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Matteo Rizzolli

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Building encroachments

Matteo Rizzolli*
University of Milan - Bicocca and University of Siena

Abstract

Property law usually reacts to encroachments with ejectment. Building encroachments differ, as restoring landowner's property claims implies the reversal of often large costs sustained by the builder. The authority faces thus the following dilemma: either it stands by the landowner and faces the social costs of undoing significant investments, or it defends the investment of the builder at the cost of neglecting landowner's claims. To address building encroachments, national property laws have deployed interestingly different remedies that range from a property rule in favor of the landowner to a property rule in favor of the builder with a variety of liability rules in between. The paper models the builder-owner conflict after the theory of optional law (Ayres, 2005), it frames different national solutions into a common analytical setting and it evaluates the different laws in their relative allocative and distributive outcomes. Moreover the paper offers support to the idea that property law may implement put-option types of remedies.

Keywords: building encroachments, adverse possession, comparative law and economics, property, land law, optional law, property rules, liability rules.

JEL Classification: K11

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1 Introduction

A building encroachment happens when somebody erects a building in whole or in part on another's real property. Property laws in all modern legislations solve conflicts regarding the attribution and enforcement of property entitlements systematically favoring the owner[1] and react to violations by means of strong remedies in the form of property rules (Smith, 2004).

However when someone builds a construction by mistake partly on an adjoining land, things get interestingly more complicated. Certainly, if the landowner does not enforce its property right, the builder may seek, after a certain amount of years, to become owner under the doctrine of adverse possession. If however the legal conflict between the builder and the landowner arises before adverse possession becomes applicable, then the law offers other legal means, other than ejectment, to the builder and to the landowner to resolve their conflict. Most civil codes have specific provisions that address cases of building encroachments, provisions that are sometimes referred to as *inverted accession doctrines.*[2] And the subject has been debated also in common law courts.[3] We try to frame the issue of building encroachments into an economic model of legal remedies based on *optional law*. The optional approach puts order to the subject that otherwise looks chaotic and offers also normative criterions to judge which laws are more efficient. Moreover the paper offers support to Ayres's (1998) claim about the existence of remedies modeled after *put options* in the law of property; a claim that has been so harshly contested by leading property scholars such as Epstein (1998) and Smith (2004). The same search for *put options* in property law has been conducted before also in Nicita *et al.* (2006) with reference to several aspects of the Italian property law. Compared to this previous work the present paper focuses only on building encroachments and frames it into a comparative institutional analysis by looking at other legislations as well. There is a somewhat contiguous topic in the law & economic literature that has received quite some attention: the doctrine of adverse possession.[4] We disentangle the differences between the two areas of the law further in the text at section 4.1. To our knowledge however there is no economic analysis of provisions specifically addressing building encroachments. This is somewhat puzzling as, in addressing some shortcomings and rough edges of adverse possession statutes, scholars have advanced proposals[5] that closely resemble the rules analyzed in this paper overlooking the fact that similar provisions were already present in the law.

The paper is organized as follows: in the next section we will model the builder owner conflict in a optional framework as devised by Ayres (2005) and we will construct archetypal remedies available to our hypothetical authority. The menu of rules is the one devised by Calabresi & Melamed (1972) and

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[1] The stability and reliability of owners claims over their estates is considered to be -from Bentham (1789) on- the backbone of the modern liberal statehood that promotes development by letting people appropriate the fruits of their works and investments (Rose, 2000). Non consensual appropriation is thus severely deterred by means of strong remedies: for instance trespass allows for damages and injunctive relief; theft is also a crime; and encroachments are mendable with ejectment.

[2] According to the Black's Law Dictionary (2004) *accession* is a "property owner's right to all that is added to the property (especially land) naturally or by labour, including land left by floods and improvements made by others". Conversely, under the doctrine of *inverted accession* (*accessione invertita* in Italy, *accessió invertida* in Spain) the owner of the building *acquires* landowner's property and not the other way around.

[3] See cases cited in note 23 and following notes.

[4] See Netter *et al.* (1998) Ellickson (1986), Merrill (1985) and Miceli and Sirmans (1995)

[5] For instance Merrill (1985) suggests the application of a liability rule II instead of a property rule III in case of bad-faith adverse possession and Kim (2003) suggests to make the granting of adverse possession dependent upon a standard of monitoring effort to be fulfilled by the landowner.

enriched by Ayres & Goldbart (2001). We will later on formulate normative criteria that will allow us to rank the rules in terms of both allocative efficiency and distributive justice.

