Journal of Institutional Economics (2017), 13: 4, 753–783
 doi:10.1017/S1744137416000473
First published online 8 February 2017

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: overemphasize the initial allocation of property rights, while some form of recurrent allocation is often needed; pay scant attention to legal rights, although these determine enforceability and, therefore, economic value; and overestimate the power of unregulated private ordering, despite its inability to protect third parties. These three biases have been a misleading policy in many areas, including land titling and business firm formalization.

1. Introduction

There are two main gaps in our knowledge on property. On the one hand, 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, 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 United States or for reforming the European conveyancing markets.

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I argue 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 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 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 (De Soto *et al*., 1986; De Soto, 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); however, although they criticize its reliance on the Coasean bundle-of-rights view of property and its 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.

2. The argument for sequential exchange

In essence, the Coasean analysis of externalities involves physical spillovers that are caused when the use of assets affects other assets. Assuming both zero-transaction costs and well-defined property rights,[3] such spillovers are easily internalized by trade among the affected parties. Therefore, private

1 See Lueck and Miceli (2007) for a survey of the literature that practically does not touch on exchange externalities.

2 Available at http://fig.net/resources/index.asp.

3 Transaction costs are conceived here as trading costs. As in Coase (1960) and most later analyses, transaction costs and property rights are therefore treated as separate entities. This separation is particularly necessary because the interaction between both entities is the key problem in property markets and drives the institutional solutions.

https://doi.org/10.1017/S1744137416000473 Published online by Cambridge University Press

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 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 L's 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 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 isolated transactions and move into the real world of contractual interactions, or 'sequential exchange'.[4]

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 distinct 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 *et al*., 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.[5] This simplification is only natural in a single exchange context

4 Barzel's claim that contractual registries facilitate judicial adjudication in a single-exchange setup (Barzel, 2002: 168–169, 185–186, 196) fails to explain which contracts are typically registered. 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.

5 Authors in the economics of property rights see them as the ability to use (Alchian, 1965: 817), enjoy (Barzel, 1997: 3) or exercise a choice (Allen, 2000: 898), keeping the analysis in purely contractual, single-exchange, terms. Analyses that focus on state action at the higher institutional level (following the pioneering works by North and Thomas, 1973; North, 1981; Olson, 1993), at the commons level (Ostrom, 1990) and at the property market level (e.g., Epstein, 1985), are fruitful on the emergence and

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 in rem enforcement without causing externalities, raising transaction costs and therefore hindering exchange.

3. On 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.

Consider exchanges in externalities: In Coase (1960), they 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,

initial allocation of rights, as well as on the role of the state, but disregard the 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: 379–383) on the reliance on in personam use claims prevalent in main areas of law and economics.

https://doi.org/10.1017/S1744137416000473 Published online by Cambridge University Press

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.

In 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.[6] 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. 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 'influence of the law on the working of the

6 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, which usually are not enforced in rem (Hansmann and Kraakman, 2002: S375).

economic system' (Coase, 1988: 10), 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, a 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 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.[7]

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: 158–160). 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. 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.

7 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 others, 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.

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: 359–360) – who trace this view to Coase (1960) – put it, a mere 'baseline' for contract (e.g., Cheung, 1970; Hermalin *et al*., 2007) and 'economic' property rights as separable from 'legal' rights (Alchian, 1965; Barzel, 1997). For example, for Barzel, economic rights are the 'ability to enjoy a piece of property' (Barzel, 1997: 3), whereas legal property rights are 'what the state assigns to a person'.

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. 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

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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 (see, for instance, Alemán, 1604; de Balzac, 1830). Even without forgeries or fraud, the system often gave rise to multiple chains of title, which left 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 (Arruñada, 2012: 55).

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.[8]

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

8 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 Section 2-403[2]) are enforced in personam.

https://doi.org/10.1017/S1744137416000473 Published online by Cambridge University Press

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 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).[9]

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).[10]

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

9 From this perspective, the complementarity between contract and property runs deeper than the limitations on their substitutability sustained by Lee and Smith (2012: 151–154).

10 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, 1995; Hart and Moore, 1990).

for the judge to be replaced by private-ordering solutions based on the parties' reputation and the expectation of future trade.[11]

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.

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.[12] 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.[13]

11 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).

12 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).

13 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

https://doi.org/10.1017/S1744137416000473 Published online by Cambridge University Press

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.[14] However, for any 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.

