Correlated Values in the Theory of Property and Liability Rules

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ABSTRACT

Louis Kaplow and Stven Shavell have shown that liability rules tend to efficiently harness the defendant's private information when courts are imperfectly informed as to litigants' valuations. But they claim that liability rules cannot harness private information when the disputants' valuations are correlated. This article rejects the correlated-value claim. While correlated valuations create real problems of implementation, Kaplow and Shavell's own harnessing result can be extended to redeem the usefulness of liability rules. When values are correlated, enlightened courts can enlarge the damages that takers expect to pay so as to induce efficient takings. The relative efficiency of property and liability rules turns out to be independent of whether the disputants' values are correlated.

1. INTRODUCTION

Scholars have often conceived of the core difference between property rules and liability rules as the difference between protecting by deterrence and protecting by compensation. Property rules protect entitlements by deterring nonconsensual takings, while liability rules compensate entitlement holders if a nonconsensual taking occurs (Rose 1997; Ayres 1998; Ayres and Goldbart 2001). Louis Kaplow and Steven Shavell, however, in a truly excellent article that repays close reading, have reoriented the debate by showing how liability rules are an "allocative" device that economizes on the litigants' private information when a court is imperfectly informed as to their valuation (Kaplow and Shavell 1996).

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As Kaplow and Shavell (1996, p. 725) succinctly put it, "[T]he virtue of the liability rule is that it allows the state to harness the information that the injurer naturally possesses about his prevention cost." They show that setting damages equal to the court's estimate of the entitlement holder's valuation not only compensates the entitlement holder for any nonconsensual takings that occur but also induces value-enhancing takings. A potential defendant who considers whether to take an entitlement protected by a liability rule will tend to take only if her benefits from taking are greater than her estimation of what damages will be. And since the latter is tied to the court's estimate of the entitlement holder's value, defendants will tend to take the entitlement only when their value is greater than the entitlement holder's value.[1]

This "harnessing" result clarifies and formalizes the pioneering work of Guido Calabresi and Douglas Melamed (1972).[2] After Kaplow and Shavell, it is now possible to see that courts should set liability rule damages so that potential takers—given their private information about the value of taking—will take only when the taking is expected to enhance value.[3] By having the courts set damages at their best estimate of the entitlement holder's harm from the taking, liability rules seem to

1. Kaplow and Shavell provide the following numeric example: "If harm is $1,000, but the state does not know whether the prevention cost is $800 or $1,200, the state may make one of two mistakes: giving the victim the right to be free from harm when in fact the prevention cost is $1,200 (so that it would be socially desirable for harm to occur) or giving the injurer the right to cause harm when the prevention cost is only $800 (so that it would be desirable for the injurer to prevent harm). Inevitably, the state will make mistakes in assigning entitlements to parties when its information about the injurer's prevention cost is imperfect. Under the liability rule, however, the socially optimal outcome will always occur. Faced with damages of $1,000 for harm, the injurer will cause harm if and only if his prevention cost (which he knows) is $1,200; if his prevention cost is $800, he will prevent rather than cause harm" (Kaplow and Shavell 1996, p. 725, footnotes omitted).

2. The "harnessing" result might alternatively be thought of as an "internalization" result, because such damages cause the decision maker to internalize the expected costs as well as the benefits of her decision. We slightly prefer the term "harnessing" because of its implicit emphasis on the harnessing of the decision maker's private information. If the private litigants do not have an information advantage over the courts, there is no need to delegate the allocative choice to the litigant (via potential taking)—the court could merely assign the entitlement to the higher valuer via a property rule (Kaplow and Shavell 1996, p. 724).

3. In some ways, their harnessing result is a generalization of the idea of efficient breach in contract theory (Friedman 1989, pp. 5–7). Setting expectation damages equal to the court's estimate of the promisee's value of performance will tend to induce the promisor to breach only when breach is efficient (that is, when the promisor's cost of performance is greater than the promisee's benefit from performance).

focus on the entitlement holder.[4] But after Kaplow and Shavell, it is now possible to think of liability rules as focusing on the potential taker. Liability rules are designed with the secret ambition of giving the potential taker the incentive to take efficiently.

The harnessing result allows Kaplow and Shavell to overthrow one of the most basic tenets of law and economics scholarship—the idea (distilled from Calabresi and Melamed) that property rules are presumptively more efficient than liability rules when transaction costs are low (Calabresi and Melamed 1972, pp. 1106–10).[5] Kaplow and Shavell (following Ian Ayres and Eric Talley)[6] showed that there is no reason to think that liability rules will produce lower efficiency than property rules in low-transaction-cost settings: "[We] cast doubt on the belief that property rules are best when transaction costs are low—assertedly because the use of property rules will induce parties to bargain and reach desirable outcomes. . . . We find that this belief is often contradicted: when transaction costs are low, parties will tend to bargain under liability rules as well as under property rules and may reach outcomes superior to those reached under property rules" (Kaplow and Shavell 1996, p. 718).

When transaction costs are nil, the Coase theorem preordains that liability and property rules will be equally efficient—and transaction-cost advocates have never advanced a reason why property rules should produce more efficient bargaining when transaction costs increase from zero to merely low (Ayres and Talley 1995b, p. 242).[7] Indeed, Kaplow

4. From the option perspective, both the plaintiff and the defendant under a type 2 liability rule are really entitlement holders. The defendant has an entitlement to a valuable taking option, while the plaintiff owns the underlying asset subject to this option. See Rose (1997, p. 2183), Ayres (1998, p. 797), and Ayres and Talley (1995b).

5. For a more explicit characterization, see Cooter and Ulen (1995, pp. 98–100). Numerous additional citations to the proposition can be found in Lewinsohn-Zamir (2001).

6. Ian Ayres and Eric Talley had previously provided a numeric example in which bargaining under liability rules produced greater efficiency than bargaining under property rules (Ayres and Talley 1995b). Ayres and Talley showed that liability rules have an information-forcing effect in bargaining (not shared by property rules) that might cause disputants to bargain more efficiently. While the two authorial pairs agree that property rules need not dominate liability rules when transaction costs are low, they differ on the reason. See Kaplow and Shavell (1995), and Ayres and Talley (1995a).

7. Kaplow and Shavell make the point thus: "One [often finds] summary expression of the belief that use of a property rule to bar outright appropriation of things is desirable because it forces a person who wants something to bargain for it with its possessor. The belief derives from the idea that, through the requirement of bargaining, we can be reasonably confident that property will change hands when and only when the change is

and Shavell's harnessing results suggest that bargaining might tend to be more efficient under a liability rule because the litigants bargain in the shadow of more efficient threat points.[8]

To our minds, both the harnessing result and Kaplow and Shavell's critique of property rule dominance in low-transaction-cost settings are unassailable. But Kaplow and Shavell go further. Their article also tries to replace the void left by their transaction-cost critique. If low transaction costs do not explain the prevalence of property rules, what does? Their answer is that property rules tend to be the more efficient way to protect tangible entitlements (what they term "the taking of things") while liability rules—because of the harnessing result—tend to be the more efficient way to protect intangible entitlements (what they term "harmful externalities").

Their attempt to find a more solid foundation for property rules is admirable. Both property and liability rule protections have had such enduring and widespread (but not all-encompassing) usage that it is quite natural to look for an explanatory theory that does not prove too much. To hold that liability rules are systematically more efficient than property rules in all contexts (say, because of the harnessing result) would mean that an inefficient form of entitlement protection had been able not just to survive but to thrive. This strikes many (law and economics) scholars as presumptively implausible.

