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Property as sequential exchange: The forgotten limits of private contract

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Abstract

The contractual, single-exchange framework in Coase (1960) contains the implicit assumption that exchange in property rights does not affect future transaction (i.e., trading) costs. This is pertinent for analyzing use externalities but limits our understanding of property institutions: a central problem of property markets lies in the interaction among multiple transactions, which causes exchange-related and non-contractible externalities. By retaining a single-exchange simplification, the economic analysis of property has encouraged views that: (1) overemphasize the initial allocation of property rights, while some form of recurrent allocation is often needed; (2) pay scant attention to legal rights, although these determine enforceability and, therefore, economic value; and (3) overestimate the power of unregulated private ordering, despite its inability to protect third parties. These three biases have been misleading policy in many areas, including land titling and business firm formalization.

Keywords: property rights, externalities, enforcement, transaction costs, public ordering, private ordering, impersonal exchange, organized markets, blockchain.

JEL: D23, K11, K12, L85, G38, H41, O17, P48.

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1. Introduction: A double deficit of knowledge on property

There are two main gaps in our knowledge on property. On the one hand, in their survey of property law for the *Handbook of Law and Economics* Lueck and Miceli judge that "the economic analysis of property law is substantially less well developed than the economic analysis of contract law or tort law…. The economics of property rights, however, is well developed but mostly without a focus on property law….. [and] much of the economics of property rights literature remains ignorant of property law. Similarly, property law scholarship often is ignorant of economics." (Lueck and Miceli 2007: 187).

On the other hand, developing country governments and international aid agencies have spent fortunes on land titling and administrative simplification projects only to find out that later transactions on the same titled land are rarely registered and that business activity remains unaffected. Moreover, as we will see below, there is substantial confusion about how to manage these institutions in developed countries, as seen in the root causes and difficulties for coping with the mortgage foreclosure crisis in the USA or for reforming the European conveyancing markets.

I argue here that both the disconnection between economics and property law and these policy failures are related to the fact that most law-and-economics analyses of "property" rights have retained a contractual view that is essentially bilateral and therefore deals with *personal* instead of *property* rights. Such analyses are immensely valuable in extending the perspective originally applied to the study of externalities by Coase (1960) but their contractual emphasis—in particular, on bilateral "single" exchange—prevents them from studying the core problem of property transactions and markets. These are characterized by "sequential" exchange in which at least three parties are involved, contracts interact and bilateral contracting may cause negative externalities.[1]

Furthermore, whatever the fruits obtained in other areas, this contractual emphasis ends up fostering three biases that inadvertently support such systematic policy blunders: overemphasizing the initial allocation of rights, paying little attention to legal rights, and overestimating the power of private ordering. This influence on policy is clear when we examine the presence of a contractual, single-exchange view of property in the academic works grounding the books of De Soto et. al (1986, 2000), the methodological papers of the Doing Business indicators (World Bank 2004–16), surveyors' literature,[2] and research on the effects of land titling and business formalization (Bruce et al. 2007).

A similar critique on the law and economics of property is made by Merrill and Smith (2001) but, while they criticize its reliance on the Coasean bundle-of-rights view of property and its

[1] See, for a survey of the literature, Lueck and Miceli (2007). In it, a single three-page subsection deals with some aspects of property exchange but practically without touching on exchange externalities, while the remaining 71 pages are dedicated to the origin and evolution of property in a generic sense, involuntary transfers, the means of internalizing externalities, state ownership and restrictions on alienability.

[2] Searchable on the website of the International Federation of Surveyors (http://fig.net/resources/index.asp, accessed October 13, 2016).

corresponding disregard for the defining role of exclusion and for policy, the present paper criticizes it for retaining a single-exchange assumption. Without this assumption, the law and economics of property could have tackled the most important issues in property markets even if it had retained a bundle-of-rights conception. Furthermore, by relying on the sequential exchange assumption, this paper is able to explore the comparative advantage of public and private ordering and to provide analytical tools for examining policy consequences.

The rest of the paper proceeds as follows. Section 2 develops the argument for sequential exchange and exchange externalities. Section 3 looks at Coase's assumptions and, in particular, his focus on single and independent transactions between two parties. The analysis must not be seen as a critique on Coase's work. On the contrary, Coase's assumptions were pertinent to the problem he was studying, which was highly relevant. Section 4 examines the role of public and private ordering in a context of property understood as sequential exchange with interactions between transactions, identifying additional mandatory rules and a wider scope of impartiality as necessary elements in property institutions.[3] Section 5 tests the role of these two elements in setting the limits of private ordering. It does so by exploring a variety of cases that have rendered varying results, thus providing guidance for structuring hybrid organizations that aim to reap the benefits of both public and private ordering. With this hybrid perspective in mind, Sections 6 to 8 examine three sets of policy failures in property titling and business formalization, corresponding to the three above-mentioned biases: emphasizing the initial allocation of property rights (section 6); paying scant attention to legal rights (section 7); and overestimating the power of private ordering (section 8). Section 9 concludes.

2. The argument for sequential exchange

In essence, the Coasean analysis of externalities involves physical spillovers caused when the use of assets affects other assets. Assuming both zero-transaction costs and well-defined property rights,[4] such spillovers are easily internalized by trade among the affected parties. Therefore, private trading—including that which takes places through organizations—becomes an effective solution to the problem posed by externalities; and reducing transaction costs and clearly defining property rights also become major ways for the law and the state to solve such problems.

However, there is also a separate realm of externalities caused not by physical spillovers in the use of assets but by interactions between contracts. For example, suppose that landowner *O*

[3] Many of the ideas in sections 2 and 3 have been introduced in Arruñada (2016a).

[4] Transaction costs are conceived here as trading costs. As in Coase (1960: 2, 5, 6, 19) and most later analyses, transaction costs and property rights are therefore treated as separate entities. This separation is particularly necessary because, as argued below, the interaction between both entities is the key problem in property markets and drives the institutional solutions. The literature on the economics of property rights sometimes treats them jointly (e.g., Allen 2000; but compare Lueck and Miceli 2007: 214, as well as Anderson and Hill 2004: 14–18), which allegedly hinders the analysis of such problem and solutions.

grants a secret lien to *L* at time t_1, sells the parcel to *B* at time t_2, and then *L* seeks to seize the parcel to satisfy the lien at time t_3. As analyzed by Merrill and Smith (2000), Hansmann and Kraakman (2002) and Arruñada (2003), this sequence of exchange creates a negative externality in the form of the secret liens that might be held by potential lien holders of which potential acquirers such as *B* are not aware when buying from *O*. If all private contracts are enforced, including secret liens, potential buyers in the position of *B* will be reluctant to buy from any *O* unless they can be assured that there are no *Ls* lurking in the background ready to assert prior claims to the asset, thus reducing its value. Moreover, anyone in the position of *L*, fearing the possibility of prior liens, will also be reluctant to rely on the collateral value of the asset when lending to *O*. Crucially, these possibilities will reduce the value of all assets, whether they have secret liens or not, causing the alleged exchange externality. And the same problem arises not only as a consequence of secret liens but also of secret sales or, in general, of all types of secret granting of rights; and not only in the context of land but in most sorts of real, intellectual and company assets.

The contractual interpretation of the Coasean framework helps us little with regard to such exchange externalities. When applied to a property (i.e., sequential exchange) context, it may even distract us, as it leads us to emphasize contractual (single exchange) solutions. However, a purely contractual solution to exchange externalities is hardly viable. Obviously, it would require an enormous number of transactions, given that the damaged parties are all the individuals holding rights in a given market.

Less obviously and more fundamental, given that the root cause of exchange externalities is the enforcement of potentially secret contracts, free private contracting with unconditional enforcement (that is, enforcement that does not depend on a public disclosure condition) not only does not solve the problem but exacerbates it. (Note that, in principle, there is no reason to preclude contract secrecy, which will generally be valuable for the parties. The analysis therefore reveals an inherent contradiction between assuming perfect information and contract freedom.)

Seen from an economic perspective, the core issue is that, in the Coasean vein, private contracting contains externalities of a certain type (related to asset uses) and takes place within a single transaction. Absent from this framework is the possibility of interactions between transactions and, in particular, the possibility of exchange-related externalities between such sequential transactions. A basic insight of the literature on property (Merrill and Smith 2000, Hansmann and Kraakman 2002, Arruñada 2003) is that exchange externalities are not contained but worsened by free private contracting with enforcement of potentially secret contracts. Solving them therefore requires more than private contracting, and necessarily involves additional and more sophisticated collective action. In practical terms: there is no need for registries in the contractual interpretation of the Coasean framework, which can be characterized as “single exchange”. In particular, registries only become necessary when we exit the world of single, isolated transactions and move into the real world of contractual interactions, or “sequential exchange”.[5]

[5] Barzel’s claim that contractual registries facilitate judicial adjudication in a single-exchange setup (2002: 168–69, 185–86, 196) lacks empirical support, as it fails to explain which contracts are typically registered and which ones are not. Registries are indeed supportive of judicial adjudication, but mainly for solving conflicts resulting from the interaction of at least two contracts in a sequential-exchange context.