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

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.

14 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.

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replicated by pure private ordering.[15] Hybrid 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.[16]

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 United States, 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. Last, 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.[17] Since the 19th century,

15 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). 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).

16 In fact, the record of governments in managing public registries is poor, from the Egyptian land registries of Roman times (Monson, 2012: 127–131) to administrative tracking of conservation easements in the United States 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).

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

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 20th 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 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.[18]

In the context of our discussion, the limitations of both of these solutions are clear: They produce at most in personam effects, whereas 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,[19] 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).[20] 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.

18 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: 688–697).

19 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).

20 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).

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 fashion to Nozick's minarchist libertarianism (Nozick, 1974: 200–224),[21] 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 *et al*., 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).[22] 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).

Maintaining the single-exchange assumption 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. The next three sections analyze the consequences of three interrelated biases: the focus on the initial

21 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 (Rothbard, 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 arbitrators, being chosen by two of the parties, would tend to relegate the interests of third parties.

22 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: 406–411).

allocation of property rights, the disregard of legal rights, and the tendency to overestimate the power of private ordering.

6. Focus on 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.[23] Inadvertently, this focus on the initial 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,[24] 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 England, and also was selective with respect to both the supply and demand for titling services (Arruñada, 2012: 139–148).

23 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: 377–378). 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: 379–383). 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).

24 Typically in many of these projects, as exemplified by the Peruvian case (Arruñada, 2012: 148–150), 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.

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,[25] which is determined by the reliability of registries' information and, in particular, by what judges think about the quality of such information (Arruñada, 2010: 179–182; Arruñada, 2012: 122–125). Instead, most of these initiatives, which have proliferated in parallel in several international organizations,[26] 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.

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 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

25 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 *et al.* (2008, 2013), Kaplan *et al.* (2011), and Galiani *et al.* (2015). As the latter conclude, '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' (2015:5).

26 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).

https://doi.org/10.1017/S1744137416000473 Published online by Cambridge University Press

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.[27] 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.[28]

7. 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 (Barzel, 2002: 180). 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.

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

27 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 (Levitin, 2013: 637).

28 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.

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 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.

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 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.[29]

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.[30] The appeal of such integration has been enhanced by the advent

29 See, for a detailed argument, Arruñada (2012: 248–249, n. 8).

30 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

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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. 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

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).

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. 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).[31] Public agencies could then focus their efforts on building such virtual interfaces that private providers of support services could then 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. Overestimation of private ordering

Last, 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.[32] Meanwhile, underdeveloped or ineffective registries remain untouched.

31 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.

32 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: 156–160) and company (Arruñada and Manzanares, 2016) registries.

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), which classified conveyancing systems paying more attention to name and history of the conveyancers (notaries, lawyers, or real estate agents) than to their function, which, from a sequential-exchange view, is driven by the type of registry existing in each country (Arruñada, 2012: 186). The report was, however, 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 registries, which in both countries are mere recordings of deeds.[33] 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.[34]

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,[35] 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: 176–179; Macintyre, 2008; Preesman, 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.

33 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).

34 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.

35 Cross subsidies were reduced, resulting in higher fees for family services and lower fees for high-price transactions (Kuijpers *et al*., 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.

Moreover, even if reforms of notaries public come up against strong vested interests, which is often presented as a merit,[36] 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: after the abovementioned changes and frauds, supervision of the profession was tightened, to the point that '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.[37] 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

36 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.

37 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.

pose similar issues to those arising when such rights are created privately.[38] The cost savings involved are also substantial.[39]

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 private ordering.[40] 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.[41] 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.[42]

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

38 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.

39 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).

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

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

42 This argument is developed at length in Arruñada (2017).

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.[43] Such solutions are only suitable for personal 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. The paper has explained 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.

Acknowledgements

This work has benefitted from exchanges with two reviewers, Yoram Barzel, Elodie Bertrand, Gillian Hadfield, Dean Lueck, Claude Ménard, Fernando Méndez, Thomas Merrill, Henry Smith, and Giorgio Zanarone. Usual disclaimers apply. It received support from the Spanish Government through grant ECO2014-57131-R. For an extended version, see the working paper

43 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. First, 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 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: 114–118, 224–228).

version at https://ssrn.com/abstract=2879827. Many of the ideas in Sections 2 and 3 have been introduced in Arruñada (2016a).

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