To support their thesis that property rules tend to dominate with regard to the protection of tangibles, Kaplow and Shavell offer two core arguments. First, they argue that liability rules cannot harness private information when the disputants' valuations are correlated and that valuations of tangibles tend to be more correlated than valuations of in-

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efficient. For example, bargaining can ensure that my car will be transferred to another person when and only when he values it more highly than I do. This argument, however, is not one that supports property rules over liability rules in any obvious way. If we believe that bargaining will result in the achievement of mutually beneficial transfers when they exist, that will be so under a liability rule as well as under a property rule. If Jack can take my car if he pays damages of $10,000, but in fact I value the car more highly than he does, I could still bargain with Jack, paying him to refrain. (This is, of course, an application of the Coase Theorem.)" (Kaplow and Shavell 1996, pp. 721–22).

8. Ayres and Talley (1995b, p. 241) referred to this as the "nonconsensual advantage" of liability rules. The harnessing result gives liability rules a nonconsensual advantage over property rules when bargaining is not feasible, and Kaplow and Shavell (1996) conjecture that such an advantage is likely to persist as transaction costs are reduced and bargaining becomes feasible. It is far from clear, however, that more efficient threat points (that is, the payoffs that will result if bargaining is unsuccessful) translate into more efficient bargains. Indeed, see Ayres and Talley (1995a, p. 245).

tangibles. Second, they argue that liability rules cannot feasibly be used to protect tangible entitlements because of the problem of multiple takings (by others or even by the original entitlement holder taking back the entitlement). We will refer to these two arguments respectively as the "correlated-value" and the "multiple-takings" claims. Because the correlated-value and multiple-takings problems do not apply to intangible entitlements, Kaplow and Shavell argue that the harnessing result causes liability rules to be the more efficient way to protect intangibles. But because correlated-value and multiple-takings problems undermine liability rules' ability to harness private information, they argue that property rules tend to be the more efficient way to protect tangible entitlements.

In this article, we reject the correlated-value claim. Our thesis is that while correlated valuations create real problems of implementation, Kaplow and Shavell's own harnessing result can be extended to redeem the usefulness of liability rules even when values are correlated. We will show that even in the presence of these problems, enlightened courts can manipulate the damages that takers can expect to pay so as to induce efficient takings. Kaplow and Shavell's laudable desire to develop a theory that could broadly explain observed legal practice seems to have trumped their willingness to run with what to our minds is the more important insight—the ability of liability rules to harness a taker's private information.

Kaplow and Shavell's numeric examples that purport to show the dominance of property rules when values are correlated systematically understate the potential efficiency of liability rules. Their examples compare the more efficient property rules to liability rules that use inefficient damages and systematically delegate allocative authority to the less efficient litigant. We will show that if the optimal liability rule is instead compared with the more efficient property rule, then in all of the numeric examples constructed by Kaplow and Shavell themselves, liability rules (which contemplate nonconsensual takings) dominate.

The relative efficiency of property and liability rules turns out to be independent of whether the disputants' values are correlated. Regardless of the degree of correlation, liability rules dominate whenever the court perceives that the range of possible valuations by the option holder extends above and below the mean valuation of the non–option holder.

This article's critique of the correlated-value claim parallels a preexisting critique of the multiple-takings claim. The multiple-takings problem arises only if courts impose naive stationary damages. But a moment's reflection suggests that the imposition of stationary damages for successive takings is inconsistent with Kaplow and Shavell's own harnessing idea. The very fact of an initial taking should make the court revise upward its beliefs about the taker's valuation. Indeed, imposing higher damages for successive takings actually allows courts to better harness the private information of all potential entitlement owners in what amounts to a more efficient auction (see Ayres and Balkin 1996; Ayres and Goldbart 2001). It turns out that both the multiple-takings and correlated-value problems can be solved by using elevated damages to better harness private information instead of using naive liability rule damages that are simply set at the plaintiff's unconditional mean value.

At the outset, we should emphasize that this is not an applied paper but a theoretical critique—written at basically the same level as Kaplow and Shavell's own analysis. Except with respect to a few points, we give relatively little attention to the practical difficulties involved in setting optimal damages or to the institutional questions about who should be making such decisions.

This article is divided into two sections. The first distinguishes the empirical and theoretical aspects of Kaplow and Shavell's tangibility thesis. The second critiques the correlated-value claim. Even though we ultimately reject tangibility as an adequate grounds for property rule protection, we believe that Kaplow and Shavell deserve credit for seeing even further into the cathedral than their predecessors.

2. DISTINGUISHING EMPIRICAL AND THEORETICAL ASPECTS OF THE TANGIBILITY THESIS

Kaplow and Shavell's claim that tangible entitlements tend to be most efficiently protected by property rules can be decomposed into empirical and theoretical elements. As a theoretical matter, they argue that when disputants' valuations are correlated or when entitlements are potentially subject to multiple takings, property rule protections tend to be more efficient (Kaplow and Shavell 1996, p. 720). As an empirical matter, they argue that tangible entitlements are likely to give rise to correlated values and multiple takings (Kaplow and Shavell 1996, p. 757).

Their empirical claim is supported by an appeal to archetypes. For them, the archetypal intangible is a nuisance entitlement, while the archetypal tangible is a chattel entitlement (Kaplow and Shavell 1996, p. 760). They plausibly argue that the benefits from pollution are likely to be uncorrelated with harms to the recipient of pollution—so that in nuisance disputes the valuations are likely to be uncorrelated. In a dispute over some chattel (say, an automobile), the valuation of the potential taker is more likely to be positively correlated with the valuation of the initial owner. Hence, the archetypal tangible entitlement has correlated values, while the archetypal intangible does not.

Similarly, they argue that tangible chattel are more potentially subject to multiple-takings problems than intangible nuisance entitlements. Almost anyone might be a potential taker of an automobile (and once taken the original owner might decide to take back). But there are only a few neighboring landowners who could pollute a particular piece of land, and it is all but impossible for the pollutee to physically take back her initial entitlement (to be free from pollution).

Some scholars might be willing to dispute these empirical tendencies. And Kaplow and Shavell themselves provide counterexamples (Kaplow and Shavell [1996, p. 772] discuss the taking of a hotel's ocean view as involving correlated values). But it is important to note that these empirical claims are not essential. Kaplow and Shavell might have repositioned their thesis to argue—purely from theory—that property rules tend to be more efficient when there are correlated-value or multiple-takings problems. They could have then left it to the reader to decide whether chattel (or particular types of chattel) have one or the other attribute.

Decomposing their theoretical and empirical contributions probably would have also clarified their thesis. For at present, Kaplow and Shavell never say whether property rules will tend to dominate if only one of the two attributes is present. If, for example, an entitlement has the correlated-value but not the multiple-takings attribute, are liability or property rules more efficient? While Kaplow and Shavell do not explicitly answer this question, their arguments appear disjunctive. If either correlated-value problems or multiple-takings problems exist, the beneficial harnessing effect of liability rules is rendered inoperative and property rules would dominate.

