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THE ECONOMICS OF PROPERTY LAW

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The Economics of Property Law

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Abstract: The economic analysis of property has made progress in areas of property closest to contracts and torts, where the assumption that legal rules can be studied in isolation has some plausibility. Property law is a system, and economic analysis can be used to capture the role of traditional notions of things, possession, and ownership. The theme in all of property law is the separation of clusters of resource related activities for treatment in partial isolation of their context. The very treatment of resource-related activities through rights to things serves to chunk together attributes, activities, and duty bearers for wholesale treatment. These modular things of property law emerge from basic possession and accession. The separation of parts of the world for semi-formal treatment extends through sophisticated forms of entity property, asset partitioning, and mixed systems. All these forms of separation promote specialization and investment, but separation comes at the cost of potential strategic behavior: actors will favor parts of the system from which they benefit more, to the detriment of others. To curtail such strategic behavior around the fault lines of the property system, property law uses a variety of exclusion and governance strategies, equitable interventions, and remedies.

Keywords: Property, possession, transaction costs, separation, opportunism, equity, property rules, liability rules, asset partitioning, entity property

Introduction

The economic analysis of property has rarely been applied to the first question of property theory: what is property? Law and economics has made impressive strides in the area of property, but further progress will come only when we apply economic tools to analyzing the institution of property as a system. An economic analysis of property law as a system reveals it to be the law of "near separation" of clusters of activities of private actors into a system of components, or modules. Among the most important of these modules are the legal things that mediate the interactions among actors.

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Like its sister areas in private law – torts, contracts – property law is a partial solution to the problem of the horizontal interactions of actors. From an economic point of view, moving away from total chaos, much less achieving efficiency, in such a complex system can be a tall order. Consider the set of all actors and every action each could take with respect to each other. A system of detailed rules that would directly ensure optimal sets of actions would be intractable – at least for interesting and useful definitions of "optimal." Such top-down solutions are not the only possible ones. Starting from the ground level, it is not hard to see how, given some starting point, actors might want to make mutually beneficial deals (contracts) and forbear from injuring each other (torts). Where does this leave property? It is mostly left to the philosophical literature to speculate about the origins of property in the service of justifying it as an institution. One modest theory along these lines is that of David Hume (1739–40). On Hume's theory, property emerges as conventions of possession that people recognized as mutually beneficial and to which they converged based on what we would now call salience. Robert Sugden (2004[1986]) has extended this theory using the tools of modern game theory.

Extending Hume and Sugden, I will argue that basic possession and many of the more refined features of property law approach the private law problem – reconciling potentially conflicting complex horizontal interactions among actors – using a strategy of incomplete separation. "Separation" here refers to taking chunks of this world of complex interaction and treating them as semi-freestanding groups that can be managed in partial isolation from other groups of interactions. Some information is "hidden" in modules, and legal things feature information hiding. Much of what owners do with Blackacre or a car is made irrelevant to duty bearers and other third parties. Separation in to legal things is an example of modularity, a well-known way of managing complexity (Simon 1981, Baldwin and Clark 2000: 58–59, 236–37, 257). Separating out modules or (to use Simon's terminology) "decomposing" a network into possibly overlapping components allows dense interactions inside the components and relatively sparse connections between the components. Doing so allows complexity to be managed and evolution to occur without major shocks to the system.

Separation into modules plays many roles in property law. To begin with, by defining things that can be possessed, complementary attributes are grouped together under the control of the possessor, removing the need for rules dealing with the interactions of the complementary attributes. When soil nutrients and moisture are part of the same "thing," property law need not deal directly with their complementarity. Possession becomes more formal – more separate form context – in larger social settings; possession is communicated through the modular thing to others generally (in rem). The duty (to keep off) need not make direct reference to the possessor and the possessor's uses, or the details of the internal attributes of the resource. To protect possession and ownership, exclusion strategies involve separation of clusters of uses from their context: violations are based on rough on/off proxies like boundary crossing. Such exclusion strategies defining modules are supplemented at their interfaces by governance norms and rules of proper use. Legal thinghood also allows for easier alienability. The law of remedies often suppresses information about uses and attributes of owners, in modular

fashion, thereby enhancing the protective function of property. Fifth, devices for managing the system keep property more formal and more compartmentalized, again using the notion of a thing as a springboard. Sixth, other forms of separation include complex divisions of property like trusts and corporations – forms of entity property – and divisions between property regimes, like common and private property intertwined in a semicommons.

Modularity helps property serve its goals at reasonable cost. All these examples of separation in property – thinghood, in rem status, formalization and standardization, and divided rights and regimes – permit specialization. By focusing decision makers on some information to the exclusion of other information, actors can specialize in maximizing the value of given assets or subsets of attributes. The stability afforded by property to the expectations of owners allows them to plan and invest and develop information about their assets.

The cost of this specialization at the potential for strategic behavior. But the closely related flip side of these benefits of property is that these decisions by owners (and other interest holders) will sometimes fail to maximize value for others, and overall. Classes of such situations involving exploitation often travel under familiar labels. Thus, "externalities" involve spillovers of uses that affect someone beyond the scope of one's property rights. The tragedy of the commons involves arbitrage between two systems: the fish in the pond is common (including its ability to help regenerate the resource) but the fish taken from the pond is private. Worse still, highly informed actors may take deliberate advantage of the modular system in order to exploit its structure for wealth-destroying private gain. When regimes of common and private property come together, people will act in common with too much regard for their interests in the private property system: this is true from medieval open fields (common grazing, private grain growing) to joint ventures and standard-setting organizations (common project, private intellectual property) (Smith 2000a). Property law characteristically tackles the private law problem of complex horizontal interactions through the device of separation, but this separation makes possible a range of strategic behavior. To deal with this potential strategic behavior, property law employs more targeted rules and standards – governance structures like nuisance, the interface of property with contract law in covenants, the interventions of equity, and organizational law.

Part I will begin by showing how a modular architecture solves the problem of managing the complexity of private actors' interactions with respect to things. Part II then presents an account of how, using notions of salience, a legal "ontology" is formed, consisting in part of persons, things, and relations among persons with respect to things. Upon basic notions of possession and accession are layered more elaborate notions of ownership and title. In Part III, I explore the contours of the modular property system, including exclusion versus governance, law versus equity, and damages versus injunctions. Part IV accounts for how the modular system of property law requires maintenance through a calibration of the degree of formalism versus contextualism. Property law also manages information costs through some mandatory standardization (including the *numerus clausus*) and institutions such as land records and surveys. Part V

extends this picture of property law based on partial separation to "entity property" (trusts, organizations) and regimes mixing private, common, and public property. I conclude with some thoughts about the economic analysis of property law as a system.

1. Property as a Collection or as a System

It is easier to see how economic tools can be used to analyze property as a system if we have a benchmark for the analysis. The "private law problem" of generalized horizontal interactions among actors in society (or the state of nature) is one such benchmark. Closely related are benchmarks from economics, including the zero transaction cost world of the Coase Theorem and the "full" property system that would be possible in such a world (Coase, 1960). In a sense, the bundle of rights picture takes these benchmarks as more realistic than they actually are. But transaction costs, construed broadly, point to the need to organize – and sometimes hide – information. is has things backwards. Positive transaction costs point to why some bundles (and rather lumpy ones that) characterize our world and to why property law is a system rather than (as the bundle view tends to see it) a collection of detachable rules.

1.1 The Full Property Benchmark

Property law, along with contracts, torts and restitution, forms the traditional bedrock of private law. In the United States and the Commonwealth, these subjects sport a large common law component, although legislation has played an important role, especially in property. In civil law systems, these areas, and property in particular, constitute the core of the civil code. When we turn to economics, its practitioners appear to focus intensely on "property rights", and economists do engage in a lot of talk about property. But economic analysis in general and law and economics in particular employ a very different notion of property from legal ones.