Thereafter we will look at how building encroachments are actually regulated in several relevant legislations and we will pigeonhole the laws into our schedule of theoretical rules and judge them in accordance with our normative criteria.

2 A theory of building encroachments

We model the encroachment case as a bilateral monopoly with asymmetric information. The builder encroaches the landowner's property and puts its structure in place within sometime. The parties go to court to seek enforcement of their respective claims over the rival entitlement. The resource with rival use is obviously the surface occupied by the building. The landowner claims the property of the land. The builder, assumed being in good faith, may want landowner's claims to be dismissed or, after realizing that the encroachment has actually happened, she may want to compromise on a solution in order not to undue her investments in the building. Note that the impairment suffered by the landowner is immediate and provokes a discontinuity in her evaluation of the occupied land; however the value of the same to the builder grows monotonically with time as its investments in the building become unreversible. The more she builds on the wrong land, the higher the value of the unlawfully occupied land becomes to her, and the more expensive the outside option of building on the right land becomes. The time frame is important because, as we will see later, it might induce the landowner to wait and try to hold-up the builder later on when more costs are sunk.

Each party of the conflict knows her own evaluation of the surface of land. v_B is the value to the builder and may be based on the sunk costs of the investment, and on her expectations of the investment rents. v_L is the evaluation of the landowner and may be based on the productivity of land as an agricultural input, its rental value or some idiosyncratic evaluation that landowners attach to their proprieties.[6] Due to reciprocal asymmetric information each of them only knows the distribution of other's evaluation $f_B(v)$ and $f_L(v)$ with mean value μ_B and μ_L and variance σ_B and σ_L respectively. The information asymmetry exists also between the parties and the court: as the court does not know v_B and v_L but only the mean of the respective distributions μ_B and μ_L.

2.1 A taxonomy of theoretical legal remedies

Hereinafter we characterize the different rules that can be deployed by the authority in allocating the entitlement between the builder and the landowner. In doing so we refer to the literature on remedies that has spurred from Calabresi and Melamed (1972) and in particular to the paradigmatic advances brought upon from the mid 90s on, thanks to the adoption of the optional theory borrowed from the analysis of financial derivatives[7].

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[6] This idiosyncratic valuation may for instance be due to the endowment effect (Jacques, 1992). Note that Stake (2001) justifies adverse possession on the ground of the endowment effect: a person that possesses continuously the land for often a couple of decades has certainly developed the endowment effect –he argues- whereas the legal owner has probably lost it if he does not even dare to control the state of her properties. This simple shift of effect from the owner to the encroacher should tilt the decision of court to attribute the land to the party with a –now thans to the endowment effect- higher evaluation of the land.

[7] In this literature we shall mention in particular Krier and Schwab (1995) Kaplow and Shavell (1995; 1996), Ayres and Talley (1995b; 1995a), Ayres and Balkin (1996), Ayres and Goldbart (2001) and Ayres (2005).

The court decides both to whom to allocate the entitlement between the two parties of the conflict, and decides upon which remedy to deploy to enforce its decision. In the original Calabresi and Melamed framework, remedies were grouped in property rules and liability rules. In the realm of property law, a property rule type of remedy confers to the entitled party a strong protection forbidding any interference with the owner's rights by other parties. A liability rule instead, allows the counterpart to access the entitlement upon the payment of damages established by a court. The optional characterization of the Calabresi and Melamed framework reinterprets liability rules as *call options*: saying that the court determines that the builder can access the landowner's property upon the payment of damages is equivalent to saying that the builder is given a *call-option* over landowner's entitlement that can be exercised at the strike price of damages. The next step is to imagine *put-option* like liability rules: that is to say remedies that confer to one party both the holding of the entitlement and the power of forcing the counterpart to buy it at the strike price of damages. In Ayres and Godbart (2001) jargon, the option-holder is the *chooser* and the counterpart that may be paid damages (or maintain the entitlement) depending on the chooser's will is the *non-chooser*.

How are damages as option's exercise price determined? Damages awarded by the court are meant at compensating one party for the loss suffered. Given that the court does not usually know the exact valuation of the parties, it sets $D=\mu_B$ if the landowner pays damages to the builder and $D=\mu_L$ if it is the other way around. Of course, damages may be computed in other ways, however this way of computing damages is both positively descriptive –as the authority compensates at its best the victim for the loss suffered- and normatively efficient as this amount maximizes social welfare[8].

