

Optional Law in Property: A Theoretical Critique

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Abstract

Since Calabresi & Melamed's seminal article on property rules and liability rules, a lot of law and economic articles have debated the efficiency of these two rules. Many of the follow-up articles argue that Calabresi & Melamed are wrong in arguing that property rules are more efficient when transaction costs are low. Put-option liability rules and other sub-types of liability rules have been developed, and they are claimed to be superior to property rules. As several property scholars have pointed out, however, the shadow examples in this so-called optional law literature are not property laws, and they have contended that property rules should be the default in property law. Built on this line of literature, this article argues that—Calabresi & Melamed are actually correct—property rules are indeed more efficient than liability rules in property law in low transaction-cost setting, because property rules better harness private information. In addition, this article develops a theory as to when call-option liability rules might be more efficient. This article also argues that Rules 3 and 4 are either unnecessary concepts or inefficient entitlement protection rules in the area of property, and that put-option liability rules are less efficient than call-option liability rules in property, because calls utilize private information better than puts. Finally, this article contends that liability rules are intrinsically different from financial options and legal options; thus, the option analogy should better be avoided.

Keywords

Property rule, liability rule, call option, put option, transaction costs, private information, optional law, investment

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Table of Contents

I.	Introduction	1
II.	Financial Option, Legal Option, and Liability Rule Are Different	4
	A. Free and Involuntary versus Paid and Voluntary Options.....	5
	B. Different Perceived Strike Price	5
	C. Number of Parties Affected.....	6
III.	Asymmetrical <i>Cathedral</i> : Limited Usefulness of Rules 3 and 4 in Property	10
	A. Nuisance Law in the View of Rules 1 and 2	13
	B. Airplane Overflight: Rule 3 or No Entitlement?.....	15
	C. Rule 2 Is More Efficient Than Rules 3 and 4	16
IV.	The <i>Cathedral</i> Should Not Be Expanded: Puts Not Needed In Property.....	18
	A. Ayresian Rule 6 Is Not A Put-option Rule	18
	B. Puts Less Efficient Than Calls	21
	C. Compensation in Accession: An Example of Inefficient Put.....	25
V.	Rule 1 More Efficient Than Rule 2 When Transaction Costs Are Low	26
	A. The Property Rule Better Harnesses Private Information.....	27
	B. Limitation of Kaplow and Shavell's Average Compensation Thesis.....	28
	C. A Stylized Example.....	29
VI.	A Framework for Preferring Rule 2.....	31
	A. Transaction Cost Are High.....	31
	B. Transferring Entitlements Promotes Allocative Efficiency	33
	C. Ex Ante Investment Not Important	33
	D. Courts Make Less Errors	34
	E. Liability Rule Is the Only Choice	35
VII.	Conclusion.....	36

I. INTRODUCTION

Calabresi and Melamed (1972: 1105) probably coined the term “property rule” as such because “much of what is generally called private property can be viewed as an entitlement which is protected by a property rule.” In the past two decades, however, the term “property rule” was in danger of becoming a misnomer that created confusion. As Ayres (2005) and many others have claimed, property rules are less efficient than liability rules, even in the field of property law when transaction costs are low. Not so. This article critically reviews the “optional law” literature and argues that in the field of physical property law, property rules are generally superior to liability rules in terms of efficiency. Calabresi and Melamed (1972) are correct in naming the rule and identifying its efficiency. The *Cathedral* shall stand.

For starters, the optional law literature centers around the assignment of entitlement and the efficiency of six entitlement protection rules. In Calabresi and Melamed’s classical setting of residents “the pollutee” versus factory “the polluter,” as shown in Table 1, Rules 1 and 3 (the property rules) assign the entitlement to one of the parties, who can determine how to use the resource, and the other party can change the use only through voluntary exchanges with the entitlement holder. Rules 2 and 4 (the “call-option liability rules”) allow non-holders to take the entitlement if they compensate the loss of the holders. Rules 5 and 6 (the “put-option liability rules”) allow the holders of the entitlement to force others to purchase the entitlement.

Table 1: The Conventional Typology of Rules 1–6

Entitlement assigned to	Entitlement protection rules		
	Property Rule	Liability Rule:	Liability Rule:
		<i>Call option</i>	<i>Put option</i>
Residents (the “pollutee”)	Rule 1	Rule 2	Rule 6
Factory (the “polluter”)	Rule 3	Rule 4	Rule 5

This article is not a naïve, blanket endorsement of Calabresi and Melamed (1972). While they are generally correct in identifying the efficient traits of property rules, their four rules are not equally useful in property law, and their characterization of the issue, with entitlement assignments as the first step, blurs the nature of most property disputes. Outside the law of nuisance, the entitlements in property disputes (such as ownership, fee simple, lesser property interests, etc.) have already been assigned. The court’s job is not to first determine who owns Blackacre. Rather, given that Blackacre is owned (by a particular person or the state), courts determine whether to issue injunctions to protect Blackacre’s owner (Rule 1) or to order the infringer to compensate the owner for her losses (Rule 2). In other words, in the field of property, even in nuisance law, it is not necessary to think in terms of Rules 3 and 4. Rather, property entitlements can be structured with Rules 1 and 2.

Morris (1993), Levmore (1997), Ayres (1998), and others have since expanded the *Cathedral*, advancing Rules 5 and 6 and using the concepts of financial options (calls and puts) to unify the various liability rules. This article argues that, while Rules 5 and 6 could be useful in contract or IP law or on a voluntary basis, these put-option rules, if imposed by statutes or judge-made laws, generally create perverse incentives in physical property law (including real estate law and personal property law). This is why there are very few real-world property doctrines that exemplify put-option rules,

and those which do are arguably less efficient than alternative doctrines that stick to property rules or call-option liability rules, because calls harness private information better than puts, and because courts tend to inaccurately assess property value.

Furthermore, linking entitlement protection rules with calls and puts is theoretically unsound, as options transacted in the financial markets, options imposed by law, and the liability rules described by Calabresi and Melamed have three nuance yet important distinctions—whether they are paid or free as well as voluntary or not; whether they are in rem, in personam, or against certain people; and whether their “strike price” is pre-determined and consciously perceived by the “option holders.” Analogizing what one learns from the financial markets to entitlement protections leads one astray—that is perhaps one of the reasons why liability rules have been mistakenly considered superior to property rules in “the law of things.”¹

In property law, property rules are generally more efficient than liability rules, because (perhaps surprising to some) the former better harness private information than the latter (but compare Ayres 2005: 183). Nevertheless, a property law system that adopts nothing but property rules will probably not maximize social welfare. Indeed, liability rules might be more efficient than property rules when transaction costs are high; transferring entitlements promotes allocative efficiency; ex ante investments are not important; and the nature of the case makes courts less likely to commit adjudicatory errors under liability rules. In some circumstances, the liability rule is the only feasible choice.

The rest of this article is structured as follows: Part II explains the three critical distinctions among financial options, legal options, and liability rules, and argues that the analogy of options does a disservice in understanding the nature of property entitlement and its protection rules. Part III explains why Rules 3 and 4 are of very

¹ See Smith (2012c) for arguments of property as a law of things.

limited use in property law, as Rules 1 and 2 alone can cover the ground. Part IV compares puts and calls in property law and argues that puts are generally less efficient than calls in the law of things. Part V backs up Calabresi and Melamed's argument that the property rule is more efficient than the liability rule when transaction costs are low, based on the counterintuitive observation that the property rule better harnesses private information. Part V also shows why Kaplow and Shavell (1996)'s mathematical proof that demonstrates the superiority of the liability rule is inapplicable in property law. Part VI advances a framework of five factors that identifies the scenarios in which Rule 2 could be more efficient than Rule 1. Part VII concludes.