Starting with Coase, law and economics has adopted an extreme version of the bundle of rights picture of property (Merrill and Smith, 2001b, 2011). The idea that property was no more than an aggregate of rights, duties, privileges, and so on availing between the owner and others, especially if defined in terms of a list of uses, was familiar since the Realists adapted Hohfeld's (1914, 1917) scheme of jural relations to their ends. The bundle of rights picture is both an analytical device and (for many) a substantive claim about property: property is not more than a bundle of sticks, with no unifying theme. As such there are few presumptions about how sticks are collected or structured and no glue holding the notion of property together. In particular, property is not about things at all, and serious social scientists and policy makers have, on this view, gotten beyond the myth that it is (Grey 1980; see also Symposium, 2011).

The bundle of rights got a big boost from Ronald Coase and law and economics. This choice was an understandable one for Coase, whose main goal was to show the impact of the law on the economy. For this purpose, the bundle of rights picture is made to order. Coase's purpose was not to explain the law of property – or the law at all. His

target was neoclassical economics, with its unrealistic approach of assuming away the institutional framework governing the interaction of economic actors (Coase, 1988:174). To make his point, he shows (in what has come to be known as the Coase Theorem) that if transaction costs were zero, the same pattern in resource use would occur regardless of the set of initial entitlements (or, in a weaker version, maximum efficiency given a set of initial entitlements) (Coase, 1960). In our positive transaction cost world, this guarantee disappears, and the lesson is that we must do comparative institutional analysis to figure out which is the least bad arrangement from an economic point of view (Allen, 1991; Eggertsson, 1990:101–116; McCloskey, 1998; see generally Posner and Parisi, 2013).

The analytical convenience of the bundle of rights picture can be carried too far. If property is a collection of rights, duties, privileges, immunities, and so on, with no inherent content, no interaction between them, and no glue holding them together, then one can vary a stick – who has the right to create vibrations or prevent them, who has the right to let cattle graze or to prevent them from doing so – and the effect of this variation can be traced out on economic behavior, hypothetically under zero transaction costs and more realistically under various institutional arrangements. The usefulness of the bundle picture for analytical convenience accounts for some of its popularity. "All else equal" is easier to achieve (or to assume) when the various legal relations and legal rules are detachable from their context. One can ask, as law and economics, especially in its early phase was inclined to do, whether a given "legal rule" was efficient. This procedure is familiar from contracts and torts, where studies of damages rules in contracts and negligence versus strict liability in torts became central topics. For the most part, legal economists treated property in a similar fashion, even though property is, as I will argue, less well captured than contracts and torts by a rule-by-rule analysis. It is precisely the system aspects of property that are left out in this approach.

Once positive transaction costs come into the picture, the bundle of rights picture shows weaknesses as well as strengths. For example, one could ask whether various good faith purchaser rules and exceptions for trespass like necessity increase efficiency. Notably, these applications of economics to property law occurred especially where property overlaps with torts and contracts. More systemic aspects of property like land surveying and recording systems received less attention in the formative period of law and economics. I will argue that these other aspects of property are less amenable to the rule-by-rule style of analysis popular in first-generation law and economics.

1.2 Property as a Modular System

Economic analysis of property law as a system does not come naturally. System effects and emergent properties are more difficult to measure than rules in isolation. Perhaps because the isolation of legal rules was easier in areas of property that overlapped with torts and contracts, much of the first wave of law and economics focused on parts of property law that are the most contractual or tort-like, rather than property itself. Indeed, property was treated as the working out of contract and tort principles (Merrill and Smith, 2001b). To borrow a civilian term, the view of property implicit in law and economics

was an "obligational" one.[1] Damages rules in contracts or negligence versus strict liability could, it seemed, be treated in isolation for modeling purposes. When it came to property, the analysis tended to be an extension of these strands of analysis, with the law of nuisance taking center stage.

To get at what is unique about property law, we can return to the theoretical benchmark of the world of zero transaction costs. We can derive a Coase Corollary from the Coase Theorem: in a zero transaction cost world the form of property entitlements would not matter to resource allocation (Merrill and Smith, 2011). Or to put it more concretely, in the absence of transaction costs, much of what is done by the law of property could indeed be accomplished using only tort and contract. Taking the true lesson of the Coase Theorem (and the Coase Corollary) seriously, we can ask what is the "essential role" of property in a positive transaction cost world: what does property law make possible that could not be accomplished by contract?[2] Property law owes its actual contours to positive transaction costs.

Return to the basic problem in private law – the problem of potentially conflicting activities by members of society. Think of all the actors and all the resources attributes, and all the actions each might take that could possibly impact the others. We could theoretically define legal relations for each pair of actors, resource attribute, and action. If we stopped there, we would be assuming very strict separation between activities and attributes, but this is not realistic. Certain collections of attributes go together (in a compositional dimension of property) (Barzel, 1997; Smith, 2001). For example, someone with the right to determine how soil nutrients are used might need control over the moisture level, etc. To handle these interdependencies, the rules governing the super thin slices of the world of our thought experiment would themselves have to be very complex and interdependent, or we would need rules of priority among the rules. In a zero transaction cost world this would all be costless, but in our world it would be prohibitively costly.

Property law economizes on transaction costs by providing massive shortcuts over this fully articulated, or "complete" property system. In our world, property law provides a first cut at this problem that aggregates some of these slices, along various dimensions (Lee and Smith, 2011; Smith, 2012). Complementary resource attributes are collected into things or assets. Rights are defined over many uses by using exclusion strategies over these collections, supplemented as needed by governance strategies referring to particular uses (Smith 2002; see also Field, 1989; Rose, 1991). The more specific governance rules and standards partially override the background exclusion regime (which applies to the more heterogeneous 'elsewhere' pattern of situation). Thus, licenses and (more robustly) easements displace the exclusion rule (trespass) because they refer more specifically to uses and users. When two devices or rules apply, the more

[1] The law of obligations embraces contracts, torts, and restitution, and in civil law an "obligation" is "a two-ended relationship which appears from the one end as a personal right to claim and from the other as a duty to render performance." (Zimmermann, 1996:1).

[2] I borrow the essential role termonilology from Hansmann and Kraakman (2000), who use it to analyze what contribution organization law makes that cannot be replciated by contract. They conclude that organizational law is property law.

specific applies over the more general. Very general rules that have many disparate exceptions (are displaced by many specific devices) apply "elsewhere" (Smith 2015a). Owners of these collections have rights defined against other generally – in rem rights – that deal with duty bearers in a wholesale fashion. Property is a shortcut over the "full property" that could be achieved in the zero transaction cost world. In an analogy to the incomplete contracts literature, we can call property inherently "incomplete" in our world.[3]

The degree of this shortcut can be captured using algorithms for finding community structure in a network. There is a large literature on finding structure – modules in a network (Newman and Girvan, 2004; Newman, 2006). We can model emergent legal relations by considering actors the nodes and their activities the edges (possibly of varying strengths) (Sichelman and Smith, ms.). Then a family of algorithms instructs one on how to remove the edges of most "betweenness" – the ones that are on the most paths between nodes (based, for example on shortest walk or random walk). The virtue of these models is that they do not prejudge the structure of the system: we can model the emergence of clustering of interactions around legal things if they really do tend to lend the system a modular structure, i.e. with more interactions internal to them and relatively sparse (but important) interactions in between. For example, the law of trespass tracks modular parcels whereas nuisance focuses to a greater extent on a few important relations between the users of adjacent parcels. Second, algorithms for finding community structure do not prejudge the level of grain that the law should implement. The structure-finding algorithm can tell one where modularity is maximized and it can be combined with the costs and benefits of delineation effort to predict how fine-grained legal relations should be if they respond to efficiency concerns, either through evolutionary pressures or by design. The use of network theory and measurable modularity carry the potential to open up avenues of empirical work on property as a system.

2. An Ontology for Property

Unlike much of the rest of property, economics has offered a bottom-up theory of possession. The word "possession" covers many different phenomena ranging from pre-legal notions of control to rights of possession protected by trespass and adverse possession.

