart, *supra* note 5, at 13 (noting how dual-chooser rules allow decoupling of **R** allocation and distribution in choice of liability rules).

[244] Allen, *supra* note 113 (distinguishing two definitions of transaction costs—costs of **R** trading and costs of establishing property rights or institutions—and arguing for utility of latter).

[245] Coase, *supra* note 33; Deirdre McCloskey, *The So-Called* Coase Theorem, 24 E. **R** ECON. J. 367 (1998) (pointing out that part of Coase Theorem that originated with Coase is claim that placement of liability does matter in world of positive transaction costs, not that placement of liability does not matter in world of zero transaction cost, as conventionally stated).

IV
PROPERTY RULES AND THE NATURE OF PROPERTY

In their article, Calabresi and Melamed coined the term "property rule" but without relating property rules to the traditional notion of property. Instead, following in the Realists'—and Coase's—footsteps, they ignored property as an in rem right to a thing in favor of "entitlements," which have no antecedent character until filled in by judges resolving use conflicts between plaintiffs and defendants.[246] In this Part, I show that the view of property rules afforded by the information-cost theory captures the deep connection between "property rule" treatment and the traditional notion of property as an in rem right to a thing.

I will show first that the strategy of exclusion is likely both to contribute to making a right more property-like and to calling for a property rule treatment. Put differently, if the character of an entitlement as property is a matter of degree, it will correlate with the degree to which delineation of the right relies on the exclusion strategy and its attendant property rule protection. Second, I will show that the recently much touted put-style liability rules (in which an entitlement holder can force its sale on another) raise the very information-cost concerns that make exclusion and property rules attractive in the first place. Finally, I demonstrate that the notion of a residual claim, so central to property and ownership as well as organizations, rests heavily on the rough and low-cost delineation of outer "boundaries" in the exclusion strategy, backed up by property rules.

A. *Property Rules and Degrees of Property*

That exclusion and governance are based on signals (measurement proxies) that differ in their cost structure allows us to reconcile a major conflict between the bundle-of-rights and the exclusion-based views of property. Consider the in rem nature of property rights. Ever since Wesley Hohfeld's famous articles, controversy has periodically erupted over what an in rem right is, and by extension what "property" means. Hohfeld sought to clarify the use of the ambiguous term "in rem" by replacing "in rem right" with "multital rights."[247] A multital, as opposed to a paucital right, is one that is matched by a large and indefinite number of similar rights held by the same rightholder against a variety of duty-holders. Crucially for Hohfeld, rights always hold between persons.[248] Contract rights would be paucital

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[246] *See* Merrill & Smith, *supra* note 32, at 379–83.   **R**
[247] HOHFELD, *supra* note 49, at 67–78.   **R**
[248] *Id.* at 30–32, 72.

because they are not so matched but rather stand alone or with only a few similar rights. When *A* owns Blackacre, the right of property is multital because it holds between *A* and *B*, *A* and *C*, and between *A* and each of a large and indefinite class of other persons. By contrast, if *A* has contracted with *B* for *B* to stay off Blackacre, *A*'s right (and *B*'s corresponding duty) are paucital. As between *A* and *B*, the right in the two cases is the same, except that in the first (multital) case, the right is one of many similar rights that *A* holds. This conception of in rem and in personam rights has led indirectly to the familiar "bundle of sticks" view of property.[249]

Opposed to this atomized view of property is one in which the right to exclude is taken as fundamental.[250] Here, too, the in rem character of property is key. Penner, for example, objects to Hohfeld's framework because, from the point of view of the dutyholder, there is no need to identify the owner of Blackacre in order to know one's duty.[251] This argument reverses and extends one made by Albert Kocourek shortly after the publication of Hohfeld's article. For Kocourek, an in rem right is "one of which the essential investitive facts do not serve directly to identify the person who owes the incident duty."[252] Thus, according to Kocourek, property (along with other in rem rights) is relatively unspecified along the dimension of dutyholders. Both Penner's and Kocourek's theories, in turn, have antecedents in Austin's view, mentioned earlier, that "indefiniteness" is the "very essence" of property.[253] The idea is that property encompasses a sphere of liberty and is good against such a large and indefinite class that it would be futile to spell out the full implications of the right. By contrast, many contractual rights are more fully spelled out. The spelling out of rights is a matter of degree, and as argued above, if it were not for the cost, any degree of specification would be possible.