Inferring whether their theory is disjunctive is of more than passing interest, because in important parts of the cathedral only one feature exists. Contractual entitlements probably have correlated values but not the multiple-taking feature. Valuations of contractual entitlements to services will tend to be correlated (even though the cost of performance and the benefits of use may be independent) because the exchange value is likely to be correlated. The seller could sell the service (say, a rock concert performance) to another buyer, and this should induce positive correlation in valuation. But if a seller breaches her promise of performance (thus taking the promisee's contractual entitlement), it will be difficult for the promisee (or for a third party) to take back the entitlement.

Kaplow and Shavell continue the Calabresian tradition of ignoring contractual entitlements—possibly because neither the transaction-cost nor the tangibility theory provides a very good explanation of why these entitlements are dominantly protected by liability rules. Calabresi and Melamed's transaction-cost theory held that property rules should dominate when transaction costs are low—but with regard to the protection of contractual entitlements in which the parties have already demonstrated an ability to enter into an initial transaction, the law protects entitlements with the liability rule of expectation damages instead of the property rule of specific performance.[9] Similarly, Kaplow and Shavell's correlated-value claim leads us to expect that many contractual entitlements would be protected by property rules, when they are not.

In this article, we do not take on the empirical aspects of the tangibility thesis. We think the archetypal distinction between nuisance and chattel entitlements is illuminating, but we demur as to whether correlated-value and multiple-taking potentials are central tendencies. Our agnosticism as to whether chattel give rise to correlated valuation grows out of an agnosticism about the nature of court ignorance. For correlated valuations to undermine the harnessing effect of liability rules, that part of litigants' value not visible to the courts must be correlated. While Kaplow and Shavell quite plausibly argue that the total chattel valuations of disputants are often positively correlated, it is less clear that the portion of value unobservable to courts is correlated. A major source of correlated valuation is the potential exchange value of the entitlement. What tends to be correlated in value is that component for which there is a market value. But market values may tend to be relatively observable by judges. It is the litigants' idiosyncratic, nonmarket values that are likely to be less observable by courts and less correlated. This is not to say that there cannot be correlated values that are privately

9. The incompatibility of transaction-cost theory with contract practice has led some scholars to call for a reform of practice—expanding the use of property rule protection of contractual entitlements. See Kronman (1978, p. 352), Ulen (1984, pp. 375–76), and Schwartz (1979).

known, only that the strength of the tendency may not be as great as Kaplow and Shavell suggest in their examples.[10]

But even if the empirical distinctions that Kaplow and Shavell posit are true, we will show in this article that Kaplow and Shavell's own harnessing principle can be extended and generalized to cope with the very real problems of correlated valuations.

3. CRITIQUE OF THE CORRELATED-VALUE CLAIM

One of the most innovative and important contributions of Kaplow and Shavell's article concerns their analysis of correlated valuations. If the valuation of the potential taker and the entitlement holder are positively correlated, then it becomes more difficult to use liability rules to harness the potential taker's private information (about her own value). Simply setting damages equal to the plaintiff's average valuation can easily lead to inefficient overtaking by defendants. If the defendant's and plaintiff's valuations are positively correlated, a high realized defendant valuation also implies a higher-than-average realized plaintiff valuation. A defendant might have a valuation higher than the average plaintiff value (and thus want to take) even though, given the correlated valuations, the defendant knows that her own valuation is still likely to be lower than the plaintiff's expected valuation.

Kaplow and Shavell illustrate this correlated-value problem with a series of examples in which the litigants' overall valuation can be decomposed into "common-value" and "idiosyncratic-value" components.[11] For example, in one of their examples they assume that (1) the litigants' common-value component is uniformly distributed between 90 and 110, (2) the plaintiff's idiosyncratic-value component is uniformly and independently distributed between 0 and 10, and (3) the defendant's idiosyncratic-value component is uniformly and independently distributed between 0 and 8 (Kaplow and Shavell 1996, p. 789). These assumptions mean that a litigant's individual valuation will be the sum of

10. See text at note 13 (discussing Kaplow and Shavell's numeric examples in which the correlated component of value is assumed to vary over a range 10 times larger than that of the idiosyncratic component of value).

11. "First, suppose that things have a significant common value, that is, a component of value that is the same for both the owner and any taker. . . . Second, assume that things also have idiosyncratic value to individuals. Idiosyncratic value derives from characteristics of a thing that different individuals evaluate differently, such as the design of a home" (Kaplow and Shavell 1996, pp. 759–60).

the realized common value and his or her realized idiosyncratic value.[12] The litigants' valuations are correlated here because there is a common variable component to each litigant's overall valuation.

Kaplow and Shavell show that a traditional liability rule—which would force a taking defendant to pay damages set equal to the plaintiff's mean valuation of 105 (100 mean common value plus 5 mean idiosyncratic plaintiff value)—will be less efficient than giving the plaintiff the entitlement protected by a property rule. The expected joint payoff under a liability rule with 105 damages is 104.82, while the expected joint payoff under a property rule is 105.

When the litigants' valuations are positively correlated, it is difficult for the court's allocative price to distinguish between unexpectedly high realizations of the common-value component and unexpectedly high realizations of the idiosyncratic-value component. In the foregoing example, a liability rule with 105 damages induces the defendant to take too often. For example, if the common-value component should turn out to be 108, a defendant would always take—even if its idiosyncratic value were as low as 0. These takings, on average, would be inefficient because on average the plaintiff's idiosyncratic value is higher than the defendant's (5 versus 4). A high realization of the common value tells us nothing about whether the defendant's idiosyncratic value is greater than the plaintiff's—and the latter comparison is what drives allocative efficiency.

A court would like to induce defendants to take only when they have a high idiosyncratic value, but in structuring a liability rule courts can only announce a damage amount that represents a combination of the common and idiosyncratic valuations. A defendant who chooses to take (when its total value is greater than expected damages) may be doing so either (1) because it has high idiosyncratic damages or (2) because both plaintiff and defendant have a high common value. The former takings will on average be efficient (for the same harnessing rationale discussed above), but the latter takings (driven by high common values) will tend to be inefficient (Kaplow and Shavell 1996, p. 760).

Kaplow and Shavell attempt to show how correlated valuation causes property rules to tend to dominate liability rules with a series of five examples that they analyze in their text and appendix. The first three

12. For example, if the common value of both parties turns out to be 103 and if the idiosyncratic value of the plaintiff turns out to be 8, the plaintiff's total realized value would be 111.

rows of Table 1 describe the assumptions underlying these examples.[13] Example 2 was the basis of our earlier discussion:[14] the common-value component of both litigants is uniformly distributed between 90 and 110, the plaintiff's idiosyncratic value is uniformly distributed between 0 and 10, and the defendant's idiosyncratic value varies between 0 and 8.

The examples all assume that the court's uncertainty as to common value (seen here by the width of the distribution) is greater than the court's uncertainty as to the defendant's idiosyncratic value. As mentioned above, this assumption is empirically contestable.[15] But we will show that (contrary to Kaplow and Shavell) liability rules can still be useful when a court's imperfect information mainly stems from its difficulty in estimating the litigants' common value.

The remaining rows of Table 1 replicate Kaplow and Shavell's efficiency analysis. The efficiency of a particular regime is directly captured by measuring the expected joint payoffs to the litigants. Kaplow and Shavell ask: Which type of regime will produce the highest expected joint payoffs in the absence of bargaining? If a regime is more efficient when bargaining is not possible, they conjecture that it is likely to remain more efficient as transaction costs fall.[16]

Under a plaintiff property rule, the expected joint payoffs in the absence of bargaining will equal the plaintiff's mean value (mean common value plus mean plaintiff idiosyncratic value). The defendant gets nothing. Continuing our discussion of example 2, we see in Table 1 that under the plaintiff property rule the expected joint payoff is 105 (the mean common value of 100 plus the mean plaintiff idiosyncratic value of 5).