2.1 Salience and Convention

Robert Sugden (2004[1986]) has reinterpreted Hume's theory of property using salience and focal points. Thus, when two actors might want to use a resource, a convention may emerge based on who is nearer to the resource or has control over it. According to

[3] In the incomplete contracts literature, contracts are incomplete because of positive transaction costs. Property's incompleteness likewise stems from the costs of more complete property. Note too that it is recognized that in a world of complete contracts there would be no role for ownership (Maskin and Tirole 1999).

Sugden the relevant game is Hawk-Dove,[4] but what levels of cooperation or conflict obtain can be left open, as long as it makes sense for people to pick an equilibrium based on salience. Hume and (to some extent) Sugden see the salience that breaks the symmetry between actors approaching a resource as a matter of psychology and inductive reasoning. As David Friedman (1994) points out, the norms of property that emerge from such a bottom-up process based on salience will reflect a very local version of morality and efficiency, because it must work in pairwise encounters of actors. The question remains open how much this ground-level morality and efficiency scale up to society. Nonetheless, conventions with this local morality and efficiency place more modest informational demands on actors than ones that reflect more big-picture notions of moral desert, distribution, or efficiency (Gold and Smith, ms.; Merrill and Smith, 2007). A rule of property that required actors to optimize the overall use of resources would not be useful to guide behavior (or litigation).

And yet, salience may also relate to economic usefulness, in the sense of the benefits of one actor's use or his or her control over the resource. In Yoram Barzel's (1997) theory of property, resources are analyzed into their constituent attributes and changes in property rights tend toward efficiency if those with a greater ability to affect the mean return of a collection of attributes get the residual claim over them.[5] Contracting parties can be expected to move toward this result (transaction costs permitting), and even nonconsensual activities will have this tendency under some conditions. Barzel disclaims an explanation of how property got started (likening it to a Big Bang), but his approach is a useful supplement to the theory of Hume and Sugden. In a world of actors encountering undifferentiated resources, it often makes sense for those who have the ability to affect the mean return of collections of resources to have de facto possession over them, as well as a legitimate claim that persists beyond the moment.

Breaking resources into attributes highlights two points about a layered theory of property (Smith, 2015a). First, notions of possession and thing definition go hand in hand. The law of accession mostly directly reflects the process of thing definition. 'Accession' can refer to a principle of lesser assets (or attributes) going to the owner of related greater assets (or attributes). This principle is reflected in a wide variety of doctrines, including the law of increase (the calf goes to the owner of the mother), and fixtures go with the land they are attached to. In common law, 'accession' also refers to what was called 'specificatio' in Roman law: someone who innocently mixes labor with material and transforms it or adds most of the value can keep the new object and pay damages for the things worked upon (or replace it with an equivalent). This branch of accession deals with the persistence of things over time (Newman, 2009; Smith, 2007). Accession overall can be interpreted as the law of thing definition and claim scope or as an acquisition principle (compare Newman, 2009 and Smith, 2007, with Merrill 2009). As we have seen, both Hume and Sugden explain accession on the basis of salience. At

[4] In the Hawk-Dove game, each player's best outcome would be to play hawk (assert oneself) e the other plays dove (yields), but the worst outcome results for each when each plays hawk.

[5] Barzel's theory has some parallels in the theory of asset ownership (Grossman and Hart, 1986; Hart and Moore, 1990), but Barzel explicitly endodenizes the assets.

any rate, in a possessory claim we need to know the scope of the claim. Accession can be thought of as basic thing definition and maintenance, which feeds into possession.

Accession has been analyzed from an economic point of view, mainly as an acquisition principle, as has possession (Merrill, 2009). When it comes to first possession, rules that designate a clear winner early in the process tend to be efficient (Lueck, 1995; see also Posner, 2000), and we can note the role of salience and control in establishing a good candidate for someone uniquely well positioned to compete (and use) the resource. Likewise, accession can head off costly competition for unclaimed resources by designating a clear (salient) winner – the owner of salient resource X gets lesser resource Y. By contrast, where potential appropriators are equally well positioned to access the resource, a rule of first possession can easily lead to the tragedy of the commons. Here homogeneity of appropriators can help maintain rules of property use, in a governance regime. (Lueck, 1995; Libecap, 1989)

What we need for the rest of property law is a basic ontology for purposes of social and legal norms. An ontology includes the basic elements and their relations, including who counts as an actor, what a thing is, and how actors may act with respect to one another.[6] Some of these relations are mediated by the things of the ontology: if A rightfully possesses resource R, then others have a duty to forbear from entering it, touching it, and so on, depending on the nature of the resource. What attributes are grouped into things and who has possession of them both respond to considerations of salience and utility.

2.2 Possessory Things and Ownership

For property law, a key shortcut over "complete" property constructed from contracts is the legal thing. The relation of those with possessory rights or ownership and those with corresponding duties is mediated through the thing. When one walks through a parking lot one need only not to take or damage the cars if one does not own them: the duty bearer need not know anything about the owner's characteristics or planned uses (Penner 1996:75-76). Particularly as possession becomes more formalized into law, there is less need to assess the qualities of the possessor or the potential challenger in order to follow the Humean custom of mutual forbearance. Parcel definition greatly simplifies the law of trespass, particularly when the law develops persistent rights to possess such that the owner need not be actually present in order to be in possession (and have the right to possess protected by trespass).

Customs of possession are formalized in the process of being adapted into the law. Thus, in the mining camps, miners had a right to work a spot without interference, in a custom called *pedis possessio*. When the custom was adopted by courts and in legislation the boundaries of the spot were identified with the formal boundaries of the claim, even when this meant expansion (Smith 2009, 2015a). (More recently courts have

[6] I am using 'ontology' here as computer scientists do, to refer to the basic set-up, without making deep metaphysical claims. Here we at least need legal persons, activities, things, and relations between persons with respect to things and activities.

resisted extending it beyond the boundaries of a single claim, as the uranium industry has long wished.)

Possession itself separates the possessory norm from a great deal of personal information of the actors. As possession becomes more legal and more widely applicable, the thing plays a greater role, such that even details of the thing itself do not matter to the duty. As mentioned earlier, when custom and law afford rights to possess to those not actually physically controlling (or even present), the "possessory" right must rely on formal thing definition because the possessor may or may not be around to voice objections. Well-demarcated boundaries in the case of land serve this function. Extending possession in this way makes sense: property becomes much more useful in terms of investment, specialization, and autonomy by persisting even when actual control or proximity are attenuated, at the relatively low cost of being clear about demarcating the connection of (extended) 'possessors' and their 'things'.

Within possessory norms, we can see nested defaults at work. For example, as we saw, norms of possession arise in particular groups, like whalers on the open seas (Ellickson 1989, 1991). The famous "fast fish loose fish" rule provided that a whale belonged to the first one to harpoon it as long as the harpoon was attached to the whaler's boat. The physical connection is salient and close to de facto possession. For particularly valuable and dangerous sperm whales, the rule was that of the 'first iron', which gave the first harpooner exclusive rights as long as fresh pursuit continued. The 'first iron' rule is less salient, more costly to promulgate, and more specific. It partially displaces "fast fish loose fish," which was the general rule. One would expect a new species of whale with no special dangerousness to fall under it. Likewise, Ellickson's (1991) findings in Shasta County are consistent with a theory of nested defaults. He found that regardless of whether the formal law is fencing in (ranchers have responsibility for damage caused by their animals on land belonging to others) or fencing out (no such responsibility), the informal norm was for animal owners to take responsibility. In the area of informal norms, the basic possessor norm has a lot of pull. We might further hypothesize that this basic exclusionary regime would be more widespread than a narrow test based on which activity was more valuable in a given small area (Merrill and Smith, 2001b). It is the more general default.

Layered on top of basic possession and rights to possess are further rules culminating in ownership. At first blush it seems puzzling to have two notions of property control and to sometimes protect one without the other – vindicating the rights of nonowner possessors some of the time and nonpossessing owners at others. By layering ownership and title rules on top of possession, property law is able to effect further types of separation, at some cost. The thing in ownership is even more formal than in possession. Indeed possession is often used for low-stakes everyday interactions: one does not do title searches on the pen one buys from a store.