It is by taking account of the cost of defining rights through more or less tailored signals that we can partly reconcile the bundle-of-rights and exclusion-based views. For a right against the world—

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[249] *See, e.g.*, Arthur Linton Corbin, *Taxation of Seats on the Stock Exchange*, 31 YALE L.J. 429, 429 (1922) ("Our concept of property has shifted . . . . '[P]roperty' has ceased to describe any *res*, or object of sense, at all, and has become merely a bundle of legal relations?rights, powers, privileges, and immunities."); Max Radin, *A Restatement of Hohfeld*, 51 HARV. L. REV. 1141 (1938) (interpreting Hohfeldian scheme from legal realist point of view); *see also* Merrill & Smith, *supra* note 32, at 364–65.   **R**

[250] *See, e.g.*, J.W. Harris, Property and Justice 13 (1996); PENNER, *supra* note 213, at 71;   **R**
Felix S. Cohen, *Dialogue on Private Property*, 9 RUTGERS L. REV. 357, 374 (1954); Thomas W. Merrill, *Property and the Right to Exclude*, 77 NEB. L. REV. 730 (1998).

[251] PENNER, *supra* note 213, at 25–31; Penner, *supra* note 180, at 724–31.   **R**

[252] Albert Kocourek, *Rights in Rem*, 68 U. PA. L. REV. 322, 335 (1920) (emphasis omitted).

[253] *See supra* note 150 and accompanying text.   **R**

where rightholder and dutyholder need not know much at all about each other in order to act in reliance on and in accordance with the right—exclusion is likely to make sense.[254] Because it bundles many uses together from interference against the world, exclusion is a low-cost, low-precision method of defining rights. If property is less specified along the dimensions of rightholders and permissible uses, then exclusion is likely to be the predominant element of the method used to define the right.

Hohfeld and his critics are looking at two aspects of this problem of delineation. Hohfeld is considering the extension of the concept of property; in its implications for the rights and duties of persons, an in rem property right and a large (and indefinite) series of in personam contract rights are equivalent. But for philosophers like Penner, property and contract are not the same because they are analyzing its intension, the concept itself: How we know whether someone has a right is different if it is a relatively anonymous property right than if it is a personalized right under a contract.[255] To this we can add that the contours of these two concepts—property and contract—reflect the costs of implementing them. Property is more "exclusion-based" than other rights because, for a given resource, exclusion uses a low-cost signal for a bundle of related uses against all those lacking the owner's permission.

We can now see in what sense the Coasean approach as developed in the liability rule literature follows in Hohfeld's footsteps. Like Hohfeld and Coase, the liability rule literature frames questions in terms of the lowest common denominators—the "sticks" in the bundle—and then proceeds synthetically to ask how bundles should be built up. By doing so, however, this type of approach has already assumed that thinking in terms of individual uses is the correct approach. It assumes away the possibility of stepping further back and defining a set of uses implicitly—without the need for enumeration, let alone evaluation—and using an exclusion strategy to delegate further choice to owners. To be sure, in some contexts the law will have to face directly the first-order problems of governing use, but, in a large range of situations, the law can avoid this type of determination. And for reasons of information costs, it usually makes sense for the law to proceed this way.

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[254] *See* Smith, *supra* note 24, at S467–74.
[255] *See* PENNER, *supra* note 213, at 23–31.

B.   The Absence of In Rem Puts

Another striking feature of the law is the absence of in rem puts, in which one has the right but not the obligation to force a sale on another party. Recent liability rule literature has entertained the possibility of increasingly exotic types of liability rules. In the traditional liability rule under which a victim "has" the entitlement but is only protected by the liability rule, the potential taker has a "call" option on the entitlement; she has the right, but not the obligation, to violate the entitlement and pay damages (the exercise price for the call option). Some authors have asked why liability rules could not take the form of "put" options.[256] A "put" liability rule would give the pollutee the entitlement (to be free from pollution) but also the option to force its sale to the polluter.