Seen from a legal perspective, most contractual interactions and exchange externalities come about as a consequence of a key distinction in enforcement that—despite having been overlooked by economists (a major exception being Ayotte and Bolton 2011)—defines two very different types of legal and economic right. If a given claim on an asset is enforced against everybody, so that everybody has to respect it, the claimant holds a right in rem (a property right stricto sensu). But if the claim is enforced only against specific persons, the claimant holds a mere right in personam (a "contract" right). In the previous example, in principle two resolutions are possible. Either *B* is given the land unencumbered by rival claims, with *L* relegated to action for damages against *O*; or *L* is given the right to enforce the lien, with *B* relegated to an action for damages against *O*. In both cases, one party is given a property (i.e., in rem) right with the other being given a contract (in personam) right.

This distinction is crucially important in terms of economic value. As a consequence of the limited liability of most economic agents, a claim on an asset enforceable against everybody (enforced in rem) is more valuable than the same claim enforced only against specific persons. In particular, "a property right in an asset, unlike a contract right, can be enforced against subsequent transferees of other rights in the asset" (Hansmann and Kraakman 2002: S374). The difference in value is usually much greater than the difference in subjective valuations between contractual parties, which is often given a major role in economic models of single exchange (e.g., Schwartz and Scott 2011; Dari-Mattiacci, Guerriero and Huang 2016).

However, most of the economic literature on "property" rights ignores this distinction between in rem and in personam rights, and the greater value of in rem rights.[6] This simplification is only natural in a single exchange context because all rights are in personam. It also makes sense for some purposes but not for understanding the institutions that make it possible to enjoy the advantages of in rem enforcement without causing externalities, raising transaction costs and therefore hindering exchange. In particular, a single-exchange view of property understandably reduces the role of the state and emphasizes private contracting solutions. However, sequential-exchange externalities cannot be overcome only by private action. A different type of public ordering is needed, characterized by mandatory rules and a wider scope of impartiality for enforcers and, in particular, judges and their suppliers of

[6] Authors in the economics of property rights often see them as the ability to use (Alchian 1965: 817), enjoy (Barzel 1997: 3) or exercise a choice (Allen 2000: 898), even qualifying that they are defined "not just under the law, but in reality" (Allen 2000: 897). This therefore comes close to a *factual* possessory definition of property that could hardly be more reductionist, with all the pros and cons attached to this methodological option (Hodgson 2015: 693, n. 12). No doubt, this parsimonious modeling has been fruitful but it kept the analysis in purely contractual, single-exchange, terms. On the other hand, analyses that focus on state action at the higher institutional level (following the pioneering works by North and Thomas 1973, North 1981 and Olson 1993), at the commons level (Ostrom 1990) and at the property market level (e.g., Epstein 1985), are fruitful on the emergence and initial allocation of rights, as well as on the protective and expropriatory roles of the state, but disregard the equally prevalent enforcement difficulties related to private transactions, which are behind much of property law. See also Lueck and Miceli (2007) for a survey that includes more legally-oriented works; and Merrill and Smith (2001: 379–83), for an analysis of the reliance on in personam use claims prevalent in main areas of law and economics.

evidence. This makes private ordering less effective than public ordering and tends to limit parties' freedom to choose sources of evidence and enforcers.

3. A closer look at the Coasean assumptions on property

In "The Problem of Social Cost," Coase (1960) considers a sample of cases in which firms harm each other (farmers and ranchers, railroads and farmers, a noisy confectioner and a quiet doctor). In its first pages, he argues that, assuming that the "costs of carrying out market transactions" is zero, allocating rights to, for example, farmers or ranchers, would not affect the final use of resources, as both parties would trade to arrive at the wealth-maximizing solution. The rest of the article then focuses on the real situation to show that, when the costs of trading in the market are significant, the initial allocation of rights may determine the final outcome.

In addition to arguing the reciprocal nature of the problem, Coase (1960) points out the diverse means available for solving it, by both private and public means, encouraging a comparative perspective and clarifying the role that judges and governments may play in reducing transaction costs to facilitate private exchange. However, when considering the framework in "The Problem of Social Cost" *from a property market standpoint*, a limitation becomes apparent. In line with the type of problem they are interested in, Coase (1960) and most of his followers consider only single independent transactions: they focus on cases of bilateral exchange (which are intrinsically contractual in nature), and implicitly assume that the availability of information is not affected by private contracts on either assets or, more precisely, minor "entitlements".

Consider the case for Coasean exchanges in externalities: in Coase (1960), such exchanges are implicitly assumed not to be affected by other previous transactions, nor to affect the cost of subsequent transactions on the same asset or on other assets of the same type. In particular, which type of rights are held by whom remains undefined: when the transactor in one of Coase's examples is assumed to hold a right to pollute, it is undefined if he also has a right to sell such a right or to sell the corresponding asset, and, if he does sell the asset, it is also unclear who would be committed by the previous transaction on the right to pollute—the seller or the whole world, including asset buyers. That is, it remains undefined if these are either real, in rem, property rights valid against all individuals or personal, in personam, contract rights valid only against specific persons. Furthermore, these possibilities are implicitly supposed not to affect the transaction costs incurred to remedy externalities, and these externality-remedial transactions are also supposed not to affect the transaction cost of trading assets.

Let us examine, for example, the Coasean case of the noisy confectioner and the quiet doctor. When the transacted entitlement is enforced in personam and whatever the parties intend to transfer, the confectioner *C* transfers to his neighbor Doctor *D* the right to harm *D* but in such a way that if the owner (*C* or somebody else) then sells his land to *B*, *B* will enjoy the right to harm *D*. The doctor acquiring the polluting entitlement is less protected, as he is subject to the additional risks of, for example, the owner selling the asset. This trading of in personam entitlements is therefore, on the one hand, a somehow less effective solution for contracting use externalities but, on the other hand, it does not affect the trade in assets.

Contrariwise, when the entitlement is enforced in rem and held by the confectioner *C*, *C* may transfer to *D* the right to harm neighbor *D* in such a way that if the owner of the land sells it to *B*, *B* will not enjoy the right to harm *D*. After purchasing the polluting entitlement from *C*, *D*'s land will therefore enjoy an additional in rem right. We then have the opposite effect of strengthening trade in entitlements, but trade in assets—in all land of that type—would suffer an added information asymmetry because asset buyers would have to respect the transferred entitlement even if the transaction on the entitlement had remained hidden. If they had bought the land free of such a burden, their only recourse would be a harder-to-enforce and therefore less valuable personal claim for indemnity against the seller. And the same problems arise, not only with these partial entitlements, but with major rights such as the asset ownership and mortgage lien examples discussed in the Introduction.

In sum, to make his point about the importance of transaction costs, Coase (1960) does not need to consider if the entitlements under discussion are in rem or in personam.[7] In particular, when he prescribes that "the rights of the various parties should be well-defined" (Coase 1960: 19), he does not need to specify whether the rights will be enforced in rem or in personam, so that either the whole world or only one person, respectively, is obliged to respect them. This is because his world is a world of single exchange in which obligations only exist between the transacting parties and their transaction does not affect third-parties' rights or transaction costs. Assuming single exchange implies that all effects take place between contracting parties. As other claimants simply do not exist, the only possibility is that the rights are granted to the parties to the transaction. Therefore, in this two-party world, rights in rem can only commit the transacting parties: all rights are in personam.

The problem is that such a two-party world, despite being useful for Coase's original purpose of studying the economic influence of the law,[8] must be abandoned for exploring the structure of property law. For this task it is essential to consider sequential exchange and in rem rights, as they drastically change the nature of transaction costs, including what in the single-exchange world would be a perplexing interaction with property rights. Indeed, when sequential exchange is considered, an intrinsic conflict emerges between transaction costs and property rights: free private contracting of in rem rights obscures the definition of rights—the allocation of entitlements—for all assets of the same type. This brings serious consequences, as freedom of contract may still solve some misallocation of entitlements but will also cause negative externalities in terms of greater information asymmetry for future acquirers, not only in that specific asset—an effect that may be more easily internalized—but—essential for causing externalities—in all assets of the same type, given that all of them may be subject to similar

[7] Moreover, this simplification is less harmful for small-value entitlements such as the use externalities that Coase took as an empirical reference for his argument. For Hansmann and Kraakman, not only use externalities but most "partial" rights are not enforced in rem: "Because the benefits of partial property rights are often low and the costs of verifying those rights are generally high, property law necessarily takes an unaccommodating approach to all but a few basic categories of partial property rights" (Hansmann and Kraakman 2002: S375).

[8] As Merrill and Smith (2001: 367) point out, "Coase's purpose in writing his article on social cost was to explore the 'influence of the law on the working of the economic system' [Coase 1988: 10]. Thus, he was not interested, as were later law and economics scholars, in using economics to explain the structure of the law itself".

burdens. That is, even if owners internalize the effect of their choices on their acquirers' responses and, consequently, on the value of the transacted asset, they will not internalize the effect on the information asymmetry of potential acquirers of all other assets and, therefore, on their value.[9]

If uncontained, these exchange-related externalities will reduce the value of all similar assets for at least two reasons, related to lesser standardization of rights and greater information asymmetry. First, when customized property rights are enforced in rem, the value of all assets may be reduced if acquirers incur greater costs for understanding the idiosyncrasies of what they are buying (Merrill and Smith 2000: 31–32, Smith 2011: 158–60). Second, and probably more important, granting in rem enforcement to hidden rights (for example, a hidden mortgage or, in the Coase [1960] scenario, a hidden entitlement to impede certain uses) decreases the market value of all assets which potential buyers might think may be encumbered with such hidden burdens.[10] In both cases, as in Akerlof (1970), the externality comes about because the possibility of customized rights or burdened assets reduces not only the value of the assets subject to such rights or burdens but also the value of any assets of the same type potentially subject to them. This reduction in value results from the increase in acquirers' information (Merrill and Smith 2000) and verification costs (Hansmann and Kraakman 2002); and, more generally, from the costs that owners and acquirers must incur to overcome the additional information asymmetry and to gather and formalize relevant consents (Arruñada 2003), as well as from the opportunity loss caused by the fall in the volume of transactions and the extent of specialization.