II. FINANCIAL OPTION, LEGAL OPTION, AND LIABILITY RULE ARE DIFFERENT

Since Morris (1993), liability rules are linked with options in financial markets. Scholars, particularly Ian Ayres and his co-authors in a series of articles and then a book (Ayres and Talley 1995b, 1995a; Ayres and Balkin 1996; Ayres 1998; Ayres and Goldbart 2001, 2003; Ayres 2005), have expanded the typology of liability rules as options (see Table 1). All of a sudden, most, if not all, legal rules and entitlements can be viewed from the perspective of "optional law." This article, however, argues that while analogizing options with liability rules is interesting and broadens our view, in property law at least, this analogy has also blurred the nature and function of compensation. Below I use "call options" as an example,² and argue that the Rule-two liability rule found in property doctrines, call options transacted in the financial markets (hereinafter "financial options"), and call options in the optional law literature (hereinafter "legal options") are different in three important aspects

² My arguments generally apply to put options as well.

(summarized in Table 2). Therefore, analogizing options with liability rules should be avoided at least in property law.

A. *Free and Involuntary versus Paid and Voluntary Options*

Financial options differ from legal options and liability rules first in terms of whether option holders have paid for the option and whether owners have voluntarily sold the option. Financial options are not distributed for free, whereas in the optional law literature and the liability rule regime, options are pre-assigned or re-assigned, and option holders do not have to pay. In addition, financial options are transacted on a voluntary basis, whereas legal options and liability rules are realized through legal stipulations (though owners may be aware of the existence of legal options and liability rules beforehand). In other words, financial options are contracts, while legal options and liability rules are mandatory laws.

This first distinction boils down to voluntariness. An owner who voluntarily enters into an option contract usually charges a certain amount of money, though she could give the option away “for free” but get something else back.³ In addition, when a legal option or the liability rule is imposed on an owner, the owner usually is not compensated by the option holder for the option itself, though it is certainly feasible for lawmakers to stipulate such compensation.

B. *Different Perceived Strike Price*

The second major distinction lies in the timing of determining strike prices and thus the *perceived* prices. Strike prices for financial options are determined *ex ante*; thus, holders of financial options, when exercising their calls, compare the value of

³ Scott and Triantis (2004: 1456–1459) points out the implicitness of contractual option. Still, the two parties enter into the contract voluntarily, and the contract price (in an efficient market) probably reflects the value of the options.

the assets with the actual strike price. Strike prices for legal options are determined ex post, often by the court. Hence, holders of legal options make decisions by comparing the value of the assets with their *expected* price. When the expected prices are set accurately and the prices are correctly recognized by option holders, actual strike prices and expected strike prices converge. Nevertheless, as elaborated below, because accurate judicial assessment of property value is often infeasible, expected prices often deviate from actual prices.

Liability rules in property law do not always work like the legal option. When Rule 2 is applied to good-faith agents, they, by definition, do not consciously compare the value of the assets with any price, because they think they have incurred the cost of, say, purchasing the entitlements before, and the cost is sunk. Put differently, good-faith agents are not aware that they are exercising an option of any sort.⁴

When Rule 2 is applied to bad-faith agents, infringements happen first, and then the strike prices of exercising the calls are ascertained ex post, again usually by the court. Here, liability rules function like legal options. In both regimes, unlike in financial options, call options are not always exercised because the option holders value the entitlements more than the title holder.⁵ Rather, option holders may infringe because they mis-calculate the price (due to, for example, over- or under-estimating the court-set compensation, or the court's setting the compensation too high or too low). Therefore, not all infringements under the liability rule regime are efficient.

C. *Number of Parties Affected*

Financial options, legal options, and liability rules are also different in the number of parties they can be enforced against. Financial options are *in personam*.

⁴ Ayres and Goldbart (2001: 15) recognize that their optional law theory concerns only intentional taking.

⁵ For similar arguments, see Fennell (2007: 1428) and Rose (1997: 2181–2182).

That is, option holders can only use options against the parties who sell them the very options. Financial options are thus contracts and worlds apart from liability rules.

Whether legal options are *in personam* or in rem (that is, good against the world) is unclear. Because the optional law literature never specifically limits the applicability of legal options to certain contexts, it should not be unfair to infer that legal options are implicitly presumed to be more than *in personam*, if not outright in rem. In rem legal options, however, present enormous opportunities to extort.⁶ An owner with in-rem put options can threaten to exercise the put against many lower-valuing non-owners and collect ransom. And a group of non-owners can, one by one, threaten to exercise their call options against owners who value their properties more than the court-set compensation.⁷ Legal options, therefore, are an uneasy fit in the structure of property.

By contrast, liability rules found in property doctrines only apply between certain parties under certain conditions (Epstein 1998; Smith 2004b: 1794–1795). Liability rules, as compared to legal options, fit more easily into the structure of property rights, which is exclusion-based, in rem (Merrill and Smith 2001; Smith 2002), and a structured bundle of relationship (Chang and Smith 2012: 21–30). Namely, the relation between owners and certain people over the resource in question features liability rules, but the relationship between the owner and most others in the world features property rules (or, the right to exclude) (Chang and Smith 2012: 29–30).

More broadly, financial options, legal options, and liability rules have different institutional functions.⁸ Financial options, on one end of the spectrum, are one

⁶ Regarding put options leading to extortion, see Ben-Shahar (2006: 449).

⁷ Thus, an in rem call option such as Levmore (1982)'s self-assessment mechanism, in which anyone can buy other's land at the owner's self-assessed value, would have to deal with this endless threat problem.

⁸ I thank Tom Merrill for this excellent point.

specific type of contracts, the sole purpose of which is to hedge risks, not to, say, redress reduced property value. Liability rules, such as eminent domain and torts compensation, concern nothing about hedging risks—though, notably, the liability rule itself is a hodgepodge of diverse legal doctrines that address different issues. Besides, the most fitting example for Ayresian legal options may be commercial contracts. The option perspective of commercial contracts is to induce both parties to make efficient breach or performance decisions, again not entirely the same as the functions of liability rules and financial options, to say the least. In short, I am not sure whether the analogy of option is a stepping-stone or a tumbling block to better understanding of property doctrines.

Table 2 Comparison of financial call option, legal call option, and liability rule in property law

	Financial call option	Legal call option	Liability rule
Option holders pay to acquire option? / Owners voluntarily sell option?	Yes & Yes	No & No	No & No
When exercising “options”...	Compare value with actual price	Compare value with expected price	Good-faith: do not compare value with price Bad-faith: compare value with expected price
Effect	<i>In personam</i>	<i>In rem</i>	Against certain people

III. ASYMMETRICAL *CATHEDRAL*: LIMITED USEFULNESS OF RULES 3 AND 4 IN PROPERTY

Calabresi and Melamed (1972)'s framework involves two-step thinking: first how to assign the entitlement and then how to protect it. As for the first step, the literature generally focuses on how the *court* assigns entitlements. Nevertheless, the *status quo ante* in a typical property law dispute (other than nuisance) is that the property interests in the things under dispute (such as ownership, *usufruct*, and mortgage) are *already owned/held* by a certain party. Put differently, the entitlements are already assigned when the cases appear in court. The court does not have much room in re-assigning entitlements from the original owner to a new owner. Therefore, the first step (assigning entitlements) is usually skipped in property law. In the second step, the court does sometimes adjust the protection protocols for entitlements. No wonder the prior literature focuses on the second step, or property rules versus liability rules.⁹

Rules 3 and 4 are rarely, if ever, used in property law. And rightful so. For reasons elaborated below, there are strong economic reasons to favor Rule 2 over Rules 3 and 4 in adjusting entitlements; this is perhaps why the court rarely re-assigns the entitlement from the original owner to a new owner without requiring the latter to compensate the former. Indeed, this would constitute "judicial takings" without just compensation.¹⁰

Below I provide a twist to the Calabresi and Melamed framework, because it better fits property law issues. Following the cautions by Rose (1997), I hereby

⁹ Polinsky (1980) is a notable exception, contributing to our understanding of intermediate entitlements.