Kaplow and Shavell compare this payoff to the payoff from what we will term a traditional liability rule[17] with traditional damages. They ask what would be the expected joint payoff if the defendant had the option

13. Examples 1 through 4 can be found in their appendix (Kaplow and Shavell 1996, p. 789). Example 5 can be found in their text (Kaplow and Shavell 1996, p. 761). The textual example asks the reader to assume "most of these idiosyncratic values are in the neighborhood of $25," which suggests a normal distribution (Kaplow and Shavell 1996, p. 761). But for the sake of both simplicity and comparability with the other examples, we assume that all distributions in Table 1 are uniform.

14. See text at note 10.

15. See text at note 10.

16. See note 12.

17. Under the Calabresi and Melamed (1972, p. 1108) schema, giving the defendant the option to take and pay represents a "rule 2" implementation. See also Ayres (1998, p. 797).

Table 1. Kaplow and Shavell's Numeric Examples

	Example 1	Example 2	Example 3	Example 4	Example 5
Common-value distribution	[90, 110]	[90, 110]	[95, 105]	[95, 105]	[0, 200]
Plaintiff's idiosyncratic-value distribution	[0, 10]	[0, 10]	[0, 10]	[0, 10]	[0, 50]
Defendant's idiosyncratic-value distribution	[0, 5]	[0, 8]	[0, 6]	[0, 8]	[0, 10]
Expected joint payoff under "plaintiff" property rule	105	105	105	105	125
Assumed (defendant choice) liability rule damages	105	105	105	105	125
Expected joint payoff under assumed (defendant choice) liability rule	104.147	104.816	104.697	105.129	117.041
More efficient rule	Property	Property	Property	Liability	Property

to take the entitlement nonconsensually and pay the plaintiff his expected value. Since Kaplow and Shavell assume damages equal to the mean plaintiff's value, the damages row is identical to the property rule expected payoff row in Table 1 (again, 105 for example 2). As discussed above, the problem with correlated valuations is that they can induce defendants to over take—taking even when their value is lower than what, given correlated values, they expect the plaintiff's value to be. In example 2, defendant takings create expected losses from inefficient takings that are 31.3 percent greater than the expected gains from efficient takings.

Indeed, in four of the five examples, property rules are claimed to be more efficient. Only in example 4, where the variation in common value becomes relatively small compared to the variation in the defendants' idiosyncratic value, does the liability rule become more efficient. But this is consistent with Kaplow and Shavell's theory (which we will show to be false)[18] that as the variation in common value becomes small, the litigants' valuations become less correlated and the harnessing result once again militates toward the superiority of liability rules. Kaplow and Shavell use these examples to argue that the more correlated the valuations, the more likely property rules are to be efficient.

Kaplow and Shavell's finding that it is more difficult to use liability rules to harness private information when the litigants' valuations are correlated is an important result that we wish to praise.[19] But while Kaplow and Shavell are correct that correlated valuations make it more difficult to harness private valuations, they are wrong to conclude that property rules dominate liability rules when valuations are positively correlated.

Their examples systematically overstate the advantages of property rules by comparing the more efficient property rule to a liability rule that has nonoptimal damages and the less efficient chooser. Just as there are two possible property rules (giving the entitlement to the plaintiff or the defendant), Calabresi and Melamed famously showed that there are two possible liability rules—the traditional type 2 rule (which gives the defendant the right to pollute if she pays damages) as well as the type 4 rule (which gives the plaintiff the right to stop pollution if he

18. See text at note 32.

19. It has long been recognized that the optimal mechanism for auctions or bargaining will turn on whether or not the bidders'/negotiators' values are independent or not. See Cramton and Schwartz (1991) and McAfee and McMillan (1987, p. 722).

pays damages).[20] In all of Kaplow and Shavell's examples, it turns out that type 4 is the more efficient liability rule (for reasons that we will soon make clear). If we compare the more efficient property rule (plaintiff ownership) to the more efficient liability rule (type 4) with optimal damages, it turns out that liability rules dominate property rules in Kaplow and Shavell's own examples—even though valuations are correlated.

3.1. The Optimal Damages

Let us begin by investigating how optimal damages should be calculated in the presence of correlated values. It turns out that Kaplow and Shavell's own harnessing result can be extended to shed light on this issue. The core insight of Kaplow and Shavell is that damages should be set so that a potential taker will take only when, given her private information about her own value, the taking is expected to be value enhancing. When the litigants' valuations are uncorrelated, setting (type 2) damages equal to the plaintiff's expected value accomplishes this. But when damages are correlated, setting damages at the plaintiff's expected value systematically induces too much taking because a defendant who knows she has a higher than average value should also expect (as in the earlier example) that the plaintiff has a higher-than-average value.

This positive correlation between the defendant's value and what the defendant expects the plaintiff value on average to be is depicted in Figure 1 for the distribution assumed in example 2. Look first at the most extreme possible defendant valuations. If the defendant knows her value to be 90, then she can infer that the plaintiff's expected value is 95.[21] And if the defendant knows her value to be 118, than she can infer that the plaintiff's expected value is 115.[22] Figure 1 shows the plaintiff's expected valuation for any given level of defendant value.

The figure illustrates Kaplow and Shavell's over-taking result. If li-

20. There is a wide variety of rules that are allocatively identical to the traditional type 4 rule (Ayres and Goldbart 2001, p. 27). For example, giving the plaintiff the entitlement plus the (put) option to sell it for $X should produce the same allocation as giving the plaintiff the (call) option to buy the entitlement for $X.

21. If a defendant's total valuation is 90, she can infer (under the example 2 distributions) that her idiosyncratic value must be 0 and that the common value must be 90. If the common value is 90, then the plaintiff's expected total value is 90 plus his mean idiosyncratic value of 5.

22. If a defendant's total valuation is 118, she can infer that her idiosyncratic value must be 8 and that the common value must be 110. If the common value is 110, then the plaintiff's expected total value is 110 plus his mean idiosyncratic value of 5.

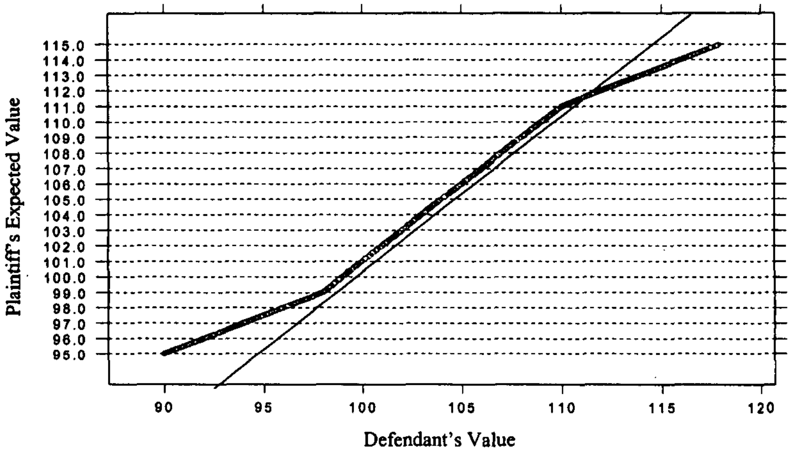

Figure 1. Plaintiff's expected value conditional on defendant's realized value

ability rule damages are naively set equal to the plaintiff's unconditional mean of 105, then defendants with valuations only infinitesimally above 105 will be induced to take the entitlement and pay damages. But the figure shows that when the defendant's value is 105, the plaintiff's expected value is 106. Thus, setting damages at the plaintiff's unconditional mean causes some defendants to take inefficiently—even though they know (because of correlated values) that the plaintiff has a higher expected value.