4. Public ordering in property

A major role of the state emerging from single-exchange analyses is given by the fact that, when transaction costs impede transactions, some sort of legal intervention might be needed to allocate asset uses to whichever party values them the most. However, this initial allocation is not mandatory and parties could abrogate it contractually. In principle, in the single-exchange and in-personam-enforcement world, there is no justification for mandatory rules constraining parties' freedom to structure their rights: the only externalities arising are use externalities, and the transaction costs incurred to contract them are internalized by the parties themselves. Under such an assumption of single exchange, it is understandable that property law has been seen just as a starting point for contract law, or, as Merrill and Smith (2001: 359–60)—who trace this view

[9] The effect holds even if the specific effects hinge on the adjudication rule applied (either a "property" rule favoring original owners, or a "contract" or "liability" rule favoring buyers). See, among many, Baird and Jackson (1984), and Arruñada (2012: 34–41). Calabresi and Melamed (1972) pioneered a whole literature on contract and liability rules but in a single exchange framework.

[10] Positive hidden information (for example, a parcel of land enjoying a right of way over an adjacent plot) is not a relevant issue because, contrary to burdens, the seller has all possible incentives to disclose it to the buyer in order to achieve a higher price. More precisely: the seller of the first plot has more incentives to disclose than the seller of the adjacent, burdened, plot.

to Coase (1960)—put it, a mere "baseline" for contract (e.g., Cheung 1970; Hermalin, Katz and Craswell 2007) and "economic" property rights as separable from "legal" rights (Alchian 1965, Barzel 1997). E.g., for Barzel, economic rights are the "ability to enjoy a piece of property" (Barzel 1997: 3) while legal property rights are "what the state assigns to a person".[11]

4.1. The difficulties of unassisted private ordering

Conversely, in sequential exchange, contract interaction causes exchange externalities which are hardly contractible because they affect strangers to the transaction, mainly the unknown owners of all assets of the same type. Without a mandatory rule requiring at least some type of public disclosure as a condition for in rem enforcement, producing or acquiring information is practically impossible for the parties and even for specialists.[12] This is because it is not possible to produce information on contracts that parties themselves have an interest in keeping secret or in producing afterwards opportunistically.

Take, the case of a legal system in which mortgages could be enforced in rem even if they had remained hidden, as was common during the Ancient Regime. Not only was it practically impossible to produce information on existing secret mortgages but the risk remained that, if necessary, debtors could produce new mortgages with friendly partners, and conveniently backdate them to defeat their creditors. At the time, title was often evidenced only with a deed or contractual document signed by the parties and testified by solicitors or notaries. Consistent with my argument, formalizing the transaction in a written deed—as in the Statute of Frauds enacted in England in 1677—and witnessing by professionals are already public mandatory requirements, which places this solution in the public-ordering space. However, despite these mandatory rules, reliance on the chain of deeds was ineffective because it opened up possibilities for destruction, error and fraudulent conveyance. In medieval England, "the security of conveyances executed by feoffment accompanied by charter was a continuous source of worry to landowners, for both theft of charters and forgery of them were common" (Simpson 1986: 121). Centuries later, the most egregious cases were those involving counter-deeds, well described for centuries in modern continental literature (for instance, Alemán 1604, Balzac 1830). Even without forgeries or fraud, the system often gave rise to multiple chains of title, which left

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[11] According to Allen, "there is a functional relationship between economic and legal property rights [but] this understanding may be implicit in many analyses" (2015: 713). However, this alleged implicit presence is debatable and hardly seems effective when considering that, under sequential exchange, there is an obvious functional link between holding an in rem (instead of an in personam) right and having the ability to use, enjoy or exercise choices: holders of an in personam right hold only a claim against a person, not a right on the particular asset. This should lead analysts to pay careful attention to enforceability and, in particular, to the main enforcement difference in property law: the one given by the distinction between rights in rem and rights in personam. Without it, they have little chance of identifying a meaningful functional relationship.

[12] Analyses of mandatory disclosure commonly assume bilateral, single exchange and therefore deal with the obligations of disclosing contractually-relevant information between the parties to the contract (e.g., Ben-Shahar and Schneider 2014). Contrariwise, disclosure in the sequential exchange being analyzed here in fact refers to releasing contractual information to third parties who are strangers to the contract.

prospective acquirers facing the risk that the title of the seller be defeated later by the title of an unknown claimant based on an alternative chain of deeds. To contract mortgages, they used to pledge the titles with the lender, a solution that poses similar difficulties and adds another risk for the mortgagor: the mortgagee could impede a future sale or even fraudulently sell. Moreover, owners could not commit to not cheat on creditors, so that they had to rely on granting ownership to them with the authority to sell if the debt was not paid, using contractual arrangements similar to the *fiducia* of classical Roman law.

In such circumstances, even specialists in producing information suffer insurmountable difficulties. Their operations hinge on gaining access to all relevant contracts: those with in rem effects. Producing information therefore requires public intervention to condition in rem enforcement of mortgages and all other potentially secret contracts to make them effectively public. Such intervention is not only public but mandatory: a default rule from which parties would be free to opt out would be ineffective.[13]

4.2. Types and nature of public ordering

The simplest solution is to make certain (usually minor) entitlements unenforceable in rem by having a closed number or *numerus clausus* of rights in rem (Merrill and Smith 2000, Hansmann and Kraakman 2002, Arruñada 2003). This was often the case, for example, with leases under the Roman law rule "sale breaks hire". This rule is mandatory and constrains private freedom of contract because it impedes parties from enforcing a lease in rem, granting the lessee an in rem right valid against the whole world. For instance, the lessee would have to relinquish the asset to the buyer when the lessor-owner violates their agreement and sells the asset. The lessee would only hold a personal claim against the seller, and—whatever parties contract—leases cannot be given in rem enforcement.[14]

Alternatively, the law subjects in rem enforcement to certain conditions. For example, the "sale breaks hire" rule has been modified in many jurisdictions so that the law enforces leases in rem when the lease is made public. This second solution can also be implemented in two ways, relying on different degrees of centralization to define the conditions for in rem enforcement. First, as is often now the case with residential leases, by relying on exchange byproducts, such as the informational value of the exercise or delivery of possession (Arruñada 2015). Second, by developing dedicated organizations (that is, registries) which, for each transaction, either produce qualified and publicly available judicial evidence, as the recorders of deeds found in France, Italy

[13] The history of registries suggests that what is essential is to redefine the conditions for in rem enforcement. For example, mandatory registration was ineffective in different jurisdictions until the law switched—and judges effectively enforced—the priority rule for adjudication from the traditional "first in time, first in right" to the new "first to record, first in right". See Rose (1988) and Konig (1974) for the experience in colonial USA, and Arruñada (2012: 55) for other historical examples.

[14] More generally, not enforcing all other entitlements in rem is the solution implicitly chosen when in rem enforcement is based on possession: in the absence of additional conditions, all other claims (including ownership, as in the Uniform Commercial Code's entrusting of possession solution [UCC §2–403[2]) are enforced in personam.

or the USA do, or publicly reallocate in rem rights, as the registries of rights of Australia, England or Germany do (Arruñada 2003).

Whether implementation of this solution is centralized or decentralized through, respectively, registration or possession, it explicitly clarifies how property and contract law complement each other. Property law adds a public phase to private contracting by conditioning in rem enforcement to additional public requirements. Thus property, in rem, rights are only transacted in a two-step procedure which includes a first step corresponding to the conventional private contracting between the parties, with effects of an in personam nature; and a second, relatively "public," step which is capable of granting universal in rem effects because public authorities represent all interested parties (Arruñada 2003).[15]

This second step is *public* not because it usually involves state representatives, or because it is based on public knowledge, or even because it contains mandatory elements, but because it necessarily involves strangers to the intended transaction. Relying on state representatives is just a means of providing impartiality. It is this presence of strangers to any of the single transactions that drives the need for additional impartiality and public ordering.

This need for a wider scope of impartiality is clear when we compare the situation in single and sequential exchange. In a common interpretation of Coase (1960), the role of the courts is seen as allocating uses to maximize value when contracting is not viable. More generally, in addition to ensuring contractual enforcement, the judge is also expected to fill the gaps in the contract, thus providing adaptation to unforeseen circumstances: "[a] dispute that brings parties to court implies that a contract did not delineate rights adequately, possibly because of changes in conditions after the contract was signed. The ensuing contract ruling then will explicitly delineate the parties' rights" (Barzel 2002: 169).[16]

To perform this function, the judge must be neutral with respect to the parties. However, given that in this single-exchange setup the judge adjudicates between only two parties to a single contract, these two parties have not only the opportunity but also good incentives for choosing an impartial judge and, in general, designing an effective enforcement mechanism. This makes it possible for the judge to be replaced by private-ordering solutions based on the parties' reputation and the expectation of future trade.[17]

This is not the case, however, in sequential exchange, which involves at least three parties entering two non-simultaneous contracts, so that one of the parties would not be represented in the other two's choice of enforcement mechanism. Understandably, this unrepresented party would fear losing enforceability in rem—that is, she would have to rely on in personam rights against the other parties.