¹⁰ See the recent U.S. Supreme Court case *Stop the Beach Renourishment v. Fla. Dep't of Env'tl. Prot.*, 560 U.S. 2606 (2010), for the idea of judicial takings. For reflections on this case and the judicial takings doctrine, see, e.g., Strahilevitz and Peñalver (2012) and Epstein (2011).

expose that the shadow examples of this article is ownership (fee simple absolute) and the various property forms (servitude, usufruct, life tenant, etc.), although I also account for nuisance issues and scenarios in which only a few sticks in the ownership bundle are chipped away.¹¹ Under my framework (see Table 3), when property disputes enter courts, and the *Cathedral* mindset is useful in thinking about the solution to the disputes,¹² I use Rule 1 to refer to the property rule protection of the original “owner/holder of property interests” (hereinafter, owner). Rule 2 refers to the liability rule protection of the original owner; that is, the original “non-owner” can acquire entitlements through paying compensation. “Non-owners” in this article refer to the parties who do not own or hold property interests until either the court re-assign entitlements to them or they pay compensation to gain entitlements. Rule 3 (Rule 4) means that non-owners acquires for free the entitlement through judicial re-assignments and the entitlement is protected by the property rule (the liability rule). Rules 3 and 4 as defined here are much less frequently used in property law than Rules 1 and 2.¹³

Table 3: The Typology of Rules 1–6 in Property Law

	Property Rule	Liability Rule: <i>Call option</i>	Liability Rule: <i>Put option</i>
Original owners	Rule 1	Rule 2	Rule 6
Original non-owners	Rule 3	Rule 4	Rule 5

¹¹ For ownership as a bundle of rights, see Chang (2013c).

¹² That is, this article does not address property issues such as whether the statute of fraud is obeyed, whether the transaction violates the rules against perpetuities, and so on.

¹³ I cannot think of an example of Rules 3 and 4 in American or European property law. I have considered depicting the adverse possession doctrine as a Rule 3, but eventually dropping this idea and instead characterizing it as a flipping of Rule 1 before and after the statute of limitation runs. I thank Tom Merrill for this point.

Granted, property rights are incomplete; not all resources have been “propertized.” Thus, the *status quo ante* is not always one party being the owner of the resource in question. In some cases (for example, parties litigating over uses of open-access commons),¹⁴ neither party might be presumed to have an edge in the *status quo ante*. But then no matter who acquires the entitlement, we can call the property rule protection of it Rule 1—and it will be odd to call it Rule 3!

Put differently, what was understood to be the first step of the Calabresi and Melamed framework, “initial” allocation of entitlements by the judiciary, is in fact “intermediate” allocation of entitlements, as courts in developed countries deal with property cases after the legislature has allocated property rights. The allocation of entitlement is intermediate in nature because the decision is made before the entitlement protection rule is set but after the initial legislative decisions. This article further contends that the property laws and courts in developed countries do not re-allocate entitlements in the middle stage, as elaborated below. But my critique here does not suggest that, conceptually and descriptively, the entitlement allocation stage and Rules 3 and 4 are never useful. As Qiao (2013) points out, the Shenzhen government in China, in dealing with unlawful constructions (“small properties”), has tried to use all six of the legal options to solve the issue. The Chinese phenomenon might be unique, as the government (not the court) owns the land, allocate entitlements, and determine the entitlement protection rule. It takes a trinity in a developing country in which property rights are unclear to make the optional law framework useful. In developed country, I doubt Rules 3 and 4 are conceptually necessary.

¹⁴ Similar arguments apply when the legislature is designing the property rights system from scratch.

A. *Nuisance Law in the View of Rules 1 and 2*

One may contend that nuisance law, which Coase (1960), Calabresi and Melamed (1972), and others use to illustrate their points, is a perfect example that entitlements can be unassigned in property law, and at the same time the terms Rules 3 and 4 seem to have been employed usefully. While I agree that in nuisance law entitlements can be considered as being subjected to (re-)assignment by the court, Rules 3 and 4 are still not necessary concepts. Instead, Rules 1 and 2 and the theory of property as a structured bundle of relations (Chang and Smith 2012: 21–30) can be used to delineate entitlement assignments.

More specifically, ownership as a whole is never subject to re-assignment in nuisance law; only certain use rights (to paraphrase the popular parlance, a few sticks in the “ownership bundle”) are.¹⁵ Both parties in nuisance lawsuits are owners (typically, landowners) or at least authorized users of the resource. Thus, what is in conflict in nuisance law are the two rights to exclude held by each of the two parties (Smith 2004a: 1020). Take the polluters versus residents scenario (see Table 1) as an example: the factory owns the land and, according to the *ad coelum* rule, holds the exclusive right to use the air and airspace above the land; ditto for the residents. If air, polluted or clean, is stationary, there is no nuisance dispute.¹⁶ In reality, of course, air flows. Consequently, when polluters emit, they unavoidably influence the residents’ exclusive use of “their” (originally clean) air. The court can favor either party’s use plan and protect it with either the property rule or the liability rule. Since generally each party’s right to exclude is otherwise protected by the property rule, both parties can be said to have their entitlements (in other aspects) protected by Rule 1.

¹⁵ I should emphasize that I do not think property is a bundle of rights/sticks (Chang and Smith 2012). Rather, the bundle of rights/sticks analogy better describes “ownership.” I develop this idea in Chang (2013c).

¹⁶ My point relates to Fennell (2007)’s work on property and half-torts. That is, emitting fumes is “risky inputs,” but it does not necessarily create “harmful outcomes.”

Following this logic, either party whose use plan regarding the air is disfavored by the court can be said to have that particular entitlement protected by Rule 2 or have no entitlement at all, depending on whether compensation is required.¹⁷ Hence, the terms Rules 3 and 4 are not necessary in delineating the property rights in the nuisance scenario.

Moreover, as Smith (2004a: 1019–1021); 2005: 70–76) points out, the terms Rules 3 and 4 suggest that they are symmetrical with Rules 1 and 2, while the nuisance law is “radically asymmetric,” because the polluters only have the privilege but not the right to pollute, as the residents do not have a duty to accept pollution. Rather, the residents can use self-help such as a giant fan to fend off pollutants. Using Rules 3 and 4 in nuisance law is thus not only unnecessary but also misleading.

A better way to conceptualize entitlements in nuisance law is to think in terms of “(involuntary) governance strategy” and “property as a structured bundle of relations” (Smith 2002; Chang and Smith 2012). Exclusion and the property rule are the default in property law (Ellickson 1986; Epstein 1997; Rose 1997; Brooks 2002: 311; Smith 2004b), and exclusion is the nature of relations between property rights holders and most others in the world. Involuntary governance is imposed (by statutes or common law doctrines) between certain pairs of property right holders over certain uses of resource—that is, governance is imposed in certain relations and/or in certain contexts—and it generally limits one party’s right to exclude, with or without mandating the other party to compensate.