With the layering of ownership and title rules on possession, we see a further example of nested defaults, or the specific over general principle. Rules of title and ownership are more specific (and used for higher stakes) and displace possessory rules

that would 'otherwise' apply. This means that possession applies whenever it is not displaced, in a very heterogeneous patters (called 'elsewhere'). (Smith, 2015a) This means that finding a unifying theme of possession, other than being a more general partially displaced stratum of law is unlikely to succeed.

Indeed, ownership is so formal that some property theorists outside of economics have proposed that property is an office (Essert, 2013; Hart 1982: 208; Katz, 2012). The idea is that duties are owed to the owner qua owner without the need for personal information. Further, when the owners property right is transferred to another, the right need not change in content: the new owner just steps into the old owner's shoes. The old duty bearer is now a right holder and the old right holder is now a duty bearer, but this switch does not require us to say that there is a different right now. Instead, the Humean theory developed earlier can capture these aspects of duties and transfers of rights: the legal thing is simply impersonal – it remains the same under conditions of transfer – and so ownership need not rise to the level of a full-blown office. In keeping with the bottom-up theory, the key to alienability is depersonalization of the right, which happens through the definition of the thing.

What the impersonality of duties and the ease of alienability require is not that ownership be an office but that legal things be depersonalized (Smith 2012). Again, think of the parked cars in the parking lot. The duty bearer need not know whether the car is on loan to the owner's sister, or whether the owner is a non-natural personal like a corporation. (These divisions of rights stem from further forms of separation that will be taken up in Part 5.) The separation of the legal thing from its context allows for this degree of in rem simplicity (Smith 2012). It also allows transfers to take place more smoothly: potential purchasers have less to inquire into, and the transfer happens automatically in many respects.

The more formal ownership and title rules allow for more elaborate forms of separation than does simple possession. Divided rights are not really possible when all we have is a notion of possession. Either one is in possession or not. Something more is needed including a method of keeping track of more connections between persons and things in order to divide rights. At the very least we need rights to possess that persist despite their holder not being in possession. Title is one method of keeping track of these connections. Furthermore, ownership allows for divisions over time and by use, such as easements.

3. Delineating Property Rights

In moving from possession to ownership and the division of rights, we are in the realm of delineating property rights. Economists going back to Demsetz (1967) and carried through in the New Institutional Economics (e.g., Barzel, 1997) have focused a great deal of attention on the delineation of property rights, including the descriptive question of how they evolve in response to background conditions and what efficiency properties we should expect (or not) from systems of property rights. Demsetz's theory was a demand

side theory: the Demsetz Thesis holds that property rights will evolve in order to deal with externalities as they arise (Symposium, 2002). Other branches of the literature ask how property rights are supplied, often very imperfectly relatively to an ideal baseline (Alston, Harris, and Mueller, 2012; Libecap, 1989; Ostrom, 1990; Wyman 2005).

3.1 Exclusion versus Governance

One aspect of property rights definition is the problem of separating out clusters of activities and attributes and then dealing with the problems of strategic interaction that such separation gives rise to. Property rights are typically delineated with some combination of exclusion and governance (Smith 2001, 2004a). An exclusion strategy is low cost and low precision: it defines basic modules and takes care of problems wholesale. The law of trespass reflects an exclusion strategy, and the message is a simple one: keep off unless you have permission. This leaves important spillovers unaddressed, and where the stakes are high enough they are sometimes worth dealing with through a governance strategy. A governance strategy focuses in on a narrower class of uses, as in covenants, easements, and nuisance law. This part of property law enriches the interface between parcels in real property law. Because most personal property has no fixed location, restrictions on use generally are achieved exclusively through in personam contract, tort law, product standards, and safety regulations, rather than through the law of servitudes.

Separation of attributes and their associated activities into clusters gives rise to problems of strategic behavior. The separation into modules is not complete. Modularization allows for specialization – each owner can become informed and skilled at using the owned asset – but property rights also lead to myopia (or worse), than others. Some of this goes under the heading of 'spillover' or 'externality'. Some of these spillovers can even be created to extort others, as for example opening a horse stable in order to be paid by neighbors to shut it down, or emitting pollutants to receive subsidies for stopping (Kelly, 2011). Further, what counts as a thing for property has to be stable in the face of strategic behavior. Gathering attributes together into 'units' needs to be done in order to reduce measurement costs (Barzel, 1982), and what counts as a unit may change depending on the legal treatment: taxes and legal rules that burden or benefit units or things can call forth effort at changing the underlying unit or thing (Barzel, 1976; Smith, 2000b). Thus, taxes on cigarettes have resulted in longer cigarettes, and access to riparian rights has resulted in "bowling alley" parcels. Property law needs doctrines to prevent strategic reconfiguring of things.

Various combinations of exclusion and governance may be better at containing strategic behavior. Putting the effects of an entire interaction within the scope of a parcel would be one method – by removing the module boundary that causes the externality (see Ellickson 1993: 1322–35). This comes at the cost of any specialization that would be facilitated by a more fine-grained parcel definition with a boundary through the activity. Another method to contain strategic behavior is to supplement the partial exclusion with a governance regime that addresses the potential opportunism. Thus could be by easement, contract, nuisance, or regulation. Or various forms of entity

property could be used to govern the wider interaction – as for example in a common interest community.

3.2 Law versus Equity

One pervasive governance-like device aimed at containing opportunism is equitable decision making by courts (or arbitrators or administrators). Separate courts of law and equity are mostly a thing of the past, but law and equity persist as partially separate when it comes to substantive law and remedies. Economic analysis mostly treats the law versus equity divide as irrelevant, and treats the distinction as faintly reflected in the choice between rules and standards (Kaplow, 1992), and property rules versus liability rules (Calabresi and Melamed, 1972, Ayres, 2005). I argue that equity is a functionally distinct decision making mode that is particularly necessary when it comes to cleaning up the strategic behavior made possible by incomplete separation.

From a systems theory point of view, this equitable element is second order, in that it takes the results of the 'regular' law as an input and selectively intervenes to solve certain problems that arise because the law has to cover many cases at once (Smith 2015b). In systems theory, the Law of Requisite Hierarchy holds that the weaker the regulator's ability and the larger the average uncertainty, the more hierarchy is needed in the organization of the regulator (Aulin, 1982:115). In law, ordinary rules and standards work badly sometimes, especially when opportunists exploit their weak spots. There is, then, a tradeoff in going to the next level: Does dealing with complexity and uncertainty at a higher level reduce uncertainty more than it creates it through the exercise of discretion? The hypothesis is that this condition is satisfied, and equity as meta law is called for, when opportunism is likely. Those actors who can in a sense go outside the system to exploit its weaknesses often have to be met and countered on a larger playing field.

What is opportunism? Formal law, including the part of property law that defines property rights is that some actors with a lot of information will take unforeseen advantage of these systems. This is a problem very familiar from tax law (Weisbach, 1999; Lawsky, 2009). Economists have not been of one mind about the usefulness of opportunism as a category for analysis. Oliver Williamson relies heavily on opportunism in his version of New Institutional Economics, in which he shows how a variety of contractual and organizational devices can be used to prevent opportunism that would otherwise prevent cooperation. Williamson adopts a very broad definition of opportunism as "self-interest seeking with guile" (Williamson, 1985:47). This is broad in the sense that Williamson includes all manner of rule violations and promise breaking as opportunism. It is narrow in the sense that it is not clear that full-blown deception is required for opportunism. Others have argued that opportunism is simply self-interest, and all a system should do is its best to provide an environment where self-interest is consistent with efficiency (compare Barzel, 1985:10–11, with Williamson, 1993). On this view, failure to do so does not call for hand wringing about the immorality of the actors within the system.