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[15] From this perspective, the complementarity between contract and property runs deeper than the limitations on their substitutability sustained by Lee and Smith (2012: 151–54).

[16] The role of the law is also limited to enforcing contractual agreements when property rights are seen as residual rights of control, as in the Grossman-Hart-Moore theory of the firm (Grossman and Hart 1986, Hart and Moore 1990, and Hart 1995).

[17] Many historians argue, however, that pure private ordering has been insufficient to enable markets to function even in the contractual field, claiming instead that effective public ordering is needed (Ogilvie and Carus 2014).

In particular, free choice of enforcing mechanism by the parties (e.g., free choice between private or public ordering or, within public ordering, free choice of judges) would worsen the defining conflict in sequential exchange, which relates to the legal rights of at least one of the transacting parties (for example, the seller). Such legal rights depend on a previous transaction with another party (for example, whether or not the owner has properly authorized the seller) and determine judicial decisions adjudicating the in rem and in personam remedies between two of the at least three parties (in the example, deciding if either the owner or the buyer gets the asset while the other gets instead a personal claim on the seller). The enforcer's decision must be based on evidence about the authorizing transaction and such evidence must be protected against opportunistic choice or manipulation by all parties, not only those involved in one of the transactions. (Imagine, for example, an owner claiming that she had not authorized the seller when the sale to a buying third party shows itself to be a bad deal.)

Consequently, by giving rise to in rem enforcement, sequential exchange poses an additional problem that requires a wider scope of impartiality than mere contractual enforcement of single exchange.[18] The governance of in rem enforcers must ensure information and impartiality with respect to parties involved in all transactions: not only transacting parties in each single transaction but also all parties holding rights on the asset or potentially acquiring rights in assets of the same type. Such parties, being complete strangers to most of the intended single transactions, are not in a good position to choose or somehow incentivize the enforcer or those producing evidence that might be relevant for enforcement.[19]

This wider scope of impartiality and the consequent extent of public intervention are determined by the target degree of in rem enforcement, whose efficiency level and timing are driven by many factors, such as the existing opportunities for impersonal trade and the cost of alternative institutions for property titling, which are not discussed here.[20] However, for any

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[18] In rem rights are meaningful (that is, distinct from personal rights) only in sequential transactions with a least three parties: having a right against the world is the same as having a personal right against your contractual counterparty when the world is inhabited only by you and your counterparty. Certainly, an element of contract and property rights is that of exclusion, protecting right holders against all sorts of depredations by strangers. However, these depredations can be seen as involuntary subsequent transactions within the sequential exchange framework. Moreover, the solution of such depredations are hardly affected by the nature of the right (real or personal) held by the property holder. On the role of exclusion, see Merrill and Smith (2001, 2011), as well as the more focused analyses in Merrill (1998, 2014) and Smith (2012, 2014).

[19] The circumstances of sequential exchange depart from those of repeated exchange commonly assumed in contract theory. The conventional distinction between one-shot and repeated transactions refers to the same parties (either directly or related through reputation) transacting different assets or services. Here, however, the repetition of interest comes from the fact that the exchange deals with property rights on the same asset, and the parties to two of the transactions are also (at least partly) different.

[20] See, for instance, Arruñada and Garoupa (2005) for the modern choice between titling systems; and Arruñada (2016b), for a historical analysis of the choice between privacy and public titling applied to classical Rome. The Roman economy was based on personal exchange, but the role of the state was essential in making it viable. Not only by providing effective

given level of in rem enforcement, public intervention is not an option but a necessary condition to enable private property contracting. Furthermore, reaching a certain level of in rem enforcement requires the same degree of public intervention. For example, making land registries more or less active in their review of transactions (that is, having German or Torrens-type registration versus French or American recordation) alters the timing of the public interventions purging and allocating property rights. Recordation of deeds allows conveying parties more discretion on timing and heavier reliance on privately-produced information, so it seems to rely more on private decisions. However, this perception is deceptive, as recorded titles retain greater in personam content than registered titles. Consider the set of available remedies: those provided by registration are only available under recordation after a judicial decision. Given the survival of conflicting claims in rem, this additional intervention by the court (a purge or quiet title suit) is required to transform such personal claims into real rights with an in rem quality equivalent to that provided by property registration for all registered transactions.

More generally, these rules are not mandatory in the conventional way in that they do not constrain the content of contracts, just the type of enforcement. The mandatory element enters when the law states which rights will be enforced in rem or, more often, which conditions (publicity, filing, recordation, registration, etc.) transactions must meet to enjoy in rem enforcement. Parties are thus not fully free to choose the type of enforcement but are totally free to decide on the material content of the exchange. Given that in rem enforcement is only relevant in a sequential exchange setup, this conception of mandatory rules plays no role in a single-exchange context.[21]

5. Private and hybrid ordering in property

Together with the additional mandatory rule establishing the requirements for in rem enforcement, this wider scope of impartiality defines the two minimum elements of public ordering that, whatever their costs, are necessary for enforcing in rem rights. In essence, these two elements of public ordering cannot even be replicated by pure private ordering.[22] Hybrid

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enforcement for personal obligations but also by enacting formal rules that reinforced informal norms (such as, e.g., the census, which in addition to being used as a tax registry also included a "nota" reporting on personal reputation), and, perhaps more importantly, by establishing "forbearance" (Williamson 1991) with respect to the "private legal order" of the family, making it possible to allocate most decision rights to the *paterfamilias*.

[21] Moreover, public intervention is only of an enabling type: even if in Torrens-type registration, which can be considered the most interventionist solution, transactions are reviewed by registrars in a quasi-judicial capacity and acting as gatekeepers, with the ultimate decisions being made by rightholders when giving their consent. Therefore, public intervention does not interfere but enables private contracting of in rem rights.

[22] Conversely, private ordering may have an intrinsic advantage when rights are unenforceable in rem, as with assets that are "easily portable, universally valuable and virtually untraceable", such as diamonds, which explains why the diamond industry has been based on a "millennia-old distribution system that relied on multiple layers of personal exchange" (Richman 2009: 32).

ordering may play a role, however, in providing services for contractual verifiability. In particular, the need for these two elements does not mean that the government—narrowly defined—is the optimal provider of verifiability.[23]

Indeed, decentralized provision of verifiability by market participants is always the case when judges adjudicate by relying on the publicly observable byproducts of transactions (mainly, on the delivery or exercise of possession). And, when proper priority rules are clear, registry services can also be produced by a hybrid: a "private" entity in a position of impartiality with respect to all parties. A case in point is that of financial assets. Even if, to eliminate delays between settlement and registration, the best practice is for a single clearing agency and depository to act also as a register (BIS-IOSCO, 2001: 13), as with the Depository Trust & Clearing Corporation (DTCC) in the US, several registries are sometimes used in so-called indirect holding systems, with two-step registration: a central depository and multiple custodians. However, when these custodians also act as first level registers, they are chosen by the issuer of the securities, so transactors themselves have no choice. Furthermore, when the issuer switches register, he has to provide the consent of third parties (such as lien holders), in a process supervised by the central register. In addition, rights with more potential to cause conflict (for instance, second liens) are simply not enforced in rem. Lastly, the central register is the sole register with legal effects for all securities owned by entities with registration functions (Arruñada 2003: 426). Therefore, this type of arrangement is "private" with respect to the running of the registry but, considering the above patterns, it is "public" with respect to its central features, this being a mandatory requirement usually defined in terms of priority rules and a lack of influence for any particular user.

The limitations of purely private (i.e., partial) ordering in property become clear when this hybrid type of financial registry is compared with the two prominent private registries built by the US property titling and mortgage industries: the title plants developed by title insurance companies, and the electronic registry of mortgage assignments created by mortgage lenders.[24] Since the nineteenth century, title companies have kept title plants that replicate public land records. That is, they transfer and abstract documents lodged at the public recording offices and build tract indexes so that the relevant information for each land parcel can be located more easily. This allows title insurers to improve the efficiency of title searches, discover any preexisting defect in the title and exclude it from coverage. In the last decade of the twentieth century, participants in the secondary mortgage market created the Mortgage Electronic Registration Systems (MERS) as a way of avoiding the costs and delays of local recordation of mortgage loan assignments by decoupling the local and national sides of the market. At the local level, MERS was to be the lender's representative, holding the rights in rem, enforced through

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Blockchain technology could change this constraint by making it economically viable to identify each individual diamond, as in the initiative leading to the Everledger registry (Lomas 2015).

[23] In fact, the record of governments in managing public registries is poor, from the Egyptian land registries of Roman times (Monson 2012: 127–31) to administrative tracking of conservation easements in the USA today (Owley 2015). However, absolute performance is trivial here: what matters is the relative performance of public versus private ordering, and effectively combining them, as emphasized in Arruñada (2012: 193–228).

[24] Another hybrid registry, for Internet domains, is analyzed along similar lines in Arruñada (2003: 427).

the recording offices. At the national market level, MERS could also act as a registry of transactions for its members, keeping a record of de facto in personam rights held by lenders and investors in mortgage securities.[25]

In the context of our discussion, the limitations of both of these solutions are clear: they produce at most in personam effects while it is the public recording offices that produce in rem effects. Understandably, both arrangements also use the information in the recording offices as the basis for their activities. Thus, although title plants are well organized and heavily regulated,[26] they only serve companies' internal administrative functions. The case of MERS is similar, especially after the foreclosure crisis showed that it faces difficulties for acting as a judicial representative of lenders (Levitin 2013).[27] When title insurance and MERS are compared to the registries for financial securities, it becomes clear why they do not produce legal effects: entry in title plants and MERS is voluntary and both are run by one of the parties to the transactions. They therefore lack independence.