More specifically, under my property theory, in nuisance law, when the resident can enjoin the factory, the resident’s right to exclude is in full swing while the factory has no entitlement. If the factory can pollute as long as it compensates the resident,

¹⁷ Merrill (1985: 36) emphasizes that trespass is available only to “possessing” owners. Owners could be ruled by courts as not having the entitlement over the column of space above the land if they do not build a skyscraper.

the resident's entitlement is subject to the involuntary governance strategy that nonetheless guarantees redress of losses, whereas the factory has the privilege to pollute. Finally, were the factory only emits negligible pollutants and is not considered as causing nuisance, the resident's right to exclude is again softened by the governance strategy—Epstein (1997: 2102–04); 2005: 154) calls it the live-and-let-live rule—or the resident can even be considered as having no entitlement against the factory regarding de minimis intrusion. Here the factory again has the privilege to pollute trivially. In sum, Rules 3 and 4 need not be invoked to describe nuisance law, and my delineation better fit within the framework of property law.

B. *Airplane Overflight: Rule 3 or No Entitlement?*

The airplane overflight law that carves out an exception to the *ad coelom* rule appears to be an example of Rule 3.¹⁸ An aircraft owner has a right, not just a privilege, to fly over others' land, as no landowner would be allowed to block the airspace or interfere with the navigation of aircrafts. Several theories could justify the airplane overflight law (Merrill and Smith 2012: 14–15). One theory, proposed by Epstein (2005: 154), argues that landowners receive “implicit in-kind compensation.” In this view, the airplane overflight law exemplifies Rule 2, with the compensation to each landowner cancels out. Another theory, adopted in *United States v. Causby*, 328 U.S. 256 (1946), argues that aircrafts fly in public navigable airspace. In this theory, countless aircraft owners could be thought of as holding a temporary Rule-3 right against countless landowners. I prefer to think in terms of property as a structured bundle of relations, in which landowners' right to exclude certain parties (such as aircraft owners) is replaced by the governance rule that allow “certain” types of

¹⁸ See Claeys (2013) for the evolution of airplane overflight doctrine versus the *ad coelom* rule.

flights—that is, in this particular relation, landowners have no entitlement against aircraft owners. Entitlement holders are nowadays often defined by regulatory statutes. Commercial airlines that operate their flights according to aviation regulations hold such entitlements, while a private owner of helicopter may not have the right to fly over others' real properties at 5 meters above ground.

C. Rule 2 Is More Efficient Than Rules 3 and 4

The preceding section argues that Rules 3 and 4 are often conceptually misleading and unnecessary. This section argues that the conventionally understood Rules 3 and 4 are less efficient than Rule 2. I will focus on Rule 2 versus Rule 3,¹⁹ favoring the former for efficiency reasons elaborated below:

First, Rule 2, requiring the non-owners to compensate, ensures that non-owners value the resource at least as much as its fair market value, while Rule 3 does not. When the court determines whether to re-assign entitlements, theoretically, Rule 2 and Rule 3 are the major alternatives. Under Rule 2, the original non-owner has to pay, whereas under Rule 3, the original non-owner gets the entitlement for free. If information costs are low, the court can generally ascertain whether the original owners or the original non-owners are higher-valuing and make the correct allocative decision. Both Rule 2 and Rule 3 would produce allocative efficiency, and from an ex post perspective, compensation under Rule 2 only affects income distribution.²⁰

¹⁹ As for Rule 2 versus Rule 4, Rule 4 contains all the undesirable features that Rule 3 has, and thus would be generally less efficient than Rule 2, too. Krier and Schwab (1995: 467–468) and Epstein (1997) provide other criticism of Rule 4.

²⁰ Over-investment is not a serious problem. Takings with fair market value compensation exemplify Rule 2, whereas takings with zero compensation exemplify Rule 3. The latter is advocated in the takings literature due to the concern over over-investment when compensation is not lump-sum (Blume and Rubinfeld 1984). Nevertheless, as I argue in Chang (2013d), real estate prices are generally assessed in ways that make them largely lump-sum. Thus, Rule 2, as compared to Rule 3, would not induce landowners to over-invest. Also bear in mind that in the context of adverse possession, the original owners usually *ignore* the properties so much so that they become subjects of prescriptive acquisition.

Nevertheless, information costs are often high, and the court is not always able to verify the reservation prices of both sides. Here, Rule 2 has an edge, because the non-owner under Rule 2 reveals her reservation price (higher than the court-assessed fair market value) by offering to pay compensation to the owner. If non-owner is lower-valuing, she would not attempt to take the entitlement. By contrast, under Rule 3, no mechanism reveals any value information about the non-owner. Thus, entitlement transfers under Rule 2 are more likely than those under Rule 3 to produce allocative efficiency.

Granted, notwithstanding the high information costs, as Merrill (1984: 1151) argues, as long as transaction costs are low, any entitlement allocation and protection rule will (through subsequent voluntary transactions) lead to efficient results. Nevertheless, transactions are never costless, and Rule 2, as compared to Rule 3, saves transaction expenses and is at least equally likely to produce allocative efficiency. Assuming that the costs of administering Rule 2 and Rule 3 are the same, Rule 2 filters out more lower-valuing non-owners from claiming the entitlements than Rule 3 does (Rule 3 basically screens out none). Thus, under Rule 3, there are more transactions of original owners buying back from subsequent owners who acquire the entitlement through entitlement adjustment. While allocative efficiency is restored after such transactions, some of the transaction costs under Rule 3 would have been saved had Rule 2 been adopted. Rule 2, therefore, reduces social waste.

Furthermore, if original owners suffer from “sunk cost fallacy” (Kahneman 2011: 342–346), the original owner is less likely under Rule 3 than under Rule 2 to buy back the entitlement (both given that the original owner values the resource more than the original non-owner), because the original owner would not want to “pay twice” for the same resource. The result, however, is allocatively inefficient.

Finally, from an ex ante viewpoint, Rule 2 also appears to be more efficient than

Rule 3. Under Rule 3, the prospect of losing the entitlements without any compensation decreases owners' incentives to invest (thus reducing property value) and increases owners' expenses on prevention, which are socially wasteful. Under Rule 2, owners lose less, and thus the value reduces less and prevention costs are lower. In addition, Rule 2 is more likely than Rule 3 to incentivize non-owners to try to strike a voluntary deal with owners, as the compensation paid under Rule 2 could be just slightly lower than the price paid through voluntary transactions, and the litigation costs may be higher than the combination of bargaining costs and the price difference. Voluntary exchanges usually ensure allocative efficiency without intervention from the court. Thus, Rule 2 once again gains an edge over Rule 3 by facilitating more voluntary transactions.

IV. THE *CATHEDRAL* SHOULD NOT BE EXPANDED: PUTS NOT NEEDED IN PROPERTY

Put legal options are not part of the *Cathedral* in the first two decades of its academic life. With contributions from, for example, Morris (1993); Krier and Schwab (1995); Levmore (1997); Ayres (1998), put options have been seriously considered by legal scholars as a new way to adjust entitlements to pursue efficiency and distributional goals. Ayres (2005) even claims that calls and puts are symmetrical in enhancing efficiency. Put options, however, have generally been frowned upon by property scholars (Epstein 1997; Rose 1997; Epstein 1998; Smith 2004b). This part argues that the property scholars' concerns are well grounded, as puts are less likely than calls to attain allocative efficiency.

A. *Ayresian Rule 6 Is Not A Put-option Rule*

Before criticizing the put-option liability rules, it is worth clarifying the

difference between the Ayresian Rule 6 and a put-option rule. My main point is that the Ayresian Rule 6 is NOT a put, if the put option here means forced purchase.²¹ In Ayres (1998: 797)'s own words, under Rule 6, "a court might allow a resident to enjoin pollution, but also give the resident the option of waiving his injunctive rights in return for damages from the polluter." Hence, the Ayresian Rule 6 is not a typical forced purchase rule, but more exactly a choice between Rule 1 (injunction) and Rule 2 (compensation).²² The Ayresian Rule 6 is implicitly premised on the condition that the polluter *has* polluted.²³ The resident cannot randomly designate a person as polluter and collect damages from her—if the resident can, the Ayresian Rule 6 would resemble a financial put. Given that the polluter has "taken" the entitlement of the resident (i.e. has polluted), the resident's asking for payment of market value more resembles requesting compensation from an infringer under Rule 2 than forcing a stranger to purchase certain entitlements.