But while Figure 1 shows a positive correlation between a defendant's value and the plaintiff's expected value, we can see that the plaintiff's expected value grows more slowly. Comparing the endpoints, for example, we see that as the defendant's value grows 28 (from 90 to 118), the plaintiff's conditional mean grows only 20 (from 95 to 115). As long as the correlation in the litigants' valuations is not perfect, a given increase in the defendant's known value will translate into a smaller increase in the plaintiff's conditional mean value. The relative flatness of the curve is important because it implies that there will often exist a point at which the plaintiff's conditional mean value will equal the defendant's value. This crossover point (or what economists sometimes call a "fixed point") is shown in Figure 1 as the intersection of the conditional mean curve with the 45-degree line. For the distributions assumed in example 2, it turns out that this fixed point occurs at 112.

Indeed, setting damages at this fixed point is optimal. In example 2, if damages are set at 112, then defendants with valuations just infinitesimally above 112 will be induced to take the entitlement. But Figure 1 shows that all such takings can be expected on average to increase value. All defendants with valuations greater than 112 will be taking from plaintiffs who they can expect to have a lower value.

The figure further clarifies the difference between compensation and efficient allocation as the motive force behind liability rules. Damages of 112 will induce efficient takings by defendants, but some defendants will know that these damages will systematically undercompensate the plaintiffs: the plaintiff's expected valuation conditional on the defendant's value being greater than 112 will also be greater than 112 (just not as much greater).[23]

The fixed-point result is just a generalization of Kaplow and Shavell's own harnessing theory. When the litigants' valuations are correlated, the optimal liability rule damages are still set equal to the plaintiff's mean value—but because this mean value is now itself a function of the defendant's value, it is a conditional mean instead of an unconditional mean. Optimal damages should be set at the point where the plaintiff's mean conditional on the defendant's value equals the defendant's value. Because the plaintiff's mean value is now a function of defendant's value, optimal damages will find the fixed point at which the defendant's value equals the plaintiff's conditional mean value.[24]

The intuitions behind Kaplow and Shavell's harnessing result also generalize. When the litigants' valuations are correlated, the court should select a damage amount such that if the defendant's value were to equal this amount, the damages would, on average, equal the plaintiff's value. Kaplow and Shavell are correct that the unconditional mean does not

23. In a separate article, we show that it is possible for courts to construct allocatively identical versions of the traditional type 2 rule that continuously vary how the gains from taking are divided between the litigants—thus allowing the court to decouple its distributive and allocative concerns (Ayres and Goldbart 2001, p. 10).

24. More formally, if we denote the idiosyncratic plaintiff, idiosyncratic defendant, and common components of value by Π, Δ, and C, respectively, then optimal damages, D, are those that solve the following equation: $E[C + \Pi \mid C + \Delta = D] = D$. But because the expectation of a sum can be reexpressed as the sum of individual expected values, this can be reexpressed as $E[C \mid C + \Delta = D] + E[\Pi \mid C + \Delta = D] = D$. Because the plaintiff's idiosyncratic value is independent of both the common value and the defendant's idiosyncratic value, this expression simplifies to $E[C \mid C + \Delta = D] + E[\Pi] = D$.

accomplish this, but they overlooked how setting damages equal to plaintiffs' conditional mean could resurrect their harnessing result.[25]

Table 2 reanalyzes the five examples from Table 1 using the optimal damages. Instead of setting damages equal to the plaintiff's unconditional mean, it sets damages equal to the conditional mean at the crossover point. For example, the table reports optimal damages in example 2 of 112 as shown above in Figure 1.

The table also reports the expected joint payoffs under a liability rule with optimal damages. In contrast to Table 1's comparison using naive (unconditional) damages—where property rule protection happens to be superior in four out of the five examples—Table 2 shows that liability rules with optimal (conditional, fixed-point) damages are more efficient in three of the five cases. For example 2, the optimal damages of 112

25. Kaplow and Shavell, in a footnote and in the appendix, did consider the possibility of higher damages. But they did not derive the criteria for setting optimal damages: "[W]e should consider briefly whether a liability rule with damages different from average value might perform better than the liability rule with damages equal to average value. If damages exceed average value—say, damages equal the highest possible common value plus the mean idiosyncratic value to owners—those few takings that would occur would constitute efficient transfers, on average. . . . We mention, however, that the range of possible common values can be quite large. (Just what is the highest possible common value of having a laptop computer with which to take notes at a conference?)" (Kaplow and Shavell 1996, p. 762 n. 157). "The above analysis assumes that damages equal the average common value, 100, plus the average owners' idiosyncratic value, 5, for a total of 105. Higher damages clearly are optimal. In the third example, for instance, if damages were 110, takings would be rare: only takers with idiosyncratic values above 5 would take (for the highest possible common value is 105 and damages are 110) and they would take infrequently (a necessary condition is that the common value exceed 104). Such takings would, on average, be desirable, because the taker's value would, on average, exceed the owner's value. (See our discussion in note 157.) We would, however, interpret such a rule as more like a property rule than a liability rule: even though damages are not infinite, they are high enough to deter virtually all takings" (Kaplow and Shavell 1996, p. 790).

Neither of these discussions focuses on optimal damages. The first passage mentions setting damages at the highest possible common value, but our discussion of example 2 shows that such a standard is still lower than optimal fixed-point damages (110 versus 112). The second passage, in contrast, considers damages that are inefficiently high. Kaplow and Shavell analyze damages of 110 for example 3 when optimal fixed-point damages are only 109 (see Table 2). These examples suggest that Kaplow and Shavell understood that elevated damages could increase efficiency but had not derived the fixed-point result for estimating the exact amount that would harness information. Counter to their suggestion, it is not necessary that a common value have an upper support in order for the court to calculate the fixed-point conditional mean. Finally, Kaplow and Shavell's assertion that it is appropriate to interpret higher damages as property rules because they "deter virtually all takings" conflates deterrence-based protections such as injunctions with harnessing protections, which aim to induce value-enhancing transfers.

Table 2. Kaplow and Shavell's Examples with Optimal Damages

	Example 1	Example 2	Example 3	Example 4	Example 5
Expected joint payoff under "plaintiff" property rule	105	105	105	105	125
Assumed (defendant choice) liability rule damages	105	105	105	105	125
Expected joint payoff under assumed (defendant choice) liability rule	104.147	104.816	104.697	105.129	117.041
Optimal (defendant choice) liability rule damages	115	112	109	107	210
Expected joint payoff under optimal (defendant choice) liability rule	105	105.113	105.011	105.225	125
More efficient rule	Property	Liability	Liability	Liability	Property

give rise to expected joint payoffs of 105.113 instead of the 105 expected joint payoffs produced under a property rule.