The requirement of additional public ordering in terms of mandatory rules and impartiality does not therefore preclude individual market participants from joining forces to develop self-governing, market-wide and independent third-party registries and enforcers. The key element is that, when they do so, they are not acting as parties to any particular transaction. On the contrary: they are assuming that the third-party hybrid enforcer will be ruling on transactions in which they have not yet entered and for which they therefore have incentives to prefer efficiency-minded, independent enforcers. What they are doing would therefore, if anything, be better described as creating the rudiments of an independent market-enabling proto-state, in a similar

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[25] Crucially, MERS is owned and controlled by lenders, protecting them against the risk that MERS might use its stronger in rem position to defraud them, as an independent rightholder might otherwise be tempted to do. Considering that UCC Article 3 provides a "*mortgage* title-and-transfer system" (Levitin 2013: 653, emphasis in the original) would suggest that the transferred rights are rights in rem. However, effects on third parties are in fact limited, as shown by the foreclosure crisis, partly as a result of reliance on the revised 2001 version of UCC Articles 1 and 9 (Levitin 2013: 688–97).

[26] The industry is subject to pricing regulations, entry barriers, and comprehensive rules on products and processes (Arruñada 2002, Eaton and Eaton 2007, GAO 2007). In particular, since it is heavily concentrated (ALTA 2015) and title plants enjoy decreasing unit costs (Lipshutz 1994: 28), suppliers are good candidates for becoming natural monopolies so, understandably, their behavior has been repeatedly scrutinized by competition authorities. (See, for example, FTC 1999).

[27] In fact, the presence of MERS provided a ready excuse for borrowers to delay and often block foreclosure procedures by questioning MERS's standing: because MERS was not the mortgage holder, borrowers claimed that it had no right to foreclose and that, by acting as a representative for lenders, it made it difficult for borrowers to get in touch with lenders when seeking to renegotiate their loans individually, as well as to structure wide-scale modification programs. The abundance of cases in which judicial rulings against MERS were later overturned on appeal suggests that many local courts likely took a narrow legalistic position against MERS in order to protect local borrowers (for instance, Korngold 2009: 743). It illustrates, however, how damaging a lack of independence in fact or in appearance is for those aiming to provide judicial evidence in this area (Arruñada 2012: 74–75).

fashion to Nozick's minarchist libertarianism (1974: 200–24),[28] a description that is applicable to many accounts of allegedly private-ordering solutions, including those relating to the Californian gold rush (Umbeck 1977), medieval Jewish Maghribi traders (Greif 1989, 1993), the medieval law merchant (Benson 1989), medieval fairs (Milgrom, North and Weingast 1990), self-governing property arrangements (Ostrom 1990), the cotton industry (Bernstein 2001), the US West (Anderson and Hill 2004), or even explicitly anarchist solutions for land titling (Murtazashvili and Murtazashvili 2015, 2016).[29] Interestingly, Coase himself seems to point in this direction when suggesting that, when traders are distant, private ordering is not enough for enabling markets (Coase 1988: 10).[30]

Maintaining the assumption of single exchange has not only limited the scope of the analyses but helped inspire and sustain repeated failures in public policies that deal with institutions supporting sequential exchange. Three interrelated biases can be distinguished in the single exchange assumption: the focus on the initial allocation of property rights, the disregard of legal

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[28] This interpretation of existing private-ordering arrangements as elements of a proto-state refutes Rothbard's contention that no state has in fact been founded or evolved in a Nozickian way (1977: 45). Interestingly, Rothbard's view seems to be grounded on a narrow single-exchange view, as he claims that "since every dispute involves only two parties, there need be only one third party appeals judge or arbitrator" (Rothbard 1977: 47). Arbitration would suffer serious limitations in sequential exchange because the arbitrators, being chosen by two of the parties, would tend to relegate the interests of third parties.

[29] Presenting these solutions as private ordering likely underestimates their reliance on the state and, more generally, the interaction between local and wider institutions in parallel with the scope of the relevant market. The discussion therefore resonates in the debate in history about the power of private property to enable a functional market economy. See, in general, Ogilvie and Carus (2014) and, for a sample of cases, Edwards and Ogilvie (2012a) and Sgard (2015), who reinterpret the case of the Champagne fairs with a much greater role for public order; Edwards and Ogilvie (2012b), who claim that the Maghribi traders combined private and public enforcement; Kadens (2012), who argues that the customary origin of the medieval law merchant is a myth; Arruñada (2012: 111), who stresses the role of the state in some of the cases described by Anderson and Hill (2004); and Masten and Prüfer (2014), who explain the emergence of the law merchant and its later supersession by state courts as adaptation to different circumstances. Most of these analyses focus on contractual institutions, but those developed in primitive or allegedly stateless societies to transact property rights also rely, instead of on private ordering, on public procedures which are functionally similar to those used by modern states (Arruñada 2003: 406–11).

[30] In his opinion, "it is evident that, for their operation, markets such as those that exist today require more than the provision of physical facilities in which buying and selling can take place. They also require the establishment of legal rules governing the rights and duties of those carrying out these transactions in these facilities. Such legal rules may be made *by those who organize the markets*, as is the case with most commodities exchanges.... When the physical facilities are scattered and owned by a vast number of people with very different interests, as it is the case with retailing and wholesaling, the establishment and administration of a private legal system would be very difficult. Those operating in these markets have to depend, therefore, on *the legal system of the State*" (Coase 1988: 10, emphasis added).

rights, and the tendency to overestimate the power of private ordering. The next three sections analyze them and propose some corrections based on the minimum elements of public and hybrid ordering identified in the current section.

6. Policy implications rooted in emphasizing the initial allocation of rights

First, retaining the single-exchange assumption leads the law and economics of property to emphasize the initial allocation of rights because recurrent allocation is not even conceivable in such a setup.[31] Inadvertently, this focus on the initial allocation, with its corresponding implicit disregard of the need for recurrent allocation, provides a fitting framework for unbalanced efforts in both land titling and business formalization projects. Indeed, most of these projects concentrate expenditures in the first steps of the process (land titling, making business firms formal), paying hardly any attention to the need for recurrent allocation (e.g., registering subsequent transactions, keeping firms formal).

In land titling projects, subsequent transactions are at most used as a selling point but without assessing the real demand and, most importantly, forgetting that, for the institutions to succeed, they must be effective and sustainable in providing a stream of future services, not only initial titling. Indeed, many land titling projects consider sequential exchange superficially when they claim to "mobilize dead capital" (de Soto et al. 1986, de Soto 2000) by placing land on the market and using it as collateral for credit, thus providing a silver bullet for development. In practice, however, most projects focus their efforts on massive, universal, low-cost and subsidized land titling. Subsequent transactions are often disregarded,[32] as a consequence of limited demand and/or poor and useless supply (the emphasis being on the volume of initial titling instead of on legal quality and sustainability). The contrast could not be greater between most of these projects, which operate over horizons of a few years, and the history of land registration in developed countries, which often took several decades if not centuries, as in

[31] Merrill and Smith analyze how attempts to escape the baseline role of property by over-emphasizing that of contract and considering property as the non contractible residual (mainly Barzel 1997) do not explain the basis on which parties contract (Merrill and Smith 2001: 377–78). They also explain how the legal allocation of entitlements is the baseline for bilateral contracting in the literature derived from Calabresi and Melamed (1972) (Merrill and Smith 2001: 379–83). Single exchange is also assumed by the "property rights theory of the firm" (Grossman and Hart 1986, Hart and Moore 1990, Hart 1995) with a corresponding emphasis on initial allocation by modeling how, in a context of "incomplete" contracts, the difficulties that parties face to renegotiate ex post drives ex ante the inter-party allocation of investments in specific assets. Initial allocation is overwhelming, e.g., in the survey by Lueck and Miceli (2007), as explained in note 1.

[32] Typically in many of these projects, as exemplified by the Peruvian case (Arruñada 2012: 148–50), second transactions remain unregistered (Bruce et al. 2007: 42) and there is little or no secured lending (Deininger and Feder 2009: 233), often because of the difficulties of enforcing repossessions by outsiders.

England, and also was selective with respect to both the supply and demand for titling services (Arruñada 2012: 139–48).

A similar disregard for subsequent transactions explains why initiatives to formalize informal business firms and to simplify business formalities often pay attention only to initial formalization procedures, without considering the future costs of remaining formal (mainly taxes but also registries' renewal fees) or, less obvious but equally important, the value of formalization services for reducing future transaction costs,[33] which is determined by the reliability of registries' information and, in particular, by what judges think about the quality of such information.[34] Instead, most of these initiatives, which have proliferated in parallel in several international organizations,[35] consider only the costs incurred by entrepreneurs for the incorporation of companies (even in countries with few companies), disregarding all other costs and benefits. Consequently, they lead reformers to reduce the average time and cost of incorporation when the priorities, especially in developing countries, should often be to allow individual entrepreneurs to operate formally without being legally registered as such and, for companies, to achieve registries that are sufficiently reliable for their services to inform judges and therefore reduce parties' transaction costs.[36] (The fact that not all company founders are entrepreneurs but may be using the company for extractive purposes—for instance, tax evasion—opens still another avenue for discussion: facilitation of initial allocation of rights may increase social transaction costs in the future.)