The asymmetry between Rule 5 and Ayresian Rule 6 is the major reason that the latter can be found in the real world, while the former is a missing category (Ayres 1998: 817). In contrast to the Ayresian Rule 6, Rule 5 is indeed a put-option, force-sale rule, as the polluter can force the resident to purchase the right to pollute when the resident does NOT interfere with the factory's operation. Due to the apparent undesirable traits of Rule 5 (Epstein 1998), it is not surprising that one cannot find a real-world example of Rule 5 in property law. A few property doctrines exemplify the Ayresian Rule 6, as discussed below, but a real-world example of forced

²¹ Were puts and calls indeed symmetrical, as Ayres (2005) repeatedly argues, any person could be subject to a put option, just as any person could strike a call option against the original owner.

²² Epstein (1998: 842) interprets the Ayresian Rule 6 as Rule 1, because the property rule protection gives the original property owner the choice between damages and injunctive relief. This Epsteinian view may not be the mainstream interpretation of the *Cathedral*. Nonetheless, even in the mainstream view, it would be conceptually clearer just to label the Ayresian Rule 6 as an either-or rule or a mixture of Rule 1 and Rule 2, and leave the term Rule 6 to label a real put-option rule (if it ever exists).

²³ As Epstein (1998: 845) points out, the Ayresian puts are only given to property owners against wrongdoers.

purchase rule is also hard to come by.

Not all Ayresian Rule-6 doctrines are welfare-increasing. One example is the boundary encroachment law.²⁴ When Dora's house sits partially on Phil's land, Phil is entitled to either tear down the encroaching construction or demand the bad-faith Dora to buy the land underneath the construction (Ayres 1998: 815–816). As Ayres (1998: 816) recognizes, the put option here has little value for Phil, as Phil can increase his payoff by demanding an injunction and then bargain a larger payment with Dora. From a social standpoint, moving from Rule 1 to Rule 6 does not seem to increase social welfare (but cf. Ayres 2005: 28). If the encroaching part of Dora's house worth more than the land underneath, Dora would have every reason to strike a deal with Phil in order to avoid demolition, and Phil, who may strategically hold out, is the source of high transaction costs that impede a trade. Giving Phil an extra put option to "force" Dora to purchase (exactly what Dora plans to do voluntarily and desperately) does not make economic sense. Besides, if the encroaching part of Dora's house worth less than the land, Dora would rather tear down the overreaching part (perhaps just a separate garage) than buying the land. Facing Rule 1, Dora can do just that. Facing Rule 6, Dora may be forced to purchase the land,²⁵ and Dora does not necessarily value it more than Phil, as demonstrated above.

Below I critique the prototypical put-option rules (i.e. forced sale and forced

²⁴ Ayres and Goldbart (2001: 35–37) also use boundary encroachment as an example of a "dual chooser rule," under which the plaintiff (encroacher) has a call option and the defendant (owner) has a put option. The doctrine, however, does not work like Ayres and Goldbart (2001)'s model. First, in Ayres and Goldbart's words, the encroacher only "signals a willingness to buy property," but the encroacher does not actually "strike" and reveal that her value is higher than the exercise price. Moreover, in the "intentional encroachment" cases discussed by Ayres and Goldbart (2001), the law does NOT award the bad-faith encroacher with a call option, as the owner can insist on tearing down the encroaching construction. Finally, the owner's put option is *contingent* on the trespass, but it works to force the encroacher to purchase the encroached land, not a tool to neutralize the encroacher's (non-existent) call option.

²⁵ Whether Dora will be forced to purchase the land, no matter she has torn down the house before the court verdict, depends on how the law is designed. In other words, in a purely legal put option setting, the option is "triggered" once Dora's house encroaches Phil's land, but whether the option will be extinguished once the construction is removed is unclear in the optional law literature.

purchase rules), to demonstrate that puts have no place in the *Cathedral*.

B. *Puts Less Efficient Than Calls*

Calls are more efficient than puts mainly because the option strike price in property law is determined by the value of an external thing, not the expected value of the holder or non-holder of the entitlements, as Ayres (2005: 20–21, 42–43)’s theory would have required.²⁶ More specifically, when a property dispute requires compensation, the court will generally ascertain the fair market value of the thing in question. Total property value (“economic value”), however, equals fair market value plus “subjective value” (Blume and Rubinfeld 1984: 619; Fennell 2004: 963–965; Miceli and Segerson 2007: 20).²⁷ That is, the owner’s economic value is higher than or equal to fair market value.²⁸ The value of the resource for most non-owners, on the other hand, is probably below fair market value; otherwise non-owners would have bought the resource in the market, if transaction costs are not too high. Those who do value it more than fair market value are the potential buyers in this context.

Given these reasonable assumptions (owner’s value \geq fair market value \geq non-owner’s value) that hold most of the time, calls can better harness private information than puts, because calls utilize valuation information from both parties, while puts utilize valuation information only regarding the original owner. More specifically, in a call option regime, the court-assessed fair market value informs us of

²⁶ As a result, the court is unlikely to implement higher-order liability rules (Ayres and Balkin 1996) in property law, as the compensation in each round of “auction” would remain the same, rather than being elevated (Ayres and Goldbart 2003), unless the exogenous market value changes drastically.

²⁷ Subjective value is sometimes called the “consumer’s surplus” (Krier and Serkin 2004: 866) or “subjective premium” (Merrill and Smith 2010: 249). Subjective value is subjective and unbeknownst to third parties, and that is why the court generally ignores it in assessing property value for compensation purposes. Several scholars have designed mechanisms to induce accurate assessment of economic value; for example, Tideman (1969); Levmore (1982); Niou and Tan (1994); Bell and Parchomovsky (2007); Plassmann and Tideman (2008, 2011). My prior works demonstrate that these models are unlikely to do the trick (Chang 2012a, 2013d).

²⁸ Following the literature (Merrill 2002: 119; Fennell 2004: 963), I assume that owners value their property at least at fair market value; otherwise landowners would have already sold the property, unless transaction costs are higher than the gains from trade. But compare Lee (2013).

the lower boundary of the owner's value, and call options provide private information regarding how non-owners value the resource. That is, if the calls are exercised (not exercised), the original non-owners value the entitlement more (less) than its fair market value.

By contrast, in a put option regime, the court-set fair market value again is the benchmark for the original owner's lower-boundary value, but the owner-held put options only reveal whether the owner values the entitlement more or less than such court-set value (or, if the estimated fair market value is very accurate, whether the owner has positive subjective value). Yet the private information regarding non-owners' value is not revealed and utilized. With valuation information from both parties, a call option regime is more likely to induce efficient entitlement transfers than a put option regime. Indeed, as Row I in Table 4 demonstrates, when subjective value is zero and the assessed fair market value is accurate, calls are always allocatively efficient, while puts are sometimes allocatively inefficient, at least right after the option is exercised.

Put differently, often more than one non-owners could exercise call-liability rule, but the non-owner who is ready to compensate at fair market value and actually take titles is not randomly picked. Instead, the entitlement taker, at least bad-faith one, is likely to be higher-valuing than the original owner. By contrast, the original owner who exercises the put option would tend to choose parties with the financial wherewithal to pay. As a result, the non-owner who is forced to purchase is less likely than those under call regimes to be higher-valuing than the original owner. This is one argument against the contention that legal calls and legal puts could be symmetrical in property law.