Elsewhere I have defined opportunism as "behavior that is undesirable but that cannot be cost-effectively captured—defined, detected, and deterred—by explicit ex ante rulemaking. . . . It often consists of behavior that is technically legal but is done with a view to securing unintended benefits from the system, and these benefits are usually smaller than the costs they impose on others" (Smith, 2010:14–15). If the question is when to intervene at a higher level, the key from the point of view of legal design is to come up with proxies that can trigger presumptions against the potential opportunists, along with further rules of thumb for evaluating behavior once the equitable safety valve is triggered.

Here too, it is not surprising that the law tracks widely accepted morality. Taking unforeseen advantage of a situation in order to appropriate more of a smaller pie does meet with disapproval. More importantly, an institutional analysis will keep on the table the full range of responses to such opportunism. These include better ex ante rules, ex post equitable standards, and tolerating some residual opportunism. It should also be noted that social norms do much of the work in getting people not to act opportunistically (a point to which I return below).

Much of what goes under the heading of equity (and used to fall under equity jurisdiction) and which further drew on an Aristotelian strand of thinking about equity, sees a need for an ex post, morally infused discretionary standard that would be targeted in personam to people engaged in opportunism (Ayotte, Friedman, and Smith, 2013; Feldman and Smith, 2013; Smith, 2014, 2015b). Crucially from an institutional design perspective, this decision-making mode is implemented in a second-order system of proxies and presumptions that constrain the operation of equity in order to prevent it from chilling legitimate behavior.

Consider as a prototypical example a building encroachment. It is sometimes said that building encroachments (at least in the old days) would automatically call forth a harsh remedy of injunctions but that modern courts, worried about hold outs, will now usually give damages. This is not totally wrong, but it gives an incomplete picture. Continuing trespass (of which a building encroachment is an example) gives rise to a rebuttable presumption for an injunction. However, we should be concerned about overcompliance (Craswell and Calfee, 1986; Sterk, 2008), and, from a less economic point of view, ex post unfairness. So the law allows a shift to damages where the encroacher has made a good faith mistake and the encroachee would face disproportionate hardship. This means (or did and should mean) that the injunction would harm the enjoined party far more than it would benefit the moving party – a torn down building would be a classic example. It does not mean equipoise or some other kind of cost-benefit test that would ask whether the particular proposed injunction's benefits would exceed its costs. Nevertheless if the encroacher is in bad faith, an injunction should issue. The scheme of proxies and presumptions, keyed to good versus bad faith and to disproportionate (or "undue") hardship, is designed to solve a two-sided opportunism problem that is set up by the system of boundaries between parcels and the *ad coelum*

rule.[7] We have to worry both about the hold out on one side and the land-thief on the other. Here equity works though the different remedies on offer in the various situations that carry more or less dangers of opportunism. I return to remedies in the next subsection.

Equity is thus a safety valve largely defined by the proxies and presumptions that trigger this kind of inquiry. Like governance (versus exclusion) and ownership (versus the right of possession), equity is a more specific regime that overrides the law in particular circumstances. The proxies that trigger the presumption against the possible opportunist are more specific than the general rules for which they are part of the safety valve. Where does this happen? The idea that some situations are so pregnant with the danger of opportunism that a class of transactions will not be enforced or will be subject to searching scrutiny is familiar across private law. Unconscionability in contract law, another outgrowth of equity, was traditionally keyed to near-fraud. The dangers of opportunism and error can be given an economic interpretation as in Epstein's (1975) theory of unconscionability: some transactions have indicia of fraud that cannot be directly proven and, given the possibilities of type 1 and type 2 errors, it sometimes makes sense to refuse enforcement of transactions (even if this will prevent a few positive deals) (see also Leff 1967). He draws an analogy to the statute of frauds: withholding enforcement of certain kinds of contracts not in writing could be better than enforcing them all or picking and choosing which ones should be enforced (this is an empirical question).[8]

Equity relies on a type of local morality, in a fashion similar to the one we saw in connection with possession. Equity enforced some custom, and was the vehicle by which some customs could be adapted into the law. The theory of social norms suggests that close-knit groups will come up with wealth-maximizing norms (Ellickson, 1989, 1991). There may be outgroup externalities, as there were with whaling norms, which were good at dealing with (pairwise) conflicts between whaling ship crews but led to the overhunting of whales (Ellickson, 1989; Friedman, 1994). Further, some customs will scale up better than others. There is the danger of enforcing in an end game situation customs that presuppose an ongoing interaction and of distorting the process of norm formation by enforcement in the law (Bernstein 1996). Nevertheless, custom has been and can be a source of new legal norms under the right conditions (Parisi, 2000). As we saw, part of the process of making a custom more widely applicable is to formalize it (Smith 2009). Despite its reputation as discretionary and detailed, equity probably had a role in simplifying custom for use by the law. In particular, rough judgments about whether one is violating a custom could inform determinations of good faith. There is as always a danger here too of distorting the norm or the law in the process of "enforcing" it.

[7] Under the *ad coelum* rule (short for the maxim "*cujus est solum, ejus est usque ad coelum et ad inferos*, which translates as "one who owns the soil owns also to the sky and to the depths"), the boundaries if a parcel extend upwards and downwards (presumptively, with adjustments, for example, for overflights).

[8] Interestingly, the statute of frauds was an early alternative to the system of land records (Hamburger, 1983), another device to prevent shady dealings in property – a topic to which I return in Part 4.

Equity acts in personam in the remedies it offers, and normally it intervenes in a targeted fashion. It acts as a safety valve, in which a court can intervene – based on the proxies and presumptions – against a specific instance of opportunism. On the theory offered here, equity's contours reflect the strategic interaction of parties with each other and with courts. But the existence of the system is announced to the world. Indeed, the possibility of equitable intervention leads to the possible chilling effect, much emphasized by the opponents of equity throughout its history. Whether the net effect is chilling, or reassuring to ordinary non-opportunistic actors is an empirical question.

Legal designers also face the question of how the possibility of equitable intervention, especially when it is couched in sometimes ambiguous moral sounding terms (such as good faith), will reach its target audience, or audiences. When the law sends a different message to different audiences, legal theorists call this 'acoustic separation' (Dan-Cohen, 1984). The term was introduced by Meir Dan-Cohen to describe the possibility that conduct rules directed at primary actors might differ from decision rules used by judges or other officials. For example, the criminal law might tell people not to steal, but give judges or prosecutors discretion not to enforce, or to show leniency, in certain situations. Equitable intervention may work similarly. The same moral-sounding directives that tell highly informed opportunists that courts will come down on their misdoing, may sound like everyday morality and provide reassurance to those with no nefarious intent. In "behavioral equity," the equitable message may promote compliance and prevent evasion of the opportunists, while not interfering with the intrinsic moral motivation of ordinary people (Feldman and Smith, 2014). Insights from behavioral decision theory can be integrated into the familiar rules versus standards paradigm, in this as in other areas of property law.

3.3 Damages versus Injunctions

We have already seen in building encroachments that conventional law and economics uses the lens of property rules versus liability rules to analyze questions of remedies in property and other areas. Calabresi and Melamed (1972) defined a property rule as protection for an entitlement that aims at forcing a would-be taker to obtain the holder's consent. If an entitlement is protected by a liability rule, it can be taken, with the only consequence being the payment of officially determined damages. (Calabresi and Melamed also introduced inalienability rules, which forbid the transfer of the entitlement.)

The primary example for Calabresi and Melamed, as for Coase, was the law of nuisance. Calabresi and Melamed applied their criteria of efficiency and fairness (and, in principle, 'other justice considerations') to this question and argued that, where transaction costs are low, property rules should be used, in order to ensure that takings of entitlements are welfare increasing. Where transaction costs are high, because of potential hold outs among those affected by the nuisance – think of a factory and residents – or because of free riders among those who might pay to shut down the nuisance, liability rules could improve matters over the corresponding property rule. The polluter would take external harm into account because of the damages, and those

affected by the pollution would be compensated. Of course, the determination may be incorrect, and subjective values are left out of the picture.