The most extreme version of this over-emphasizing of the initial allocation of rights are cross-country quantitative indicators of land and business registries' performance, epitomized by the Doing Business indicators on registering property and starting business. By considering only the initial formalization costs, they blind policymakers to the tradeoffs between initial and future transaction costs. Overall, the information they provide on initial costs might be useful if it were reliable (which it is not: see Arruñada 2007, IEG 2008), but should be used with care, bearing in

[33] Many experimental studies observe that reducing the costs of initial formalization of business firms causes only a small and temporary effect, if any, on formalization: for example, De Mel, McKenzie and Woodruff (2008 and 2013), Kaplan, Piedra and Seira (2011), and Galiani, Meléndez and Navajas (2015). As one of these studies concludes, "firms remain informal, not because burdensome entry costs deter them from operating formally, but because they perceive the benefits of formality to be modest at best" (Galiani, Meléndez and Navajas 2015: 5).

[34] See Arruñada (2010: 179–82; and 2012: 122–25).

[35] Such as the OECD (2003, 2006); the European Commission, with its "Charter for Small Enterprises" (CEE 2004); and the World Bank, with its *Doing Business* indicators (2004–15).

[36] This is not to deny that entry barriers may be a major deterrent for economic development; and serious entry barriers do remain in many markets, probably more so in developing economies. But the binding ones are not located now in the legal formalization process, which is generally open to all at a low cost, too low in fact to qualify as a significant barrier to entry. Mixing serious entry barriers with trivial ones entails the risk of setting mistaken priorities and implementing distractive policies. In particular, misuse of the "entry" label for initial formalization costs, which is common in the business start-up literature, causes confusion and exaggerates their importance. Compare, for example, how the empirical results of Alesina (2005) on business *entry* are presented by Djankov (2009) as referred to "start-up reforms".

mind its partial nature. Failure to do so explains why the use of these indicators has been falling into the old "management by numbers" trap into which many large firms fell in the 1950s and 1960s (Hayes and Abernathy 1980).

Conversely, considering sequential exchange advises different criteria for selecting, designing and evaluating titling and business formalization projects. First, when launching a new project, more attention should be paid to current contracting practices. Especially, if economic agents are already relying on vicarious solutions, such as implementing secured credit through sales with repurchase agreements, this confirms that true demand for titling exists and therefore advises that resources should be spent on titling institutions. If such vicarious solutions are not common, such demand likely does not exist, even if survey respondents say otherwise. Second, the priority when organizing or reforming registries should be for them to provide reliable judicial inputs. Ensuring this evidentiary quality is often more important than minimizing formalization costs, a common objective of reforms.[37] Even if institutional efficiency depends on achieving the right tradeoffs between costs and benefits, including legal quality, the fact that only reliable, independent registries are able to produce in rem rights should be borne in mind when considering such tradeoffs. Third, when evaluating reforms, the focus should be not only on how many land parcels or business firms have been titled or formalized but also on how many *subsequent* transactions (second sales, mortgages, new businesses) have taken place and what proportion of them has been formalized. Lastly, although full consideration of the tradeoffs between initial allocation (or formalization) and ex post transaction costs would be well-nigh impossible, reform efforts should at least estimate some major later costs and benefits by measuring, for example, the incidence of litigation and the contractual and judicial processes whose effectiveness can be attributed to registries' performance.[38]

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[37] Mistaken priorities in this area are also common in developed countries, as illustrated by the US foreclosure crisis, discussed above, which resulted from efforts to reduce transaction costs ex ante without considering how this was increasing future enforcement costs. "To facilitate securitization, deal architects developed alternative 'contracting' regimes for mortgage title: UCC Article 9 and MERS, a private mortgage registry. These new regimes reduced the cost of securitization by dispensing with demonstrative formalities, but at the expense of reduced clarity of title, which raised the costs of mortgage enforcement" (Levitin 2013: 637).

[38] This is not what the revised Doing Business indicators are doing. After the changes introduced in 2014, Doing Business maintains its old biases but aims to calculate numbers more precisely by, for instance, adding more cities or including vague promises of comprehensiveness (IFC-WB 2014). It also claims to consider the value of formalization services but its concrete steps to measure it are disappointing, as they focus on easy-to-measure but minor elements. For example, the revised "Registering property" index, first published in the 2016 version of the indicators (World Bank 2015), "will complement the current ones measuring the *efficiency of the land title transfer process*. It will look at, for example, the reliability of the information recorded by the land administration system (such as *whether there is an electronic database for checking maps and cadastral information*) and the transparency of that information (such as whether there are official statistics on the number of transactions at the land registry). Other aspects measured will include the extent to which the land registry and cadastre provide for *complete geographic coverage of land parcels* and the accessibility of mechanisms for resolving land disputes" (IFC-WB 2014: 2, emphasis added). In addition to focusing on such minor elements, the inordinate

7. Policy implications rooted in the disregard of legal rights

Considering sequential exchange also clarifies the link between legal and economic property rights, with economic rights becoming inseparable from legal rights. When single exchange is assumed, economic and legal rights can be treated as separable entities, and rights enforced by private ordering are not even considered legal.[39] This is not damaging because the in personam rights which are the object of single exchange can be enforced privately, as they are valid only between the transacting parties. This is not the case, however, for the in rem, property, rights of any sequential exchange, which are necessarily enforced by public third parties, as they are valid not only against parties to a single transaction but against the world—i.e., against parties to previous and future transactions.[40]

Unfortunately, disregarding the foundational role of legal rights lends support to institutional reforms with mistaken priorities: mainly, land titling projects that confound and even privilege geographical over legal demarcation of land; and simplification reforms that in their pursuit of synergies integrate administrative and contractual registries, losing sight of the fact that, since they serve different functions, they require different organizations. (With "administrative" registries I refer to registries organized for public administration purposes—such as tax collection in the case of cadastres. By "contractual" registries I mean those organized to reduce private transaction costs—mainly, property and company registries.)

On the one hand, land demarcation has both a physical and a legal component. Physical demarcation involves measuring and defining the boundaries of a land tract. It is often performed by land surveyors hired by one party, most commonly the owners or the government. Legal demarcation is the end result of a process based on a "purging" procedure in which owners of neighboring tracts consent on some definition of a tract's boundaries or, otherwise, oppose it in order to assert their claims. Eventually an agreement will be reached by all relevant parties or a judicial decision will be passed on the matter. It is only after the land is thus *legally* demarcated that boundaries have legal force in rem. For example, whatever the physical demarcation accompanying a deed and whatever the promises given by the seller with respect to boundaries, neighbors can still enforce in rem their boundary claims against the buyer who, were they right, will have only a claim against the seller—and possibly the surveyor—for the deficiency with respect to the promised demarcation. Therefore, land demarcation is also the product of both purely private contractual exchange and the functionally "public" gathering of consents characteristic of property transactions, a public stage that can be performed by different means

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attention paid to geographic information is also revealing in the light of the argument developed in the next section.

[39] For example, "[t]he rights delineated by a third party not using force are not legal rights" (Barzel 2002: 180). Note that, even in a context of single exchange, this non-legal nature of privately-enforced rights is uncertain on positive grounds, to the extent that private ordering in fact hinges on judicial forbearance and comparative efficacy (Williamson 1991, Masten and Prüfer 2014).

[40] Compare Hodgson (2015) who also criticizes the distinction often made by the economic literature on property rights between economic and legal rights, but asserting the relevance of legal factors "involving recognition of authority and perceived justice or morality" (2015a: 683).

for different dimensions relating to the definition of property rights. For instance, for land registration, it is usually enough if parcels are identified even if their boundaries are not perfectly demarcated.[41]

Conversely, disregarding the legal dimension of property leads physical demarcation to be considered more effective than it really is. A prominent example of this emphasis on the physical component of land demarcation is the interpretation by Libecap and Lueck (2011) that the findings of their seminal work on land demarcation,[42] are caused by rectangular surveying. In fact, it is unclear to what extent the differences they observe in land value, investment, transactions and litigation should be attributed to physical or, more likely, legal land demarcation, given that their two samples of parcels differ not only in the physical demarcation technique used but also in the way the land was allocated to settlers, and, consequently, the legal quality of their ownership titles. Where land was demarcated by rectangular survey (RS), settlers were granted specific parcels, guaranteeing no overlaps or conflicting claims. But, where land was demarcated by "metes and bounds" (MB), settlers were given a right to appropriate a certain area, which then was freely chosen by each settler, privately surveyed and recorded, without, in principle, undergoing any purging procedure to avoid overlaps and clear the title. Consequently, whether the differences observed by Libecap and Lueck capture the effects of the different demarcation systems or those of alternative allocation and titling procedures is unknown, and their results probably overestimate the relative importance of physical demarcation by including those of the different allocation procedures used in that case for RS and MB lands. In particular, their results might reflect the fact that the boundaries of plots under MB have not been purged and are therefore likely to overlap those of neighboring plots. In this case, both contracted and reported acreage under MB would systematically overestimate the legal acreage really sold, as parties would try to keep their boundary claims alive. Therefore, the acre prices that they observe under MB would underestimate real prices.[43]

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[41] In any case, whatever the titling system, when boundaries are less precisely defined, they are not abandoned in the public domain, as suggested by Barzel (1982) for costly-to-measure property rights, but are defined by the informal mechanisms of adverse possession and acquisitive prescription, which allow for an implicit purge of rights to take place ex post, instead of by a formal and costlier purge taking place ex ante.