Let us now go back to the rules with the Calabresi and Melamed (1972) categorization:

Rule I: *The authority orders the restitution of the land to the landowner.*

This is a standard property rule. The authority acknowledges that the landowner is entitled to the land and orders the builder to remove the construction and (maybe) pay a sanction for encroachment (and/or for not respecting the court's injunction not to trespass). Under rule I, total payoffs are given by the evaluation of the entitlement by the builder that is equal, on average, to μ_L.

Rule II. *The authority orders the builder to choose between a) restituting the land or b) keeping the land and paying damages*

This is the optional characterization of the traditional liability rule. The authority recognizes the owner's entitlement to the land, however it does not order the builder to demolish but allows her to maintain the building upon the payment of damages. In optional words, the court confers a call option to the builder, option that she can exercise over the owner's entitlement at the strike price of the damage amount. If the builder's private evaluation is higher than the damage amount, she will choose b) exercising the call option, allocating the land to herself, paying damages, and still gaining the difference v_B-D.

Given the distribution $f_B(v_B)$, the option value for the builder is $\int_D^{\infty} (v_B - D) f_B(v_B) dv_B$

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[8] See Kaplow and Shavell (1996). To see why, suppose that the court opts for a rule II (see further in the text) and sets $D=\mu_L$. The builder will therefore take only when her own valuation is higher than the average evaluation of the landowner. Suppose instead that $D<\mu_L$, then transfers would happen for values below landowner's average evaluation, meaning that in some cases the entitlement would be moved from the party that values it more (the landowner) to the low valuing party (the builder). Conversely, with $D>\mu_L$ the landowner would retain the entitlement also in certain cases for which her evaluation is lower than the builder's one. Therefore optimal damages $D=\mu_L$ maximize the number of Pareto improving transactions and thus social welfare.

We have previously argued that optimal damages should be set equal to the mean evaluation of the non-choosing party. In this case the non-chooser is the landowner and her mean evaluation is μ_L, and therefore the value of the option under a rule II is $\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$.

If the builder's evaluation is below the damage amount she will opt for (a), thus returning the land. In this case the landowner regains an entitlement that she evaluates on average μ_L. If the builder opts for (b) the landowner is compensated exactly with μ_L.

Then total payoffs under a liability rule II are $E(\pi \ \ rule \ \ II)=\mu_L+\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$

Rule III: *The authority orders the builder to maintain the land and orders the landowner to dismiss her claims.*

This rule is the reverse of rule I. The court transfers the ownership of the land to the builder.

Under a rule III, total payoffs are: $E(\pi \ rule \ III)=\mu_B$

Rule IV: *The authority orders the landowner to decide between a) giving up her claims or b) paying the builder to have the land returned.*

Optimal damages should be set equal to μ_B. If the landowner evaluates the entitlement less than μ_B she opts for (a) and the builder retains an entitlement worth to her on average μ_B. If the landowner opts for (b) she gains on average $\int_{\mu_B}^{\infty}(v_L-\mu_B)f_L(v_L)dv_L$

Total payoffs are thus: $E(\pi \ \ rule \ \ IV)=\mu_B+\int_{\mu_B}^{\infty}(v_L-\mu_B)f_L(v_L)dv_L$

Rule V: *The authority orders the landowner to comply with builder's decision of either a) keep the land (in this case the landowner must dismiss her claims) or b) restitute the land (in this case the landowner must pay damages)*

In optional terms, the court confers to the builder both the entitlement and the put option that can be exercised at the strike price of the mean landowner's evaluation μ_L. If $v_B>\mu_L$ then the builder opts for (a) keeps the entitlement, otherwise she opts for (b), sells the entitlement and collects μ_L.

Total expected payoffs for Rule V are $E(\pi \ \ rule \ \ V)=\mu_L+\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$

Rule VI*: The authority orders the builder to comply with landowner's decision of either a) having the land restituted (in this case the builder must dismiss her claims) or b) keep the land (in this case the builder must pay damages)*

The court gives the entitlement to the landowner as well as a put option to force the builder to buy the land at the strike price of her mean evaluation μ_L. The landowner keeps the entitlement if $v_L>\mu_B$ otherwise it sells the entitlement and collects μ_B.

Total expected payoffs for Rule VI are: $E(\pi \ \ rule \ \ VI)=\mu_B+\int_{\mu_B}^{\infty}(v_L-\mu_B)f_L(v_L)dv_L$

Rule VII: *The authority orders the builder to 1) pay initial lump-sum damages and 2) then decide whether to a) return the land or b) keep it and pay additional compensatory damages.*

Under rule VII the authority gives the entitlement to the landowner, the call option to the builder and obliges the builder to transfer an amount T of money to the landowner before her final allocative decision. Then, if $v_B<\mu_L$, she opts for a) and return the land to the landowner. If $v_B>\mu_L$ the builder keeps the land, transfers μ_L to the landowner and gains $\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$.