Granted, if transaction costs are low, resource will ultimately flow to the party who values it most, and any allocative inefficiency is temporary. Nevertheless, as

emphasized above, exercising options, transferring entitlements, consummating transactions are never cost-free (cf. Posner and Landes 1996). Any allocatively inefficient entitlement transfer that arises from ill-advised legal options wastes resource and reduces social welfare.

The discussion so far assumes that the court is able to assess fair market value accurately, but it is not always the case in practice (Krier and Schwab 1995: 453–455).²⁹ My prior empirical work finds that courts often appraises fair market value too high or too low (Chang 2011). The effects of inaccurate assessment on calls and puts are asymmetrical, making calls again more efficient than puts (see Row II and III in Table 4).

Finally, when subjective value is positive, the court-assessed compensation based on fair market value under-estimates the owner's total value (Krier and Schwab 1995: 457; Smith 2004b: 1774). As Row III in Table 4 suggests, calls and puts are both likely to lead to inefficient exercise (or lack of) of options. This is one reason why property rules should be used as the default in a positive information cost world with low transaction costs,³⁰ because property rules will guarantee efficient allocation of resource (more on this later), whereas calls and puts do not.

To make the above claims more persuasive and clearer, I discuss the efficiency of calls and puts that are exercised or not exercised when the court over-, under-, or accurately assesses property value in more details below. The cells refer to the different scenarios demonstrated in Table 4, which assumes that the owner's subjective value is zero to simplify the narration.

Cell (1): When the court accurately assesses fair market value, the strike price of

²⁹ See also Smith (2004b: 1778) which points out that option holders under liability rule regimes have incentive to “game” the system by strategically manipulating or misrepresenting how much they value the resource.

³⁰ See Allen (2000: 906–907) for the distinction between the closely related information costs and transaction costs. Here, the main problem is that the court does not have sufficient information to assess the subjective value; thus, it is an information cost problem, not a transaction cost problem.

the call option is set at owner's value. Thus, exercising (not exercising) the call option by non-owners suggests that non-owners value the resource more (less) than current owners, and it is thus efficient.

Cell (2): If the court over-estimates fair market value, the non-owner's voluntary exercising her call option is efficient. Nevertheless, non-owner's not exercising her call option is sometimes inefficient, as the non-owner's value can be lower than the over-estimated fair market value but higher than the owner's true value.

Cell (3): If the court under-estimates fair market value, non-owners who exercise the call option are buying on the cheap. Since, as assumed above, most non-owners value the property at less than fair market value, exercising (not exercising) the call options is generally inefficient (efficient).

Cell (4): When the court accurately assesses fair market value, owners exercise the put option only if they value the resource at about fair market value and perhaps need cash. They did not sell the resource because of positive transaction costs. It is, however, unclear how much non-owners value the resource. Non-owners could be higher-valuing but have not been able to acquire the resource due to high transaction costs. Non-owners, however, could instead value the resource below fair market value, and this is exactly why they have not purchased the resource in the first place. Hence, exercising the put option can be efficient or inefficient. If transaction costs are not very high, non-owner is more likely to be lower-valuing than higher-valuing; thus, title transfer will be allocatively inefficient.

Cell (5): If the court over-estimates fair market value, owners are likely to exercise the put options, leading to inefficient resource allocation, since most non-owners value the resource at less than fair market value, not to mention the over-blown court-estimated value. Not exercising the put option is efficient most of

the time, but the owner has no incentive to stop.³¹

Cell (6): If the court under-estimates fair market value, unless the non-owner happens to be one of the few persons who value the property more than the owner, not exercising the put option is likely to be efficient. Indeed, owners have no incentive to exercise the put option. Thus, the put option is useless in this context, because it will never be exercised.

Table 4 Efficiency of Exercised and Not Exercised Calls and Puts

Court's estimate of fair market value		Option types			
		Calls		Puts	
		Exercised	Not exercised	Exercised	Not exercised
I.	Accurate	(1) Efficient	Efficient	(4) Likely inefficient	Likely efficient
II.	Too high	(2) Efficient	Sometimes inefficient	(5) Likely inefficient	N/A (option will be exercised).
III.	Too low	(3) Likely inefficient	Likely efficient	(6) N/A (option unused).	Likely efficient

C. *Compensation in Accession: An Example of Inefficient Put*

To further illustrate how puts are ill-fitted in property law,³² consider the

³¹ If the assumption of zero subjective value is lifted, owners may not exercise the option because their economic value is higher than the over-estimated fair market value.

³² Put options are benefactors providing unrequested benefits to recipients. Porat (2009: 194) advances six cumulative conditions for awarding compensation for unrequested benefits. Put options in property law can hardly meet these requirements.

Fennell (2011: 26) makes a case for the efficiency of an institutional platform that, among others, allows households to hold a put option against the government, so as to sell certain property entitlements that they do not want to the government. In Fennell's framework, households voluntarily enter into the put or call option contracts with the government. My arguments in the article apply only to stipulated legal options and liability rules. In Fennell's work, the puts are financial options that are voluntarily made by households and the government.

improver compensation rule in the accession doctrine, a Rule 6. Specifically, when an improver works on other's chattel but only slightly increase its market value, the original owner keeps the title, but has to reimburse the improver for her labor. That is, the improver owns her labor and can force others to purchase it.³³ As I elaborated elsewhere, the improver compensation rule is highly likely to be inefficient, especially when bad-faith improvers are compensated as well (Chang 2013b). In this context, both ex ante and ex post the original owners of chattels value the thing in question more than the improvers, and the owners probably do not want the improvement. To make things worse, an intentional, unauthorized improver essentially holds an in rem put option to force anyone to purchase her labor. If improvers receive compensation only when they are good-faith and non-negligent in verifying titles ex ante,³⁴ the improver compensation rule, if enforced, does not resemble a put option, because improvers think that the purchase prices of the things in question are sunk and thus do not compare value of improvement with option strike price (see Part II.B supra).

V. RULE 1 MORE EFFICIENT THAN RULE 2 WHEN TRANSACTION COSTS ARE LOW

Calabresi and Melamed (1972) famously argue that when transaction costs are low, property rules are more efficient than liability rules. Posner (2010: 86–89) generally follows this stance, and Cooter and Ulen (2012: 100–101) accepts this maxim with some refinements. Hylton (2006: 142); 2011) argues that when defensive actions and expenses are taken into account, property rules are generally superior to liability rules,

³³ In a recent excellent study, Bar-Gill and Bebchuk (2010) uses formal mathematical model to demonstrate that, from an ex ante viewpoint, Rule 1 (what they call “mutual consent rule”) is generally more efficient than Rule 6 (what they call “restitution rule”), because the latter rule induces entry by inefficient, low-quality sellers and forces some buyers (who would have stayed in the market had Rule 1 been the norm) to exit the market.