Calabresi and Melamed (1972) derived four rules from a two-by-two choice. Following Coase's (1960) notion of reciprocal causation,[9] they posited that the 'entitlement – for example to emit smoke or to enjoy clean air – could be 'given' to either party, for example a factory owner and a resident (or residents). The entitlement (in either party) could be protected by a property rule or a liability rule. This yields four possibilities. Under Rule 1, the resident has the entitlement to clean air protected by a property rule, and so can get an injunction to shut down a polluting factory. Rule 2 affords the resident the entitlement but only protected by a liability rule, namely damages. Flipping things around so that the factory owner has the 'entitlement', they say that the entitlement (to pollute) can be protected by a property rule or a liability rule. They identify the property rule in the polluter, Rule 3, as the resident's inability to get an injunction and the factory's continued ability to pollute. In the most innovate move, they pointed out that the polluter could be protected by a liability rule, in Rule 4, where the resident would have the right to take the entitlement to pollute from the factory owner but the resident would have to pay damages (the factory owner's shut down costs). Others have pointed out that Rules 2 and 4 are like call options and have explored put options (forced sales, Morris, 1993; Ayres, 2005). Additional rules are possible (e.g., higher-order rules, Ayres, 2005).

It is the entitlement structure itself that typically receives too little attention in the economic analysis of property law. One symptom of the problem is that laws against theft, hardly controversial in general, have been considered difficult to capture in law and economics. What if thieves value entitlement more than 'victims'? Part of the explanation is that the law of theft obviates elaborate precautions by owners, which would otherwise be wasteful (Hasen and McAdams, 1997). The same can be said for broad use of undercompensatory liability rules: holders will use self-help to avoid the taking, and property rules can save on some of the costs of self-help (Hylton, 2011; Smith, 2004b).

More generally, entitlements are not as thin and malleable as this literature assumes (Rose 1997: 2178-2179; Merrill and Smith, 2001b). Again, for Coasean transaction-cost reasons, the entitlement structure is lumpy and asymmetric (Lee and Smith, 2012; Merrill and Smith, 2001, 2011; Rose, 1997; Smith, 2004a, 2012; see also Fennell, 2012). We do not ask against a blank slate whether pollution should or should not occur. The background set of entitlement includes a right to be free from more than de minimis pollution, depending on the nature of locality, and, subject to a safety valve exception, this entitlement is protected by a property rule. Crucially, the general right to exclude sweeps in this type of right without it needing to be separately delineated. As noted earlier, property solves these types of problems wholesale, subject to retail-level adjustments for situations of bad faith, extreme holdouts, and the like.

[9] Coase argued that causation was reciprocal in the sense that in any resource conflict, the conflict would not arise but for the presence of each of the parties. Thus, the crops contribute to the trampled crops as do the cattle, and in the example under consideration the resident causes the conflict as well as the factory.

And because entitlements are lumpy, they are far from being symmetric. Consider again the factory-resident example. If an entitlement in the resident protected by an property rule is Rule 1, and an entitlement in the resident protected by a liability rule is Rule 2, it is problematic to switch things around an expect symmetry as Calabresi and Melamed do. Thus, "Rule 3" is not the mirror image of Rule 1: there is in the default package of entitlements no right to pollute, in the sense of being able to sue the resident for not accepting the pollution (for example by blowing it back). At most Rule 3 means the denial of an injunction such that the polluter can exercise a liberty to pollute. There are circumstances in which a polluter may have a full claim-right to pollute: the polluter might have an easement to pollute (or some non-property tradable permit relating to pollution), either by grant or prescription. Easements are adjustments to the interface between the modules, the legal things corresponding to the adjacent parcels. They are a step on the road to governance and modify basic exclusion. Thus, if we move from Rule 1 (injunction for the resident) to Rule 2 (damages for the resident) in certain situations of extreme holdout behavior (roughly), there is no corresponding need to go from Rule 3 to Rule 4, because the nature of the 'entitlements' is very different. Because the default package of rights does not include a right to pollute, there is no corresponding need to 'soften' it with a Rule 4. The famous coming-to-the-nuisance case of *Spur Industries, Inc. v. Del E. Webb Development Co*.,[10] in which the court required the nuisance victims to pay the costs of shutting down the feedlot, is anomalous – and indeed such a result has not occurred again (Epstein, 1997; Smith, 2004a).

A subsequent (vast) literature developed the framework of property and liability rules, and much of the tenor of this work is pro-liability rule. One interesting result in the liability rule literature is that in contexts like nuisance, an average harm rule can be better than a property rule (Kaplow and Shavell 1996). If the liability rule is based on average harm and the courts' estimate of liability is unbiased, then ex ante the polluter and the victim will be presented with a correct expected value, and their incentives will be correct. The same cannot be said for a property rule, which will deter some takings where the potential taker values the entitlement more than the holder potential takee. So it would seem that ever more elaborate schemes of liability rules can do better than a simple estimate of market value of the entitlement taken (Ayres 2005).

There is, however, a problem of separation involved in this strand of liability rule literature. The assumption that liability rules can be based on an unbiased estimate of value (or harm) is stronger than it appears, because the actuarial classes involved may not be stable (Ortiz, 1995: 403–06; Smith, 2004b). The problem is the familiar one of partial separation and consequent strategic behavior. Once a liability rule is in place, knowledgeable takers may be able to cherry pick assets that are more valuable than the court is likely to find them to be, based on its imperfect proxies. This is a form of arbitrage, and fits under the heading of opportunism discussed earlier. And not surprisingly, injunctions tend to be employed here, especially in situations of subjective value and putative game playing. Indeed, as discussed in the building encroachment situation, sometimes the problem in remedies is potential strategic behavior on both sides,

[10] 494 P.2d 700, 708 (Ariz. 1972) (en banc).

which is accounted for on the traditional test for injunctions (Gergen, Golden, and Smith, 2012). For example, traditional injunction jurisprudence was keyed to good faith. It also was based not on a direct cost-benefit test but on disproportionate or undue hardship, not equipoise. Thus, in the central examples to the liability rule literature like *Boomer v. Atlantic Cement Co.*,[11] the law of injunctions is flattened out in both the more recent law and in the conventional economic literature (Gergen, Golden, and Smith, 2012; Laycock, 2011). Older law, far from giving automatic injunctions, was attuned to the two-sided opportunism problem, and provided a safety valve for holdouts while doing less damage to the entitlement to be free from nuisance.

Generally, we may say that the term "property rule" was chosen advisedly after all, and there is an information-cost rationale for the prevalence – surprising on the conventional approach – of property rules. In addition to the suppression of self-help, more generally, broad entitlements protected by property rules solve some problems of strategic behavior, while causing others. Property rules and liability rules correspond to sanctions and prices, respectively, in the terms of Cooter (1984), and we can see why. Protection of a set of entitlements through a property rule is a sanction in the sense that liability takes a jump at a certain signal (e.g. crossing the boundary of a parcel, taking away a chattel) which corresponds to the notion of doing something wrong. It is not a price, which is a charge for doing something permitted, and which varies continuously with harm (assuming harm is continuous). As Cooter points out, sanctions are more appropriate where we know the standard and know less about the extent of harm in a given case, whereas prices are more appropriate where we know more about marginal harm than about the optimal level of an activity. The sanction does not vary with a host of variance in behavior, making them less subject to those forms of strategic behavior like that involved in the cherry-picking problem. Correspondingly, owners can develop information about their assets without having to worry whether they can prove harm to a court. When holdout behavior becomes too strong, the rationale for the sanction is diminished.

The cost of a property rule is the strategic behavior of holdouts and the problem of externalities that span the boundary of the legal ting and the rest of the system. It is for this reason that we do not have only the law of trespass or a rule of automatic injunctions. Governance strategies and more tailored remedies – conditions on and exceptions to injunctions – are designed to deal with remaining strategic behavior at some cost. Again, the question is how the system overall deals with horizontal interactions, including the strategic behavior presented by various forms of partial separation into modules.

4. Managing the System

Property features many principles, doctrines, and institutions that aim to manage the problem of separation and strategic behavior.