[42] Libecap and Lueck (2011) compare two types of land that were allocated to US settlers at the end of the 18th century: in the Virginia Military District (VMD), settlers were given a right to appropriate a certain area, which was freely chosen by each settler, privately surveyed and recorded, without any purging procedure to avoid overlaps or clear the title; conversely, in the neighboring areas of Ohio, settlers were granted specific parcels, with a guarantee that there were no overlaps or conflicting claims and based on a rectangular survey for physical demarcation. They find substantial and persistent differences between these two types of land, not only in terms of land value, but also in roads, number of transactions, and legal disputes, with the VMD understandably showing worse results.

[43] This titling hypothesis is consistent with the fact that Libecap and Lueck observe such value differences in farmland but not in urban land, whose boundaries are usually more precise. It is also consistent with their finding that most 19th century litigation in metes and bounds areas is not related to boundaries (1.46 by 1,000 parcels, about 4 times more than in rectangular survey areas) or to the validity of the survey (2.48‰, 31 times more) but to the validity of the

The legal nature of physical demarcation is missing in policy, as land titling projects still spend most of their resources on mapping and surveying,[44] two activities that, by themselves, are of little value and often end up being unsustainable (Arruñada 2012: 141–43). These projects would gain instead from copying older registries and aiming for sustainability, focusing on parcel identification but relying on possession for establishing the verifiability of physical boundaries. Proper consideration of legal rights advises a more nuanced treatment of physical and geographic information in titling efforts. Parcel identification is necessary but establishing boundaries should not be considered a requirement for land titling. Investments to demarcate land by mapping the area and identifying parcel boundaries can therefore be transformed into a variable cost by allowing voluntary parcel identifications of different quality, so that greater precision is applied when most valuable. This would also tie in with the fact that the value of physical demarcation depends on the nature of the land: for example, surveying is only customary for commercial transactions in the USA (Madison, Zinman, and Bender 1999, 14).

On the other hand, disregard for the legal nature of private property rights also leads to contractual (i.e., property and company) and necessarily impartial registries being seen as mere depositories of information and therefore good candidates for integration with administrative (mainly, tax) and inevitably partial registries.[45] The appeal of such integration has been enhanced by the advent of information technologies, as their costly introduction made the possibility of integrating part of their functions more appealing, from entering data to controlling registration or even merging records. The benefits of this greater integration, which may affect the user interface, the back office, or both, stem from the two types of registries relying on the same information and performing some similar activities. Separate registries duplicate both entry and control procedures, as well as some of the information on record. For instance, owners and entrepreneurs may have to file documents in two or more offices, and some of the information in these documents may be the same. For example, part of the data in company incorporation documents is the same as that given when registering a firm with the tax authority or the social security agency. Moreover, duplication may occur in both single and repeated filings.

However, integration also involves substantial risks because, given their different purposes, contractual and administrative registries have different demands and often rely on different resources and organizations. In particular, they use different types of specialized knowledge and implement different incentive structures. For a start, the data on file often serve different functions. For example, land registries work effectively with less precise geographical identification than cadastres, which are often used for planning purposes, such as building roads.

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entry/patent (8.61‰, 33 times more) (Libecap and Lueck 2011: 453). Lack of clarity in the title seems to have been more important as a driver of litigation and, possibly, of transactions costs and value.

[44] Adding the numbers provided by Burns (2007: 94–95) shows that at least 53.45 percent of the unit costs of land titling projects is being spent on physically identifying parcels.

[45] These policies often aim to integrate the land register with the tax cadastre. The recurrent failure to achieve a functional land register in Greece provides a prominent example of the costs involved (Taylor and Papadimas 2015). In the business area, these integration policies often lead to creating public “single windows” and “one-stop shops” that reduce explicit costs to users but increase their hidden tax burdens (Arruñada 2010). For a general analysis of the issues involved, see Arruñada (2012: 202–205).

Therefore, the type of knowledge necessary for exercising their functions is substantially different. And their different purposes also entail different demands. First, contractual and administrative registries, respectively, support bilateral contracting and unilateral enforcement. Hence, delays in contractual registries preclude further transactions, whereas in administrative registries they merely postpone enforcement. Second, entry in contractual registries can usually be kept on a voluntary basis, whereas entry in administrative registries must often be mandatory, as they are designed to avoid negative externalities.

Consequently, organizational constraints and incentive structures for different types of registries are also different. Registration procedures need to be stricter in contractual registries to ensure independence, because they bestow rights, not only obligations, on the filing users or their future contractual parties. Conversely, cadastres, the paradigm of administrative registries, are declarative: if someone claims to be in possession of land, most cadastres will have no trouble believing that person because their entries only create obligations for declarers. In contrast, land registries have to implement rigorous registration procedures to check the quality of title or attest the date of filing because they bestow rights on filers or, more commonly, concede economic benefits to filers by bestowing rights on subsequent third-party innocent acquirers. In addition, the incentives necessary to operate their processes are also different: contractual registries need to be impartial with regard to the transacting parties, on the one hand, and third parties, on the other; whereas administrative registries serve and are run by one of the parties, the government.

Considering sequential exchange advises an alternative strategy: improving the interaction between public agencies and private facilitators, while preserving the independence of the agencies and exploiting the strengths and specialization advantages of public and private operators. This would enable *private* operators providing unified access to multiple public registries (a private "single window," to take the term used in the world of public administrative simplification) to be competitively designed by market forces, such as the business facilitating and information services that have been developing for decades to provide unified access to the outputs of different public registries.[46] A sensible policy would therefore focus on creating flexible public-private interfaces with the bureaucracies in charge of the public core of formalization services while allowing the free market to organize a multifaceted intermediate sector, comprising all sorts of intermediaries offering final users a variety of more or less integrated services (a variety of *private* single windows).[47] Public agencies could then focus their efforts on building such virtual interfaces that private providers of support services could then

[46] Observe that these facilitate interaction with public registries in both the filing of documents and the exploitation of registries' information. Benefits should arise in both processes. Potential benefits from having redundant repositories of information (Stephenson 2011: 1462–75) are limited to exceptional cases in which impartiality is not in doubt because the information was produced in the past. This was the case with the private abstracts of title that were used for reconstructing the public records of Chicago burned in the 1871 Fire. Blockchain could, however, change the terms of the tradeoff of costs and benefits of redundant solutions if it provides impartiality and the cost of duplication becomes trivial.

[47] Given that each agency has its own "regulatory space", coordination problems tend to be prevalent (Freeman and Rossi 2012), but they remain when their different bureaucracies are integrated under a single roof. What is proposed here is for the market to play a greater role in providing coordination services.

integrate in a modular fashion. This alternative strategy also holds a lesson for indicators of institutional performance: instead of precluding any consideration of private facilitators, their prices should be taken as a market proxy of performance: for example, for company incorporation, the price of "shelf" companies is a much more comprehensive proxy of the ex ante costs of incorporation than the biased partial numbers produced by Doing Business (Arruñada 2012: 205–208).

8. Policy implications rooted in the overestimation of private ordering

Lastly, disregarding contract interaction and sequential exchange leads to overestimation of the effectiveness of private ordering in many different areas, from conveyancing to application of the "blockchain". Policy consequences are visible in an array of institutional and regulatory reforms that naively liberalize outdated palliative services such as those of conveyancers and notaries public, without realizing that success hinges on reforming registries instead.[48] Meanwhile, underdeveloped or ineffective registries remain untouched.

This confusion of priorities is inevitable when, in line with a single-exchange perspective, the functioning of the conveyancing industry is analyzed independently from that of land registries. A striking example was provided by the ZERP report on the reform of legal services in real estate transactions in the European Union (ZERP 2007),[49] which was instrumental in inspiring European policy in this sector, putting pressure on national governments to liberalize conveyancing. In fact, the reforms of notaries initiated in 2014 in France and Italy follow this line by liberalizing some aspects of notaries' activity without strengthening the functioning of

[48] These effects are most visible with respect to services that substitute for those of property and company registries, as there is some evidence that these services are less costly and extensive in jurisdictions that have more effective registries, both in land (Arruñada 2012: 156–60) and company (Arruñada and Manzanares 2015) registries.

[49] The report classified conveyancing systems according to the intervention of different kinds of conveyancers, with such kinds defined according to their name and historical origin (notaries, lawyers, or real estate agents) but without paying attention to their function, which, from a sequential exchange view, is driven not by their name or history but by the type of registry existing in each country. Indeed the type of registry defines by default the functions actually performed by conveyancers, whether these are lawyers in common law countries, notaries in civil law countries, or real estate agents in Scandinavia. Consequently, the report could not explain why highly regulated conveyancers, such as those of Germany and Spain, exhibited lower legal costs. But this finding was surprising only within the report's misleading framework: conveyancing costs depend mainly on the nature of the land registry in place. For the same reason, the report was widely off the mark when considering that the Netherlands has a unique titling system whereas it is simply a recordation system with mandatory intervention by notaries public (Nogueroles 2007: 124).

registries, which in both countries are mere recordings of deeds.[50] This policy is misguided on two counts. First, by forgetting to reinforce registries, it blocks substantial reform. Second, with registries as they stand today, liberalizing conveyancers may even be counterproductive because it might make it harder for them to perform their palliative function of protecting third party interests.[51]

The experience of previous reforms in the Netherlands, where most notaries' prices were freed after 1999 and some freedom of entry was allowed into each other's reserved markets, supports these doubts. In addition to an initial increase in some dimensions of competition,[52] no change was detected in perceived quality by notary clients (the parties choosing the notary), but the quality attributes controlled by the land registry did decline (Nahuis and Noailly 2005), confirming that greater competition leads to weaker control of externalities. Moreover, Dutch notaries have also been involved in mortgage and real estate fraud (Lankhorst and Nelen 2004: 176–79, Preesman 2008, and Macintyre 2008). Rather than merely liberalizing the price of conveyancing services, what is required for reducing not only the costs but also the demand for palliative conveyancing services is to make public titling more effective. This may require a movement toward registration of rights or, at least, adding to mere recordation of deeds tract indexes and a check by the registry that grantors are on record, two features that are still absent not only in most of the United States but also in Italy (Nogueroles Peiró 2007).