³⁴ This description approximates the common law in the U.S. (Koh 1998: 237; Chang 2013b), but miles away from the doctrines in civil-law jurisdictions.

when transaction costs are low. Lewinsohn-Zamir (2001) makes a case for the property rule over the liability rule, based on behavioral and experimental results. Kaplow and Shavell (1996), Ayres and Talley (1995a: 235), Ayres and Goldbart (2001: 20), and Ayres (2005) famously counter that as long as the compensation under liability rules is set at the “average” (or “expected”) value of the non-option holder (or the owner, in property law), liability rules are, “on average,” superior to property rules. This part counters that Calabresi and Melamed’s original insights apply in property law—when transaction costs are low, property rules tend to be more efficient than liability rules.³⁵

A. The Property Rule Better Harnesses Private Information

In property law, actually it is the property rules that harness private information, not the liability rules. Following Allen (1991, 2000), I distinguish transaction costs and information costs—the latter being the prerequisite for (but different from) the former. In a low transaction cost world, information cost can be high. Specifically, the subjective value of property owners is private information and ascertaining its amount is costly for non-owners such as potential buyers and courts. Under the property rule protection, potential buyers have to bargain with the owners. If owners accept the quoted price, it reveals the private information that owners’ subjective value plus market value is lower than the quoted price, and no deal suggests that the offered price is not high enough. Under the liability rule protection, the prerequisite for harnessing the call option holder’s private information is to set the exercise price of the call option correctly, but the court’s information costs in getting this job done are

³⁵ If liability rules are indeed more efficient than property rules in most scenarios, how can the neoclassical economic theory sustain, since this claim depends on the condition that the court’s visible hand can better harness private information than the market under the property rule and voluntary exchange?

very high. Therefore, property rules can harness private information without the court's intervention, while call-option liability rules can harness private information only if the court harnesses owner's private information first. Ayres and his coauthors' optional law works constantly put aside the impractical nature of their fancy proposals, even though the simplest single-chooser, first-order liability rule has information cost problems. If in practice the expected value of non-option holder cannot be systematically ascertained accurately, the claim that liability rules are superior is in doubt. If the expected value can be appraised accurately, but only with high information costs, allocative efficiency may be more likely to attain under liability rules—nevertheless, the total social welfare (taking into account the court's information costs and litigation costs) is not necessarily higher under the liability rules than under the property rules.

B. *Limitation of Kaplow and Shavell's Average Compensation Thesis*

Kaplow and Shavell (1996)'s claim that liability rules are “on average” superior to property rules cannot be generalized to most property law issues.³⁶ Kaplow and Shavell (1996: 776–779) use a mathematical model to demonstrate that liability rules are superior to property rules in the context of “harmful externalities” under certain conditions, including compensation being set at the average harm. Smith (2004b) has criticized this claim as treating uncertainty as risk and assuming away this tough question in property law. I would add two further counter arguments: Because subjective value is often assumed to be non-existent by courts, the compensation is generally set at below owner's true losses. Moreover, the first-order condition of Kaplow & Shavell's model is minimizing harm and prevention cost, while the

³⁶ Note that in another part of their article, Kaplow and Shavell (1996: 723) also favor the “use of property rules for protection of possessory rights in things.”

normative goal of property law also includes allocative efficiency, which is not considered in the model. Hence, one should not jump from the assumption that compensation is on average set correctly to the conclusion that liability rules are superior in property law.

C. *A Stylized Example*

Summing up the arguments above, the following stylized, numeric example further demonstrates that when *only* allocative efficiency is considered and transaction costs are low, property rules dominate liability rules: If owners of certain goods on average value them at \$50, at which the amount of compensation under the liability rule is set, non-owners' infringements will be efficient when the original owners in fact value it at less than \$50, and non-owners' non-infringements will be efficient when the original owners in fact value it at more than \$50 (Row C and Row B in Table 5). The readers can easily tell that in the other two types of scenarios (Row A and Row D in Table 5), non-owners' infringement decisions are *inefficient*. By contrast, when property rules are implemented and transaction costs are lower than the gains from trade, property rules *always* induce efficient allocation, as shown in Table 6. No matter how much an owner values her goods, titles transfer only when non-owners value it more and offer a price that surpasses the owner's economic value. Property rules fail the allocative efficiency test only when transaction costs are higher than the gains from trade. That means only the *marginal* cases (in which both parties' economic value approximate each other) remain allocatively inefficient, and the magnitude of the inefficiency is small.

Table 5 (In)efficiency of Rule 2 when damages set at the expected economic value of the owner

Owner's economic value	Non-owner's economic value	Exercise price of call option	Non-owner exercises call option?	Efficient allocation?
(1)	(2)	(3)	(4)	(5)
		=average of (1)	[yes if (2)>(3)]	[yes only if (2)>(1)]
A 40	45	50	No	No
B 60	45	50	No	Yes
C 40	55	50	Yes	Yes
D 60	55	50	Yes	No

Table 6 Efficiency of Rule 1

Owner's economic value	Non-owner's economic value	Bargaining range	Voluntary transfer of title?	Efficient allocation?
(1)	(2)	(3)	(4)	(5)
			[yes if (2)>(1)]	[yes only if (2)>(1)]
A 40	45	40–45	Yes*	Yes†
B 60	45	N/A	No	Yes
C 40	55	40–55	Yes*	Yes†
D 60	55	N/A	No	Yes

Note*: I assume that transaction costs are between 0 and 5.

†: If transaction costs > 5, voluntary transfer will fail to go through, and the allocation will be inefficient.

VI. A FRAMEWORK FOR PREFERRING RULE 2

It should be clear by now that optional law in the field of property is mostly about the choice between Rule 1 and Rule 2 (or a mixture of both rules), with the former as the default rule.³⁷ The preceding section has emphasized that when transaction costs are low, Rule 1 is justifiably used as the default. When transaction costs are sufficiently high, Rule 1 is not always more efficient than Rule 2. This section points out several variables that should be taken into account when the court or the legislature considers moving from Rule 1 to Rule 2.

A. *Transaction Cost Are High*

The prerequisite for even considering the use of Rule 2 is high transaction costs. Several important sub-types of transaction costs in property law—bargaining costs, verification costs,³⁸ and prevention costs—are worth considered in more details. First, when bargaining costs are high (due to, for example, owner's monopoly power or strategic behavior) enough to impede many potentially efficient trades, the liability rule becomes more likely to induce allocatively efficient transactions. Note that if bargaining costs are the reason to adopt the liability rule, the property doctrine needs not enable option holders to acquire the entire entitlement or entitlement of the optimal scale. In some contexts, as in access to landlocked land, a limited Rule 2 is sufficient to reduce bargaining costs and facilitate further voluntary transactions (Chang 2013a).

³⁷ Tom Merrill has urged me to go even further, dismantling the whole Calabresi and Melamed framework, as the liability rule misleadingly mixes together rules with different functions, such as prices for property exchange and tort damages for deterrence. Thus, the liability rule is an unhelpful generalization of discrete phenomena. I am inclined to agree. I do not push on this point here because this article focuses on property law, not all private laws. In any case, we would need terminologies to describe what is now called the property rule/Rule 1 and the liability rule/Rule 2. The liability rule is a misnomer in property law, but the compensation mechanism is surely needed in certain contexts, as I demonstrate below.

³⁸ Verification costs, admittedly, can often be thought of as a sub-type of information costs.

Another example would be the necessity setting, discussed at length in, e.g., Epstein (1997: 2105–11). In cases like *Vincent v. Lake Erie Transportation Co.*, 109 Minn. 456, 124 N.W. 221 (Minn. 1910), and *Ploof v. Putnam*, 81 Vt. 471, 71 A. 188 (1908), the ship owners and the dock owners may not have ample time to strike a deal before the storm hits, and the dock owners' strong bargaining power would make bargaining costs high anyway. The case law has held that the ship owner can moor in the dock without the consent of the dock owner but has to compensate the dock owner for the latter's loss. The ship owners, however, only acquires temporary entitlement (during the storm). That is, the liability rule applied here is also limited.

Second, other things being equal, if the identity of the owners and the content of the property rights can be verified at low costs, the property rule is preferred. When verification costs (also called search costs) are high, the probability of infringement is low, and the likely harm to the property owner is low or reversible, the verification cost may surpass its benefit; liability rules then gain an edge (Sterk 2008: 1304). For example, regarding boundary encroachment cases, in places where metes and bound registration system is used (Libecap and Lueck 2011), the content of the property rights (land size and boundary) often has to be verified with high costs; by contrast, in places like Taiwan where anyone can check the boundary of any land parcel on her smart phone, verification costs are much lower. Other things being equal, there is a stronger reason to use Rule 1 in the latter, and Rule 2 can be adopted in the former to reduce verification costs and as a safety valve (Smith 2009: 2128–2129; 2012a).