3.2. The Optimal Option Holder

By itself, the superiority of liability rules in a slight majority of these five examples tells us very little. Kaplow and Shavell's examples certainly are not adequately structured to prove that property rules tend to dominate, but given the arbitrariness of the specific numbers assumed we would—without more analysis—have to be agnostic about a general tendency.

But as it turns out, there is a second way that Kaplow and Shavell's original comparison overstated the dominance of property rules. They choose to compare the more efficient property rule to the less efficient liability rule. In all of these examples it is more efficient to give the initial entitlement to the defendant and give the plaintiff the right to take and pay damages. This is the famous type 4 rule of Calabresi and Melamed that was judicially implemented in *Del Webb*.[26]

It is straightforward to see that the more efficient property rule is to give the entitlement to the litigant with the higher expected value (in these examples, always the plaintiff). In the absence of bargaining, this straightforwardly maximizes the parties' expected joint payoff. Kaplow and Shavell made the facially plausible assumption that the more efficient liability rule would give the initial entitlement to the litigant with the higher value (and to give the lower-valuing litigant only the taking option).

But this assumption turns out to be false—and the reason can quickly be seen once we appreciate that liability rules confer upon potential takers the option to take or not to take. From an option perspective, liability rules can be seen as dividing the litigants' claims to the entitlement. One litigant receives a call option—the option to buy—while the

26. *Spur Indus., Inc., v. Del E. Webb Dev. Co.*, 494 P.2d 700, 708 (Ariz. 1972) (Cameron, V.C.J). The court's unconditional order seems to differ from the previous definition of a type 4 rule, which gives the resident the choice of whether (1) to pay to stop further pollution or (2) to not pay and to allow the polluter to continue polluting. To harmonize the case with the definition, it is necessary to speculate about what would have happened if Del Webb had petitioned the court to void its order enjoining the pollution as well as its order that Del Webb indemnify Spur. If we believe that the court would have in effect allowed Del Webb to withdraw its initial complaint, it would have in effect been giving Del Webb the type 4 choice—that is, the choice of paying to stop pollution or not paying and allowing the pollution to continue. Alternatively, at a minimum, future developers will realize that suing in this jurisdiction may be choosing to pay for an injunction.

other receives the entitlement subject to the call (see Ayres and Talley 1995b, p. 1048; Rose 1997, p. 2183; and Ayres and Goldbart 2001, p. 18). Appreciating this option interpretation directly leads to the conclusion that type 4 dominates type 2. A fundamental result of option theory is that options are more valuable the more volatile the underlying asset (see Brealey and Myers 1996, p. 557). As applied to liability rules, this means that courts should tend to give the option to the litigant with the more variable valuation distribution.[27] From Table 1, we can see that in all of Kaplow and Shavell's examples, the plaintiff's valuations are not only systematically higher but also systematically more volatile. From an option perspective, this suggests that the plaintiff is the more efficient taker—so that type 4 is likely to be more efficient than type 2.

Table 3 shows this in fact to be the case for all five examples. It reports the expected joint profits under a type 4 regime using optimal (conditional, fixed-point) damages. Comparing Tables 2 and 3, it is easy to see that type 4 dominates. The expected joint profits under type 4 are systematically larger than the expected joint profits under type 2. In example 2, type 2 (with optimal damages) produces expected joint payoffs of 105.113, while type 4 is more efficient, producing the higher expected joint payoff of 105.213.

For these examples, the greater efficiency of type 4 combined with optimal damages completely reverses Kaplow and Shavell's claim that property rules will tend to be more efficient than liability rules when valuations are correlated. In all five of their examples, the optimal liability rule turns out to be more efficient than the best possible property rule.

Five examples do not prove a tendency, but we can go still further. It turns out that as long as the option holder's idiosyncratic-value distribution can take on values both above and below the other litigant's idiosyncratic mean, the liability rule will be superior.[28] As long as the option holder's potential values overlap the non–option holder's mean value, there will exist an "interior" fixed-point damage amount—that

27. This proposition is formally shown in Ayres and Goldbart (2001, p. 28).

28. More formally, as long as the nonchooser's unconditional idiosyncratic mean lies within the support of the chooser's idiosyncratic value, the liability rule will dominate either possible property rule. In contrast, Kaplow and Shavell assert that "[a] sufficient condition for superiority of the property rule is that the support of the [defendant's idiosyncratic distribution] lies below the [plaintiff's idiosyncratic mean]" (Kaplow and Shavell 1996, p. 788). Table 3 shows, however, that this assertion is true only if one restricts attention to type 2 implementations.

Table 3. Kaplow and Shavell's Examples with Optimal Damages and Plaintiff Choice (Type 4)

	Example 1	Example 2	Example 3	Example 4	Example 5
Expected joint payoff under "plaintiff" property rule	105	105	105	105	125
Assumed (defendant choice) liability rule damages	105	105	105	105	125
Expected joint payoff under assumed (defendant choice) liability rule	104.147	104.816	104.697	105.129	117.041
Optimal (plaintiff choice) liability rule damages	95	98	101	103	10
Expected joint payoff under optimal (plaintiff choice) liability rule	105.052	105.213	105.180	105.427	125.008
More efficient rule	Liability	Liability	Liability	Liability	Liability

is, a damage amount within the support of the option holder's probability distribution where the option holder's value equals the non–option holder's conditional mean value.[29] The existence of interior liability damages assures the dominance of liability rules because in equilibrium the option holder will nonconsenually take whenever her privately known value is higher than the non–option holder's conditional mean. Sufficient variation in the option holder's idiosyncratic values (relative to the other litigant's idiosyncratic mean) implies that the option has both private and social value—sometimes it will be efficient to exercise the option (and transfer the entitlement), and sometimes it will be efficient for the option holder not to exercise.

This sufficient condition for liability rule dominance also explains why examples 1 and 5 switch from having property to liability rule dominance as we switched from type 2 to type 4 implementations. In example 1, the plaintiff's and defendant's idiosyncratic valuations vary between 0 and 10 and between 0 and 5, respectively. Under type 2 when the defendant is the option holder, the defendant's possible idiosyncratic values [0, 5] do not vary above and below the plaintiff's mean idiosyncratic valuation of 5. Giving the defendant an option to take in this example has no social value, because there are never realizations of defendant's idiosyncratic value where we would want the defendant to take.

Kaplow and Shavell have provided an example where a property rule dominates a type 2 implementation, but it should now be clear that the superiority of the property rule has nothing to do with the correlated valuation. Even if there were no correlated value (which could easily be accomplished by eliminating the variation in the common-value distribution), the property rule would dominate because the type 2 option would have no social value.[30]

But example 1 also shows that the failure of the sufficiency condition with regard to a type 2 implementation does not imply that the condition will fail with regard to a type 4 implementation. Under type 4, the plaintiff is the option holder. In example 1, the plaintiff's idiosyncratic

29. This result is formally proved in Knysh, Goldbart, and Ayres (2002).

30. When the option holder's idiosyncratic distribution does not overlap with the non–option holder's mean idiosyncratic value, there will not be an interior fixed-point damage amount—so that the optimal damages will be set at an extreme value under which the defendant will never take (or always take). This can be seen in Table 2 by the example 1 liability damages of 115, which replicate a property rule outcome by deterring all defendant takings.

mean varies between 0 and 10 and the defendant's idiosyncratic mean is 2.5—so the plaintiff call option will have both private and social value.[31] Some realizations of the plaintiff's idiosyncratic value will make a taking efficient, and other realizations will make a taking inefficient. It is in just these circumstances that a liability rule will dominate a property rule.