[11] 257 N.E.2d 870 (N.Y. 1970).

Property law is known (and often criticized) for its formalism, but it is not completely formal or equally formal across-the-board. Formalism is a type of separation – the relative invariance of a rule, statement, or system – from background context (Heylighen, 1999). Thus, the language of first-order logic is more formal than natural language, and written language tends to be more formal than spoken language. Likewise, everyday mathematical notation is less formal than the language used in proofs, because the former is a sort of shorthand for those who are in the know (including the writer). The separation involved in the formalism of property involves making property more (but partially) invariant to contextual information. This is helpful where in rem duty bearers are involved (Smith, 2003). All legal systems, and property law in particular face a basic communicate trade-off: at the same cost, one can communicate in an informationally intense way (much information per unit of effort) to a socially closer audience or in a more stripped-down, formal way to a more impersonal and extended audience (Smith, 2003). Elliptical communication, as where someone asks that a window be closed by mentioning it is cold, are more possible in more personal contexts. Correspondingly, rights can more easily presuppose background information in contract law (in personam) than in property (in rem). More can be expected by neighbors as duty bearers (as in nuisance) than by the world at large (as in trespass). Even more can be expected in a scheme of covenants, although familiarity will decrease over time (changed conditions).

Property law is more formal in some contexts than others. More in rem aspects have to reach an audience of large and less informed parties. Making them responsible for idiosyncratic information would make for high processing costs on their part. This is a rationale for the *numerus clausus*, or the closed list of basic property forms (Merrill and Smith, 2000, 2001b). Those creating idiosyncratic property rights will not take into account informational externalities.

Property rights are sometimes said to raise issues of information costs and benefits. Strictly speaking, what is scarce here is not information but attention. Some rights will be more costly to measure than others, and by measurement is meant figuring out how much of various attributes they have. This can range from whether the owner really is the owner (verification costs) to the scope of the rights (evaluation costs) to the consequences for violation (avoidance costs). Different types of actors derive different benefits and costs from the production and processing of information about property rights, and only some experience an informational externality. This, A and B might create fancies (idiosyncratic right), such as a lease for life or an easement that has non-customary implications off-parcel. The benefits and costs are bore by these parties. The fancy may turn out to be inconvenient later to successors, but if (and it is an if) capitalization of values is working, these costs (and benefits) will be reflected in the prices to the transactors creating the fancies.

The potential externalities are to true third parties – other transactors and violators. Thus, if A and B create a timeshare in a watch (not allowed in the catalog of property forms), then it is other transactors who have to be on the lookout for less than full day rights in watches. Moreover, if the types of division and other dimensions of idiosyncrasy is an open one, these other transactors have to watch out for idiosyncrasies

of a possibly unknowable sort. These information externalities may have played a role in the financial crisis of 2008, in that financial products were created in ways that created complexity for third parties to process in a falling market – a 'complexity externality' (Caballero and Simsek, 2013).

It might be thought that property records remove the need for standardizing property (Epstein, 1982; Hansmann and Kraakman, 2002). This does not follow. How the existence of property records should affect the degree of property standardization is an empirical question. For one thing, registration systems appear to require a stricter *numerus clausus* because the registrar, who pronounces valid title, cannot be expected to process a great deal of idiosyncrasy (Arruñada, 2003, 2012; Smith 2011). (The registrar does a mini quiet title action and stands in for the set of in rem duty bearers.) In other areas, having a standardized format for information is beneficial even if the information is readily available (e.g., court documents). Standardization happens sometimes spontaneously, sometimes through private actors with a stake (trade associations), and sometimes the efforts of the state. There is reason to think that where the state is already enforcing property rights there are economies of scale and scope in the state taking on the standardization function as well (Barzel, 2002).[12]

For areas that fall in between property and contract we need to find intermediate levels of standardization (Merrill and Smith 2001a). Thus, in bailments, landlord-tenant, security interests, and trusts, major aspects of the law are not fully in rem or fully in personam, and those aspects that fall more toward the in rem side of the spectrum tend to be more formal and standardized: reaching a more indefinite and/or more impersonal audience requires more formalization and standardization. Also, in general, where contracts are treated as property and made alienable, they are treated more like things. Traditionally, it was equity that lent personal rights a property character and the prerequisite for propertarian treatment was that the contract be unconditional, specifically enforceable, and tied to indentifiable property (Worthington, 1996; Penner, 1997). In other words, property treatment required separation from context. Negotiability is the most extreme form of separation, with cash being the strongest example. One can get good title to cash even with a thief in the chain of title. As elsewhere, separation promotes alienability, but at the cost of potential strategic behavior. Sometimes (as with a cashier's check), the drawer chooses to take the risk in the interest of minimizing the need for inquiry by the payee, and the criminal law presumably deters some theft. The costs and benefits of separation and prevention of opportunism all vary by the type of resource and the situations parties are likely to find themselves in.

If strategic behavior is enough of a problem, rules can become mandatory. The mandatory rule can provide for notice or protection. Where the externalities from alienation are too great, we sometimes find inalienability rules, such as for human organs, votes, and the like. If there is a mandatory core in fiduciary law, it is justified by very

[12] Interestingly the standardization function can be separated from property in private hands, in standard setting organizations, and we worry there about strategic behavior. Equitable intervention is used to prevent misuse of patents in standard setting organizations and could be used even more systematically. Smith, 2013).

hard to anticipate strategic behavior. And the enforceability of equitable interests against third parties requires notice, and this, not surprisingly, cannot be contracted around.

One benefit of standardization that receives little attention is the interconnection problem. If we had lots of idiosyncratic property rights, the question is how they combine. As it is, when two parcels are unified, their basic features – the nature of the boundary, the rules of co-ownership and the like – automatically do not clash. This is by no means guaranteed to occur without any effort. An indication of the dangers averted by standardization can be found in the area of intellectual property licensing (Van Houweling, 2008:938–39). If someone is trying to make a work that involves more than one piece of copyrighted material it is important that the licenses not clash. This problem surfaced in open-access licenses, which went through several generations. The important aspect of such licenses is that the obligations travel to remote users. Different generations of open-access licenses specified inconstant duties. This is the type of problem that, on a much larger scale, the *numerus clausus* and other standardizing aspects of property law are aimed at preventing.

Standardization benefits can also be seen in the realm of land surveying and parcel definition. In a series of articles Libecap and Lueck have shown that the rectangular survey system leads to higher land values and less conflict than the metes and bounds system.[13] (Libecap and Lueck, 2011; Libecap, Lueck, and O'Grady, 2011). In Libecap and Lueck (2011), they present the results of a natural experiment based on two regions of Ohio, which for exogenous reasons received rectangular survey versus metes and bounds treatment, and found in the areas on the rectangular survey side of the boundary: better alignment of parcels, 18 times fewer land disputes in the nineteenth century, 20–30 percent higher per acre value in flat terrain through at least the middle of the twentieth century, and higher population densities, urbanization, and investment in industry. The rectangular system achieves a greater separation of parcel definition from local context, which is more stable over time and allows for better modularization of parcels.

5. Extended Property Rights

Property comes in more complicated and flexible forms than the estates and future interests, even supplemented by forms of co-ownership. Separation can be pursued further to create entity property, the foundation of many organizational forms (Merrill and Smith, 2010: 123–158; 2012: 646–806). These include the trust, but also the corporation, common interest communities, and the like. The familiar types of property regimes themselves – private, common, and public – can also be mixed together in a variety of ways. Both the extension of property into forms of organization and the mix of property regimes raise issues of separation and strategic behavior.

[13] Under the metes and bounds system, descriptions of parcel boundaries are based on angles and measurements, often using markers like rocks and trees as fixed points. The rectangular survey prescribes a grid within which rectangular parcels can be defined.