Property scholars have been skeptical of the value of put-style liability rules.[257] It is unclear to them why giving a choice to the holder of a put as to who gets the entitlement makes any sense. To this we can add that put-liability rules differ from call-liability rules in that the latter but not the former dovetail with a governance regime. Exclusion rules are typically directed towards a large and indefinite audience (in rem) and are correspondingly simple and tend not to require much specialized background knowledge. Governance rules are typically more information intensive; they contain more information per unit of delineation cost, and so are especially suited for smaller, more close-knit, and more expert audiences, such as a limited group with access to a common pool resource.[258] In a grazing commons, the "rest of the world" need only know to keep off, and only the insiders, the commoners, need know about the regulations of grazing times and the requirements for tethering animals. The more detailed rules may or may not be backed up by liability rules (putting a value on certain resource-depleting activities), but exclusion rules directed at the world at large tend to be backed up by property rules, as in trespass.

One difference between in rem call and put liability rules is in how the world at large has to process them. In a call liability regime, the rest of the world has the power but not the obligation to take entitlements. Liability can be avoided categorically, for example, in the case of auto accidents by not driving. In the case of put-style liability rules, the put, if in rem, means that any member of the public

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[256] *See, e.g.*, Ian Ayres, *Protecting Property with Puts*, 32 VAL. U. L. REV. 793 (1998); Ayres & Balkin, *supra* note 30, at 729–33; Morris, *supra* note 5, at 854–56.   **R**

[257] *See* Epstein, *supra* note 6, at 2093; *see also* Rose, *supra* note 6, at 2180, 2184–88.   **R**

[258] *See* Smith, *supra* note 140, at 1111, 1116–17, 1150–56.   **R**

might have to worry about being forced to pay for an entitlement she has never contemplated before. The information-gathering costs, or alternatively, the debilitating uncertainty that this involves, has no corresponding benefit. It is true that tort law is not standardized like property—there is no *numerus clausus* of torts and courts can devise new torts in response to new social conditions[259]—but tort law also generally avoids casting generalized affirmative duties on the public at large. Even in tort law, in rem rights always have as correlatives duties of abstention.[260] A member of the public does not have the affirmative duty to be a forced buyer of an entitlement.

In the few cases in which the law uses puts, a relationship between the parties already exists.[261] The person who is the forced buyer has taken some action to be in the special position of the in personam dutyholder under the liability rule. Thus, in conversion, the victim can either recover the thing or force its sale, but it was the converter who initiated the relationship. But members of the large and indefinite general public are spared the information-gathering costs of being subject to put-style liability rules.

C. *Property Rules and Residual Claims*

A final notion closely associated with the ownership of property is the residual claim. Often the holder of the residual claim is called the "owner" even if other interests of a more limited nature have been carved out of the total bundle of rights over the asset. The owner of the residual gets that which is left over after all the other claims have been honored.[262] The question is why this is so.

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[259] Clark v. Associated Retail Credit Men, 105 F.2d 62, 63–64 (D.C. Cir. 1939).

[260] *See* A.M. Honoré, *Rights of Exclusion and Immunities Against Divesting*, 34 TUL. L. REV. 453, 458–59 (1960); *id.* at 459 ("[T]here appears to be no instance, either in the Anglo-American or continental lists, of a right protected by a claim that persons generally should perform something."); Merrill & Smith, *supra* note 77, at 788–89; s*ee also* HOHFELD, *supra* note 49, at 72; Wesley Newcomb Hohfeld, *Faulty Analysis in Easement and License Cases*, 27 YALE L.J. 66, 70–71 (1917); Jacob, *supra* note 150, at 1377–78 ("[Hohfeld's] position on affirmative obligations relates directly to his belief that property was paradigmatically constructive rather than consensual. The argument he is making is that few affirmative, as opposed to negative, obligations ought to be broadcast. Hohfeld has in mind something like the obligation to join a posse.").

[261] *See* Epstein, *supra* note 6, at 2093–94. This is a special case of the proposition that the law does not impose in rem duties that require affirmative acts. *See* note 260 and accompanying text.

[262] For Oliver Hart, the right to control the use of an asset

resides with the owner of the asset. Ownership of an asset goes together with the possession of residual rights of control over that asset, that is, the owner has the right to use the asset any way that is not inconsistent with a prior contract, a custom, or any law.

One answer centers on risk bearing. The holder of the residual bears all the exogenous risk. Efficiency suggests that a person who has an advantage in bearing risk will hold the residual. One variant of this is that a person who can affect the mean value of the asset will get the residual.[263] This person has more impact on the value of the asset and so should get more of the upside and downside of the asset's value. These hypotheses may help answer why the owner owns a lot of the asset, but they do not wholly explain why the residual is defined negatively—as that which is left over after other claims have been carved out. Why not build the residual synthetically out of smaller "sticks" in the bundle of rights?