Moreover, even if reforms of notaries public come up against strong vested interests, which is often presented as a merit,[53] this is shortsighted and even pyrrhic: the rents of each individual professional are likely to be reduced but the social cost will not be substantially reduced because outdated registries based on recordation of deeds, which are the main source of inefficiency, remain unchanged. Reforms that do not improve registries end up merely dissipating professionals' rents while maintaining demand for the profession. Even worse: by ensuring the profession's survival, they make it possible for such professionals to recapture lost rents in the future, when regulation is reintroduced. This was precisely what happened in The Netherlands:

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[50] In France, the *Loi Macron* (2015) liberalized the entry and hiring of professionals, but subject to detailed rules and constraints. Italy also liberalized advertising and entry, and reduced the number of documents subject to mandatory notarization (Guidi 2015).

[51] In these broad reforms, there are elements that clearly go in the right direction, especially when reducing the mandatory use of notaries in areas in which they are not necessary because there are no substantial externalities. For example, since 2006 it is not necessary to retain a notary to sell a used car in Italy. The problem is that services with these characteristics are few in number and scope because registries remains underdeveloped and making them more effective is not a priority of these reforms.

[52] Cross subsidies were reduced, resulting in higher fees for family services and lower fees for high-price transactions (Kuijpers, Noailly, and Vollaard 2005). Yet there were hardly any entries, with most new notaries joining established offices (CMN 2003), an observation consistent with the empirical assessment by Noailly and Nahuis (2010) that the reforms did not affect entry decisions.

[53] See, for example, "Notaries Public to the Barricades," *The Wall Street Journal*, December 12, 2014; "The Struggle for Reform in France and Italy," *Financial Times*, December 12, 2014; or "Notaries: The Princes of Paperwork," *The Economist*, March 21, 2015.

after the abovementioned changes and frauds, supervision of the profession was tightened, to the point that, instead of deregulation, "the amount of regulation . . . increased dramatically" (Verstappen 2008: 21).

Furthermore, registry reform should bring cost reductions in conveyancing but of a different order of magnitude. Legal transaction costs (that is, the sum of conveyancing plus registration fees) in land sales and mortgages differ drastically depending on the type of registry involved. In a sample of European countries, when measured as a percentage of the average home sale, they are 86.47% higher under recordation than under registration (Arruñada 2012: 159). And almost all of these cost savings (close to 96%) take place in conveyancing: for the average residential sale, average registry fees are practically the same (0.30% of home value under recordation and 0.26% under registration), but solicitors' and notaries' fees twice as big (being, respectively, 1.48 and 0.69%).

This analysis is applicable to other areas which, on the surface, seem to have little in common with land conveyancing. A case in point is the trading of financial derivatives, which can proceed Over the Counter (OTC), being arranged by investment banks that then play a role partly similar to that played by conveyancers in a purely private context without land registries (banks design the contract but not the underlying financial asset); or, alternatively, rely on clearinghouses and organized exchanges for trading more standardized contracts.[54] The tradeoff of costs and benefits is also similar, with two of the main elements replicating more general discussions: for example, the value of derivative customization poses an issue similar to that of the numerus clausus of rights in rem, while negative externalities of OTC trading in derivatives also pose similar issues to those arising when such rights are created privately.[55] The cost savings involved are also substantial.[56]

Another interesting case is that of blockchain, the cryptographic technology behind bitcoin, which is failing to fulfill its promise of providing a venue for impersonal exchange based on

[54] A prominent example is the reform adopted by the US Congress in July 2010, which required routine transactions to be traded on exchanges and routed through clearinghouses, as well as customized swaps to be reported to central repositories (mainly, Title VII of the Dodd-Frank Wall Street Reform and Consumer Protection Act). In particular, the Act required that most swaps be guaranteed by clearinghouses and executed on electronic and regulated platforms, known as swap-execution facilities, instead of over the phone.

[55] The Act has been controversial, with different views on its costs, benefits and effectiveness. Compare, for example, Caballero and Simsek (2013), who model a "complexity externality" that supports moving OTC transactions to exchanges as a preemptive measure to simplify and increase market transparency; and Roe (2013), who argues that clearinghouses are fragile with respect to systemic risks.

[56] A report by McKinsey & Co. estimated that the shift of trading towards organized platforms triggered in the USA by the Dodd-Frank Act would cause losses of 4.5 billion dollars, 35% of the revenue of the investment banks that had previously operated this OTC market (Rudisuli and Schifter 2014). The advantages of bilateral trading to banks dealing in derivatives exceed those of higher margins (see, e.g., Awrey 2013: 415).

private ordering.[57] Blockchain enthusiasts claim that it makes no use of specialized third parties for enforcement. In particular, its "smart contracts" offer automatic execution without third-party intervention, which should avoid the risk that the trusted party or the government might manipulate the content of the blockchain.[58] However, blockchain relies on several types of intermediaries, such as those running the system and providing the interface between the world of personal claims traded in the blockchain and the world of real assets. More importantly, contract completion seems to rely on traditional enforcers, as indicated by the "hardfork" implemented by the Ethereum platform in the summer of 2016.[59]

9. Summary

In order to better understand property institutions, we need to focus on the transaction costs involved in sequential exchange with interaction between contracts, a type of exchange that is essential for specialization in contractual functions. In sequential exchange, not only use externalities but also exchange externalities are prevalent, and two additional elements of public ordering are needed to contain them: mandatory rules must establish the conditions for in rem enforcement, and enforcers must enjoy a wider scope of impartiality. Private-ordering arrangements can play an effective role in providing verifiability services but only under such conditions.

Moreover, the interaction between contract and property law also changes, with contract law governing the inter-party manifestation of the consents needed in what is necessarily a double-stage (private and public) property transaction. Property law institutions—broadly defined, to include those dealing with all types of sequential exchange—also become the key mechanism for making truly impersonal exchange possible, this being understood as exchange in property, that is, in rem rights, the only rights whose value is independent of parties' personal attributes.

I contend that this sequential-exchange perspective is necessary for understanding the functional dependence between economic and legal rights and for economic analysis to throw light on the institutions of property markets. To date, most models in law and economics contemplate contractual problems and solutions.[60] Such solutions are only suitable for personal

[57] Blockchain has even been considered by libertarians as a means to get rid of the state altogether (Tapscott and Tapscott 2016: 199–201).

[58] See, for instance, the presentation of the Ethereum platform, which claims to work "without a middle man or counterparty risk" (Ethereum 2016).

[59] This argument is developed at length in Arruñada (2016c).

[60] Merrill and Smith (2001: 398) conjecture that a main reason for this contractual focus of recent scholarship may have been a change in social concerns derived from greater property security. Indeed, taking property and titling institutions for granted may have played a role but the theoretical analysis and policy problems discussed in the previous sections suggest two additional reasons linked to supply and demand in the market for ideas. Note, first, that analyzing sequential exchange requires altering assumptions such as the number of affected parties and the nature of enforcement. It is easier to assume two parties and to make in rem enforcement

exchange so they force market participants to rely on personal safeguards and the potential benefits of in rem enforcement and impersonal exchange are squandered. Moreover, this purely contractual view is behind a variety of misinterpretations of empirical findings and specific policy failures in issues related to impersonal exchange. For example, when reforms focus too narrowly on the liberalization of private contractual specialists (conveyancers, title insurers, patent lawyers, investment bankers) without proper development of market-enabling central units, such as registries and organized markets for financial derivatives. More generally, such reform policies tend to disregard the conditions of public ordering necessary for such public outfits to perform their functions and for private or hybrid ordering to play an effective, if complementary, role in providing verification services.

This paper explains how these elements of public ordering can be taken into account, which should allow for more exhaustive consideration of the tradeoffs involved when deciding on the level of in rem enforcement and how to implement it. This would avoid policy mistakes that either unduly expand public intervention, reduce it to the point at which in rem enforcement is endangered, or organize dysfunctional verification solutions. A final caution is in order, however. The analysis does not aim to prescribe either a high degree of in rem enforcement or specific solutions for implementing it (based, for instance, on possession, public registries or hybrid forms), which will generally hinge on the particular features of the specific markets and other institutions.[61]

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irrelevant by assuming that parties enjoy unlimited liability. Second, the contractual view also fits squarely with the interests of the "luddite" professionals (from lawyers, notaries and conveyancers who intervene in land transactions to investment bankers who sell customized financial derivatives) who provide services for personal trade and oppose policies strengthening the institutions that would enable impersonal trade in "legal commodities" (in the example, land registries and organized trading platforms). For a deeper analysis and other cases, see Arruñada (2012: 114–18 and 224–28).

[61] I discuss some of these issues in the first sections of Arruñada (forthcoming).

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