Third, when owners have incentives to fend off trespassers but prevention costs are high, property rules have advantages. Rule 2 is rarely unconditional in property law—even the eminent domain power (a Rule 2 power) is constitutionally constrained by the public use requirement—rather, certain prerequisites (for instance, “inadvertent” encroachment over the boundary) must hold. To prevent non-owners from fulfilling

these requirements, owners will employ self-help, such as installing extra locks, but such actions are potentially socially wasteful (Smith 2004b: 1786). From an ex ante viewpoint, the lower the prevention costs entailed by the liability rule, the more Rule 2 is justified.

B. *Transferring Entitlements Promotes Allocative Efficiency*

In adopting Rule 2, the legislature or the court should have strong evidence for presuming that original non-owners value the entitlements more than the original owners. For example, in the access to landlocked land context, most often landlocked owner values the passage to public road more than her neighbors (Chang 2013a). If owners clearly are higher-valuing, the law should stick with the default Rule 1. Granted, a multiple-order liability rule (Ayres and Balkin 1996) may lead to the same result, but the costs involved in the re-takings are wasteful (Smith 2004b: 1789).

C. *Ex Ante Investment Not Important*

When ex ante investment is critical in enhancing the property's market value, including developing information about the asset (Smith 2004b: 1777), property rules should be preferred (but compare Ayres 2005: 186).³⁹ Not all resources are constantly invested and contain unveiled secrets. Land value can be increased through proper investments, but the value of a Swatch cannot. *Ceteris paribus*, there is a stronger reason to adopt Rule 2 in the latter than in the former.

³⁹ For discussions of the negative ex ante effects of Rule 2, see Bar-Gill and Bebchuk (2010: 380).

But compare Bar-Gill and Persico (2012) which argues that, given that investment cannot be transferred to any future possessor of assets, and that both the current owner and the potential taker can invest on the assets in question, "property rules can rarely induce optimal investment." Bar-Gill and Persico (2012: 27) note that their argument is especially relevant in IP. In physical property law, however, it will be very difficult to think of a real-world example that fits their descriptions and conditions.

D. *Courts Make Less Errors*

Courts are not always perfect appraisers of property value, and, as demonstrated above, when courts systematically under-assess property value, liability rules will not perform well (Ayres and Goldbart 2001: 63). Personal properties, especially commodities, tend to have clear fair market value, and their owners generally do not attach high subjective value to them. By contrast, the value of residential real properties is not always easily identifiable, particularly in sparsely populated regions, and owners usually attach subjective value to them. Other things being equal, Rule 2 tends to perform better regarding chattels than regarding real estates.

As pointed out before, judicial assessment costs often positively correlate with transaction costs (Polinsky 1980; Krier and Schwab 1995: 453–455). When it is the case, high transaction costs do not warrant the use of liability rules, as erroneous property compensation would lead to resource misallocation. Nevertheless, there are cases when the property value could be easily ascertained through the use of, say, hedonic regression models ex post by the court, but asymmetric bargaining power and other factors might have impeded bargaining, for example in the context of access to landlocked land (Chang 2013a). That is, when transaction costs are high but judicial assessment costs are low, Rule 2 could be preferred.

Another variable that should be taken into account is whether the errors made by the court in assessing property value is correlated (Brooks 2002: 311–314). The liability rule has an advantage over the property rule when the errors are weakly and negatively correlated (Brooks 2002: 294). When the uses by both parties are distinct, the values of the resource for both parties are less likely to be correlated, and thus the judicial adjudication costs under the liability rule are lower than that under the property rule, favoring the former (Brooks 2002).

E. *Liability Rule Is the Only Choice*

When the things in question is damaged or ruined, the liability rule is the best the law can do (Rose 1997: 2181).⁴⁰ The property rule, usually leading to an injunction, is only useful when the property rights can return to the *status quo ante*, but all the king's injunctions cannot put Humpty Dumpty together again. The German property jurisprudence usefully distinguishes disposals into *de jure* disposal and *de facto* disposal. *De jure* disposal is, for example, when a non-owner sells a watch to a third party, whereas *de facto* disposal is, for instance, when a non-owner eats other's cake or burns other's car without the owner's consent, eliminating the owner's property rights on the cake and the car.⁴¹ Generally, *de facto* disposal can only be dealt with by the liability rule. Granted, if the property rule is considered as a call option whose exercise price is extremely high (Ayres 2005), the *de facto* disposer can be mandated to pay high punitive damages. High exercise prices, however, may over-deter and induce potential *de facto* disposers to be too cautious. Thus, high punitive damages are not always desirable, at least when the *de facto* disposal is unintentional.

Recently, Parchomovsky and Stein (2009: 1839–1840) proposes “propertized compensation,” which is a “damage measure that sets compensation equal to the owner's pre-trespass asking price,” to be employed mainly in intentional trespass. Their proposal would narrow the domain of “inevitable liability rules,” but under Parchomovsky and Stein (2009)'s strict evidentiary requirement, market-value compensation (the ordinary liability rule regime) is still often the only feasible choice.

⁴⁰ For a similar argument, see also Fennell (2007: 1434) who argues that because the state's physical coercion is not applied in time to prevent the entitlement violation, some other remedies have to be applied.

⁴¹ The closest American term to *de facto* disposal would be “conversion” in its original, narrower meaning.

VII. CONCLUSION

This article argues that the property rule (Rule 1) indeed should be the default in property law, especially when transaction costs are low, because the property rule harnesses private information better than the liability rule, a point long ignored or incorrectly criticized in the prior literature. The liability rule (Rule 2) could be more efficient than the property rule when transaction costs are high; non-owners are likely higher-valuing; ex ante investment is not important; and courts assess property value fairly accurately. Also, sometimes the property rule is simply infeasible after the fact, leaving the liability rule as the only option. Notably, these arguments tend to favor Rule 2 in personal properties, while preferring Rule 1 in real properties.

This article also calls for a new way to conceive entitlement transfers in property law. The Calabresi and Melamed framework and the add-on by later scholars suggest a symmetrical structure of property entitlement that involves a two-step thinking process. Nevertheless, as demonstrated above, the two-by-two framework (or three-by-two Ayresian framework) may become a hurdle to clear thinking in property law. This article prefers depicting Rule 1 as the center and default, and characterizing Rules 2, 3, 4, and 5 as different ways the original owners can lose their properties to others nonconsensually. And Rule 6 is the exceptional rule that gives original owners an extra choice to force a sale on others. This less fancy version of entitlement delineation highlights Rule 1 as the baseline rule in property, and emphasizes the five other rules as less common alternatives to Rule 1 that legislatures or courts can draw on to adjust entitlements when Rule 1 does not produce the most efficient result. Nevertheless, as cautioned above, Rules 3, 4, 5, and 6 are rarely used in property law, and even its rare appearance cannot pass efficiency muster in most, if not all, circumstances. Thus, to economize on property concepts (Smith 2012b), perhaps

thinking just in terms of the property rule versus the liability rule (both in singular forms) in property issues relieves the unnecessary burden on our “System 2” (Kahneman 2011) and leads to clearer thinking.

In sum, the *Cathedral* located in property law is built on the main pillar of the property rule, and occasionally supported by the liability rule. The decoration of option terminology has given the *Cathedral* some dazzling glory. But at the end of the day, as Shakespeare in *The Merchant of Venice* and Indiana Jones in *Raiders of the Lost Ark* remind us, all that glitters is not gold. The plain vanilla terminologies of the property rule and the liability rule are more accurate and can direct property scholarship to the right track—examining property doctrines one by one to ascertain whether the default property rule should be maintained or the liability rule is warranted.

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