Note that our sufficiency condition merely compares the litigants' idiosyncratic distributions. It is completely independent of the common-value distribution. This is important because it implies that the superiority of liability rules to property rules does not turn on whether the variation in the litigants' values is more importantly influenced by variation in common or idiosyncratic values. Regardless of how much (or how little) the common value varies, liability rules will dominate if the sufficiency condition holds. This finding directly contradicts Kaplow and Shavell's assertion that property rules will dominate as long as the variation in the common value is large relative to the variation in the litigants' idiosyncratic value.[32] That conclusion was an artifact of their comparisons of systematically inefficient liability rules to the most efficient property rules.

When the more appropriate horse race is run, it turns out that liability rules can dominate even when the idiosyncratic variations are very small compared to common-value variation. In example 5, the common-value variation (0–200) is four times the plaintiff's idiosyncratic variation (0–50) and 20 times the defendant's idiosyncratic variation (0–10), yet a liability rule still can produce slightly higher expected payoffs (125.008 versus 125, as shown in Table 3).

Put simply, if a liability rule dominates in the absence of any common-value variation, it will continue to dominate even if the common-value variation becomes arbitrarily large. To be sure, the degree of dominance will narrow as the damages move toward a property rule level and the difference between the expected property and liability rule joint payoffs declines. But the mere existence of correlated valuation does not mean that harnessing private information becomes theoretically untenable. In-

31. A similar analysis shows why, for example 5, a property rule dominated a type 2 implementation but not a type 4 implementation. In example 5, the plaintiff's and defendant's idiosyncratic-value distributions varied from 0 to 50 and from 0 to 10, respectively. Under type 2, the defendant option holder's distribution lies strictly below the plaintiff's mean value of 25. But under type 4, the plaintiff option holder's distribution lies both above and below the defendant's mean value of 5.

32. See text at note 18.

deed, the question of whether the best liability rule is more efficient than the best property rule is independent of whether the litigants' valuations are correlated. The degree of correlation, while not affecting the relative efficiency of liability and property rules, will affect the absolute difference in efficiency. Higher degrees of correlation will tend to reduce the efficiency shortfall from mistakenly using a property rule.

Some readers might seize upon this narrowing result to argue that liability rules may be more efficient—but only to an insignificant extent. The optimal liability rule increases the expected joint payoffs of the litigants above those generated by a property rule, but only by a small amount. Table 4 shows in example 2 that the expected joint payoff under the optimal liability rule is only slightly higher than the expected joint payoff under a "plaintiff" property rule (105.213 versus 105).

But the failure to produce substantial increases in efficiency is simply a by-product of there being very few potential gains of trade to be had in Kaplow and Shavell's examples. Table 4 reports the maximum expected gains of trade that might be had if the court were perfectly informed about the litigants' private valuation and could thus assign with certainty the entitlement to the higher valuer. We can see that the "first-best/perfect information" expected payoff is only slightly higher than the plaintiff's mean valuation—implying that in these examples there are, to begin with, very few potential gains from trade. If we compare the enhanced efficiency of liability rules relative to this first-best upper limit, we see that liability rules capture a sizable proportion of the potential gains from efficient allocation (30 and 40 percent of the potential gains in examples 3 and 4). If we alter the examples to allow for more substantial gains from trade, we find that optimal liability rules produce more substantial increments (over property rules) in the expected joint payoff.[33]

33. For example, if both the common-value and the plaintiff-idiosyncratic components are distributed uniformly between 0 and 100, while the defendant-idiosyncratic component is distributed uniformly between 40 and 60, the expected joint payoff under a property rule is 100 while the expected joint payoff under the optimal (plaintiff choice) liability rule is 108.33—which represents a capturing of 65.7 percent of the potential gains of trade (112.67). More generally, the incremental and percentage improvement in efficiency produced by the optimal liability rule (relative to the optimal property rule) will increase as either the mean or the variance of the common-value component decreases (relative to the mean or variance of the option holder's idiosyncratic-value component). As discussed above (text at note 10), there is no reason to believe that the common-value component will have from the court's perspective a relatively large variance (given the tendency of common values to be dominantly influenced by observable market forces), and Kaplow and Shavell

Table 4. Assessing the Movement toward First-Best Allocative Efficiency

	Example 1	Example 2	Example 3	Example 4	Example 5
Expected joint payoff under "plaintiff" property rule	105	105	105	105	125
Expected joint payoff under optimal (plaintiff choice) liability rule	105.052	105.213	105.180	105.427	125.008
First-best (perfect information) joint payoff	105.417	106.066	105.600	106.067	125.333
Improvement in allocative efficiency as percentage of property rule shortfall from first best, $(B - A)/(C - A)$ (%)	12.5	19.5	30	40	2.4

3.3. Dual-Chooser Rules

While we have shown that type 4 liability rules are more efficient than property rules in Kaplow and Shavell's own examples, some might respond that pure type 4 rules will sometimes be difficult to implement.[34] A plaintiff might gain the option to take an entitlement only after the defendant has taken some triggering action (such as polluting).

Another alternative to the simple liability rules modeled by Kaplow and Shavell can be found in what we have elsewhere called a "dual-chooser" liability rule (Ayres and Goldbart 2001, p. 61). Dual-chooser rules are rules that allow either side to veto the transfer of an entitlement (say, from plaintiff to defendant). For example, sometimes the closest the law can come to a type 4 rule is to give the plaintiff a "take-back option" in the second stage of a two-stage game. Under such a regime, the defendant would first decide whether the benefits of initially taking the plaintiff's entitlement are greater than the cost of the expected court award, and the plaintiff would then decide whether the costs of losing the entitlement were worse than the benefit of expected damages. Either party could veto the transfer: the defendant by not initially polluting and the plaintiff by exercising his take-back option.

In a separate article, we have extensively analyzed such dual-chooser options and shown that they can sometimes be more efficient than either type 2 or type 4 liability rules (Ayres and Goldbart 2001, p. 61). But for now it is sufficient to see how nicely dual-chooser rules can respond to the correlated-value problem—even if type 4 liability rules are not feasible.

Dual-chooser rules are well suited to respond to the problem of correlated valuations because these rules allow the other side to veto takings that are driven by common-value realizations. The problem with the type 2 rule was that defendants might take merely because the common-value component was unexpectedly high. But a dual-chooser rule eliminates this problem by allowing the plaintiff to veto takings that are driven by both parties' having a high common value. Under a dual-chooser rule, the entitlement will transfer to the defendant only if the plaintiff's total value (common plus idiosyncratic) is less than the damage amount and if the defendant's total value (common plus idiosyncratic) is greater than the damage amount. Indeed, it can be shown that the

never defend their consistent assumption that the common-value mean is large (100 in their examples) relative to the idiosyncratic means (less than 10).

34. Indeed, we have made this argument ourselves (Ayres and Goldbart 2001, p. 48).

optimal dual-chooser rule can at least replicate the efficiency of the type 2 or type 4 rules and thus produces systematically higher expected joint payoffs than the optimal property rule.[35] Thus, even if pure type 4 implementations are not feasible, dual-chooser liability rules—which still harness the litigants' private information by contemplating nonconsensual transfers—will still tend to dominate property rules.