5.1 Entity Property

As discussed earlier, personal obligations can be treated as property, and equity courts played a large role in this process. The trust is a systematic treatment of personal obligations as property. In a trust, a settlor transfers legal title of the property (the corpus of the trust) to a trustee, who is obligated to manage it for one or more beneficiaries. The beneficiary has equitable title, which means that the beneficiary has rights protected against the trustee, most notably through the fiduciary duties of loyalty and care. The beneficial interest – equitable property – receives some (but limited) protection against third parties. If the trustee transfers the property to a third party wrongfully, the beneficiary can claim the property back from the transferee unless the transferee is a good faith purchaser for value. Anyone with notice cannot be in good faith, but the law does not impose much of a duty of inquiry on potential transferees.

There is another kind of separation involved in entity property, which Hansmann and Kraakman (2000) call 'asset partitioning'. In affirmative asset partitioning, a pool of assets is designated that is free from the personal creditors of the holders of the asset. Trusts are a classic example of the affirmative asset partitioning type of separation: the corpus of the trust is protected against the claims of the trustee's creditors. In a trust, the corpus is not subject to the personal creditors of the trustee. And through separation by means of the concept of a fund, the claims of personal creditors of the beneficiary are subordinate to those of the creditors dealing with the trustee qua trustee.

Organizations like corporations and partnerships also involve affirmative asset partitioning (Hansmann and Kraakman, 2000). Some organizations also feature defensive asset partitioning – known as limited liability in organizational law. Under defensive asset partitioning, the holders of the designated asset pool (the corpus, the firm's assets) are protected in their personal assets from claims of creditors of the entity. Entity assets can be treated as semi-automatous, which allocates information costs among the various actors and can allow certain actors, e.g. creditors of a firm, to specialize in monitoring a given pool of assets.

Unlike defensive asset partitioning, affirmative asset partitioning cannot be replicated by contract (Hansmann and Kraakman 2000). To designate a pool of assets and shield them from the personal creditors of the owners would require a complex set of covenants that would have to be updated and which would be hard to enforce. The transaction costs would be prohibitive, in a fashion reminiscent of the transaction costs that property law obviates by taking the shortcuts involved in delineating rights by way of legal things. Hansmann and Kraakman identify asset partitioning as a contribution of property to organizational law. Indeed, we can go further: the conventional view of corporations as a nexus of contracts (see, e.g., Easterbrook and Fischel, 1991) is limited in just the way that the bundle of rights picture of property misses the contribution made by thing definition and related devices in the law of property. Like property law generally, asset partitioning involves separation, here of the asset pool from certain classes of claims. In a way, this is module or thing definition, but of a more entity-oriented sort.

Like other forms of separation, asset partitioning gives rise to potential strategic behavior. In trusts and in organizational law, albeit to different extents, one major method of constraining opportunism is through fiduciary duties. Fiduciary duties are designed to contain the extreme danger of fiduciary misbehavior. Trust beneficiaries are often vulnerable and have difficulty monitoring trustees. The duty of loyalty prohibits self-dealing and conflicts of interest with a flat ban; good faith and substantive fairness are no defense. The trust is a complex mixture of contract and property (with a different emphasis in different jurisdictions, Lau, 2011; Sitkoff, 2011). It needs to be a hybrid in order to respond to this special kind of separation. This is a lot like the equitable safety valve aimed at countering opportunism, except that in response to defined highly dangerous situations, fiduciary law also uses broad ex ante rules as well as targeted ex post intervention (Smith, 2013). (Broad ex post intervention would be the most destabilizing of private arrangements.) Monitoring and competition may also serve this function, and the greater possibilities of the latter probably explain why fiduciary duties are weaker and more subject to variation by contract in organizational law than in trust law.

Separation and encapsulation of information in organizations, with consequent specialization, are a fundamental property-like contribution to firms in general. Daniel Spulber (2009a, 2009b) applies the Fisher Separation Theorem to define a firm as an organization in which the decision making about the firm's objectives can be separated from the personal preferences of its residual owners. If possible, such separation facilitates the famous 'separation of ownership and control' in corporations, which can be seen as a prominent version of entity property. When Berle and Means (1932) introduced the separation of ownership and control they regarded it as a challenge to the validity of private property. They emphasized what we would now call agency cost problems. Problems like these are, however, the flip side of the separation that allows for specialization (e.g., management, capital provision). The real question is whether such strategic behavior can be cost-effectively contained, through fiduciary duties, market competition, and other devices (see, e.g., Jensen and Meckling, 1976; Easterbrook and Fischel, 1991). Far from undermining the notion of property, the separation of ownership and control in corporations is a paradigm case of separation, specialization, and strategic behavior that is a *leitmotif* through all of property law.

Entity property allows for more complex mixes of exclusion and governance than do the basic property forms. What role asset definition plays in the theory of the firm is still an open question. Problems of measurement and strategic behavior can be dealt with in exclusion by moving firm boundaries (e.g., making instead of buying, vertical integration), or more elaborate governance rules, both off-the-rack and contractual, can contain specific types of opportunism.

5.2 Mixed Regimes

Similar complex mixtures of types of rights can also be achieved by mixing different property regimes – public, common, and private. First, one system and another abut, in

the sense that a thing will be treated differently as it moves from one regime to the other, for example, common to private. Thus, the tragedy of the commons occurs because the stock is common but units of flow (e.g. fish from a pond) are private if taken by first possession (Cheung, 1970; Gordon, 1954; Warming, 1911). If the fish and pond were common, there would be no tragedy but perhaps there would be insufficient incentive to fish. If fish and pond were both private, there would likewise be no overfishing, but the risk spreading and cheap definition of common property in the pool would be foregone. Which combination is most efficient is an empirical question.

Theoretically any property regime, by creating separation, can give rise to strategic behavior and externalities. Thus, if in a private property regime, too many actors have exclusion rights, or overfragmented rights given likely use, the multiple-veto can lead to underuse, in an anticommons (Buchanan and Yoon, 2000; Heller, 1998; Parisi, Schulz, and Depoorter, 2005). There is a higher-order question of how to motivate actors to create or modify a property system in the first place (Krier, 1992; Fennell, 2004). In some situations, disparate stakes can make some actors find it worthwhile to create such as system, with a combination of positive and negative externalities for others (Levmore, 2002; Wyman, 2005).

Private, common, and public property can be combined at the micro level. In a semicommons, common and private property cover the same things and interact (Bertacchini, de Mot, and Depoorter, 2009; Fennell, 2011; Smith 2000a). The problem with this type of separation is again strategic behavior. An example is the open fields of medieval and early modern England. Peasants owned long strips that were cultivated as private property for grain growing but would be thrown open for common grazing after harvest and in fallow periods. This allowed for specialization and internalization in grain growing and operation on a larger scale for grazing, which seems to have involved greater scale economies. This temporal interleaving of private and common property carried with it the danger of strategic behavior: actors could appropriate goods (manure) and fend off bads (excessive trampling) in the common use with regard to how it impacted their private parcels. These scattered strips can be seen as a method of containing the strategic behavior: at some cost of inconvenience and externalities in the grain growing, the strategic picking and choosing, with steering of cattle for trampling and manure, would be too difficult. Similar problems, requiring special solutions, can be seen in a wide variety of areas, especially where the things of property are hard to define, as in water, the Internet, and intellectual property (Grimmelmann, 2010; Heverly, 2003; Smith, 2007, 2009).

The public and private property regimes also interact. In addition to the externalities from one set of users to the other, we must also worry about rent seeking resulting in problematic transfers. The takings doctrine polices private to public transfers, and the public trust reins in some public to private transfers (Epstein, 2003; Merrill, 2011). The partial separation of the two regimes gives rise to strategic behavior that requires policing.

Conclusion

The increasing complexity of property in response to new economic activity is not a reason to jettison formalism outright. In this the Realists went overboard. Economic analysis, in adopting the bundle of rights and in treating problems in a detached fashion, runs the risk of entrenching this non sequitur. Instead, new developments in the world and in property law call now more than ever for an analysis of property as a system. Part of that project will involve exploring how property separates – and how and whether it should separate – chunks of the world of private interactions and deal with the resulting patterns of potential strategic behavior.

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