One answer is that the residual claim is a response to information cost. In the case of an enterprise, the contribution that is hardest to measure will have a return based on something more like a residual claim.[264] The virtue of a residual claim is that the person's contribution need not be measured directly. The residual is by definition that which is left over from an asset after all other claims have been honored. Thus, to measure out the residual, one must define the asset as a whole—which will be necessary for all sorts of purposes—and will then have to measure the contributions of the other claims. This is very different from trying to build up the residual directly by trying to figure out the value of the residual holder's claim in terms of its constituent sticks.

Here is where the definition of property as a bundle of rights can be misleading. If we think of the rights to an asset as a bundle of sticks and the residual as the sticks left over after other sticks have been parceled out, the question becomes why we cannot just figure out which sticks the "owner" should have directly. The problem is that the bundle-of-rights view assumes away delineation and other information costs. Before rights are parceled up, they do not come in predefined sticks. Some delineation is necessary to have sticks. Thus, on this view, it is very different to define the residual claim as what is left over after other rights have been defined and measured than it is to define the residual as the resulting "sticks." Recall Markby's analogy of property to a bucket of water, which is not conceived as an

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Oliver Hart, *An Economist's Perspective on the Theory of the Firm*, in ORGANIZATION THEORY 154, 160 (Oliver E. Williamson ed., 1995); *see also, e.g.*, Jonathan R. Macey, *Fiduciary Duties as Residual Claims: Obligations to Nonshareholder Constituencies from a Theory of the Firm Perspective*, 84 CORNELL L. REV. 1266, 1279–80 (distinguishing notions of residual claim as residual cash flow and residual legal rights).

[263] YORAM BARZEL, ECONOMIC ANALYSIS OF PROPERTY RIGHTS 9 (2d ed. 1997).

[264] *See* Yoram Barzel, *The Entrepreneur's Reward for Self-Policing*, 25 ECON. INQUIRY 103, 105, 114 (1987).

aggregate of drops.[265] The fact that the owner tends to have an "indefinite reservoir" of use rights follows from the nature of the delineation problem. The owner has this reservoir because the cheapest way to divide the asset uses the asset's outside boundary and the boundaries of the nonresidual claims. The claim of someone whose contribution to the value of the asset is significant and difficult to evaluate will be a good candidate for the residual right because the savings in delineation costs will be correspondingly high.

V

CONCLUSION

Property rules have informational advantages. There has been much talk of delegation and information harnessing among pro–liability rule commentators, but these approaches all assume that property operates on a use-by-use basis and that uncertainty is reducible to risk. But if property law has to contend with assets that have multiple, costly to measure attributes, an exclusion-based strategy becomes a reasonable first pass at internalizing the costs and benefits of the various uses of an asset. Delineation under exclusion proceeds implicitly and not use by use. Further refinement can occur through governance rules in those situations where the stakes are high enough and the group whose behavior is targeted is small and expert enough that further precision in use control is warranted. Property employs the exclusionary regime to delegate to owners the first-order choices of uses with respect to an asset. Property rules back up this choice because courts are usually less efficient at dealing with uncertainty than are owners and potential takers. Property rules also typically allow less self-help and manipulation by owners and takers. And the kind and amounts of information required under a property rule complement the information generated under an exclusionary regime.

This information-cost theory of the advantages of property rules can explain some otherwise very puzzling aspects of the law. It helps explain why property rules are so widespread and are used in basic situations of the sort that refined theories easily overlook. Basic regimes like trespass are only exceptionally supplemented in the law with off-the-rack governance regimes like those in the law of nuisance and necessity. For reasons of information cost, precisely those entitlements that tend to be labeled property will be delineated using methods falling towards the exclusion end of the spectrum and will be protected through property rules rather than liability rules. The information-cost theory of property rules also allows one to explain why

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[265] *See supra* note 151 and accompanying text.   **R**

property rules are associated with the notion of property through the use of regimes of exclusion to delineate rights. The absence of in rem puts is both related to the exclusionary regime and its accompanying property rules: Forcing people at large to be purchasers of entitlements involves high information costs. Finally, the information-cost theory also allows a better understanding of the nature of the residual claim and its central place in the theory of property. Property rules are aptly named.