Kaplow and Shavell can be pardoned for not considering these newfangled dual-chooser rules, but their failure to consider the type 4 rules that Calabresi and Melamed discovered more than 24 years earlier is a more serious error—an error that they probably made by ignoring the implicit option value of liability rules.[36] Just because a plaintiff has the higher average value does not mean that type 2 liability rules will be more efficient than type 4. From an option perspective, giving the entitlement initially to a lower-valuing defendant and giving the higher-valuing plaintiff a taking option can be more efficient if the plaintiff has a systematically more volatile valuation. When the more efficient liability rule is compared to the more efficient property rule, Kaplow and Shavell's own examples show that correlated valuations need not undermine their harnessing result.

3.4. The Lemons Problem

All of the foregoing examples make the seemingly innocuous assumption that the original possessor of the entitlement (the plaintiff) has a higher mean value than the nonpossessor (the defendant). Kaplow and Shavell reasonably defend this assumption by claiming that the plaintiff's prior decision to "obtain (or choose to retain) things" signals to a court that he places a high idiosyncratic value on the entitlements.[37] But Kaplow and Shavell's other assumptions of correlated values and imperfect in-

35. For these uniform-distribution examples, the expected joint profits under the optimal dual-chooser rule are identical to the expected joint profits under the optimal type 4 liability rule. The damages under dual-chooser implementations are less extreme than under type 2 or type 4 implementations. Instead of relying on more extreme damages to deter inefficient takings (driven by high-common-value realizations), the dual-chooser rules rely on the other side's veto (Ayres and Goldbart 2001, p. 57).

36. Ayres and Talley made a similar error in comparing bargaining under liability and property rules (Ayres and Talley 1995b, p. 1048). Their core numeric example assumes that the defendant's valuation is less variable than the plaintiff's valuation, but they ignore the more efficient type 4 implementation.

37. "For example, I may purchase my home just because it has higher idiosyncratic value for me than for others: I may particularly like its design, setting, or location" (Kaplow and Shavell 1996, p. 760).

formation undermine our confidence that possessors have higher average valuations.

In probably the most cited of correlated value articles, "The Market for Lemons" George Ackerlof (the recent Nobel prize winner) showed that an owner of a used car may be unable to sell at any price even though it is common knowledge that a particular buyer values the car more highly (Ackerlof 1970). The classic lemons problem is that when a buyer's and seller's valuations are correlated but the seller knows more about the entitlement's value, a lower-valuing seller may be unable to sell to a higher-valuing buyer. The lower-valuing seller is stuck with the entitlement.[38]

Kaplow and Shavell admit that "[t]he assumption that idiosyncratic value is higher for owners means that it will be socially desirable on average for things not to be taken,"[39] but the possibility of a lemons problem should make us uneasy about assuming that a particular person possesses an entitlement because she values it more than nonpossessors. The assumption of systematically higher owner values skews their model against liability rules because it pushes toward nonoverlapping probability distributions—where property rules will be dominant. But Ackerlof's article teaches us that correlated values may impede the ability of lower-valuing owners to sell their goods. Owners may continue to own not because their probability distribution is higher than others, but simply because of the lemons' adverse-selection effect. The fact that correlated values (when combined with private information) tend to drive out consensual trade thus provides a further justification for focusing—as we have—on the relative efficiency of property and liability rules when trade is not feasible.

38. For example, assume that it is commonly known that (1) a seller knows her own value exactly, (2) the buyer's valuation is k (> 1) times greater than the seller's valuation, and (3) the buyer knows only that the seller's valuation for a car is uniformly distributed between 0 and 100. Then if k is less than 2, a rational buyer will refuse to trade at any price. For example, if $k = 1.5$, then a buyer considering whether to buy at a price P will believe that the average value of a seller willing to sell at this price is $P/2$—which in turn implies that the buyer's expected value of buying such a car is $(k \times P)/2 = P \times (3/4)$. No rational buyer is willing to pay P for a car that is worth on average only $3P/4$. The buyer vetoes any proposed trade—worrying that she would be buying a lemon (a car whose value is expected to be lower than the price). More generally, the lemons problem exists when the buyer's expected value of the car, given that the seller's value is less than P, is less than P—even though the buyer's expected value is larger than the seller's expected value: $E_B[v_S \mid v_S < P] < E_B[v_B \mid v_S < P] < P$.

39. Kaplow and Shavell (1996, p. 760).

4. CONCLUSION

To our mind, the great contribution of "property versus liability rules" is Kaplow and Shavell's reconception of liability rule damages as an allocative device instead of a mere compensatory device. With property rules, the court (in the absence of private bargaining) allocates the entitlement. But with liability rules, the court delegates the allocative decision to a private litigant. Even in the absence of bargaining, the litigant with the taking option can choose whether to allocate the entitlement to herself. Setting the damages that a taker must pay equal to the expected harm of the nontaker guides the taker's allocative decision—so that she will take only when her private benefit is greater than the nontaker's expected cost. This is the harnessing benefit of liability rules.

But in confronting the real problems of correlated valuations and multiple takings, Kaplow and Shavell lost sight of harnessing. Instead of trying to adapt damages to economize on the taker's private information, Kaplow and Shavell argued that it was better to extinguish the takings option and deter all nonconsensual takings.

We disagree. The solution to the problem of correlated valuation is not to enjoin and criminalize such takings but to enlarge the damages for nonconsenual takings in ways that redeem the potential of liability rules for economizing on the taker's private information. This elevated damage solution parallels a solution that others have already found for the multiple-takings problem—simply elevating the damages for each successive taking can actually better harness the private information of multiple takers. Using elevated damages to extend the harnessing idea solves both problems.

Kaplow and Shavell tend to consider such elevated damages to be property rules because they deter more nonconsensual takings (Kaplow and Shavell 1996, p. 790).[40] But there is more than a semantic issue at stake in whether elevated damages are termed "property" or "liability"

40. At a few points, Kaplow and Shavell acknowledge that liability rules with higher damages might promote efficiency. "[O]ne can conceive of the two property rules and the liability rule that we studied as all being, in fact, liability rules with different levels of damages: the property rule protecting injurers corresponds to a liability rule with zero damages; the conventional liability rule that we emphasized is the rule with damages equal to courts' best estimate of harm; and the property rule protecting victims mirrors a liability rule with extremely high, or infinite, damages. . . . [T]he fully optimal liability rule may, in principle, be one with any level of damages" (Kaplow and Shavell 1996, p. 756). "[A] liability rule with damages different from average value might perform better than the liability rule with damages equal to average value" (Kaplow and Shavell 1996, p. 762 n. 157).

protections. The essential question is whether courts (and other lawmakers) should structure the law so as to deter all nonconsensual takings or so as to intentionally allow nonconsensual takings that are expected to enhance value. The tangibility thesis seems to claim that deterrence/property protections tend to dominate when entitlements are tangible, but we have shown that the arguments proffered by Kaplow and Shavell do not explain why courts cannot still profitably tailor damages to facilitate nonconsensual, value-enhancing takings.

Now that the transaction-cost basis for property rules has been undermined (in part by Kaplow and Shavell themselves), it is natural and laudable to look for a replacement theory to help explain the prevalence of property-like protections. But the tangibility thesis (while providing interesting insights along the way) ultimately does not convince. The search for a satisfying foundation for property rules continues.[41]

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41. Ayres and Goldbart (2001, p. 103) note a variety of other contenders (such as providing better ex ante investment incentives) that similarly have not withstood sustained analysis.

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