The landowner in case (a) gets T and the entitlement of average value μ_L and in case of (b) she gets the transfer T plus transfer μ_L

The initial lump sum transfer from the builder to the landowner does not necessarily zero the expected payoffs[9] for the builder but it is at least over compensatory for the landowner in respect to a simple rule II without affecting its allocative incentives. Rule VII has some interesting proprieties: the builder pays something to the landowner regardless of its decision. The rule biases the distribution further in favour of the landowner in such a way as to compensate her fully for the loss of control over the entitlement. In a sense it reaches a distributive outcome that is the opposite of the put implementation of rule V where the builder has both the entitlement and the option. Nevertheless incentives to take or not to take for the builder are the same, and still the builder only takes whenever her evaluation is greater than the average evaluation of the landowner.

As for rule II and rule V, total payoffs are $E(\pi \ \ rule \ \ VII)=\mu_L+\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$

although they are redistributed differently between the builder and the landowner.

Rule VIII. *The authority orders the builder to 1) pay initial lump-sum damages and 2) comply with landowner's decision to a) having the land restituted (in this case the builder must dismiss her claims) or b) keep the land (in this case the builder must pay additional compensatory damages)*

Rule VIII has both the put option and all of the payoffs assigned to the landowner and thus it is very favourable to her. In fact the builder is likely left with a negative payoff (unless $v_B\geq\mu_B+T$). Since rule VIII is a *landowner as the chooser rule* total payoffs will be equal to the one produced by rules IV and VI.

	Damages amount and allocation (who should pay what)		**Payoffs**	
	Builder	**Landowner**	**Builder**	**Landowner**
Rule I	-	-	0	μ_L

[9] In the original formulation of the *pay or pay* rule in Ayres and Goldbart (2001) initial damages T are set equal to the value of the option $\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$ to be exercised by the builder. When the builder opts for (b), the landowner gets μ_L + $\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$ while if she opts for (a) the landowner keeps something she evaluates on average μ_L plus the initial transfer. In either case the landowner appropriates all payoffs of the transaction. It should be noted that the task the authority is asked to accomplish -tailoring the amount of damages on the value of the call for the builder- is cumbersome: if the court can really compute the value of the option, it means that it knows the private evaluation of the builder and thus the information harvesting effect of liability rules (see Kaplow andShavell, 1996) is forgone since the allocative choice of the chooser reveals an information the court already knows. Knowing the private evaluation of parties, the court can directly allocate it to the one who values it the most.

Rule II	μ_L		$\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$	μ_L
Rule III	-	-	μ_B	0
Rule IV		μ_B	μ_B	$\int_{\mu_B}^{\infty}(v_L-\mu_B)f_L(v_L)dv_L$
Rule V		μ_L	$\mu_L+\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$	0
Rule VI	μ_B		0	$\mu_B+\int_{\mu_B}^{\infty}(v_L-\mu_B)f_L(v_L)dv_L$
Rule VII	$T+\mu_L$		$\int_{\mu_L}^{\infty}(v_B-\mu_L)f_B(v_B)dv_B$ -T	$T+\mu_L$
Rule VIII	$T+\mu_B$		-T	$\mu_B+T+\int_{\mu_B}^{\infty}(v_L-\mu_B)f_L(v_L)dv_L$

Figure 1: In the second and third columns we show which party ought to pay damages and transfers according to each rule. In the last two columns, we show how total payoffs are distributed between the two parties.

Notice that total payoffs under Rule II, Rule V and Rule VII – when the builder is the chooser- are the same. So it is for Rule IV, VI and VIII –when the landowner is the chooser- although the payoffs are distributed strikingly different under either the put and call implementation of the two groups of rules. The same level of social welfare is achieved under opposite distributive outcomes, this only by choosing the remedies either in the form of put call or other more complex rules (such as rule VII and rule VIII described above).

These eight theoretical rules will be used later on to analyze the way different national laws address building encroachments. It should be noted that the theory of optional law developed by Ayres & co-authors allows the construction of rules for each possible division between the parties of the total payoffs with both put and call implementations of the same allocative outcomes.[10]

2.2 Normative criteria to rank the rules

The analysis developed by Ayres and Goldbart (2001) not only offers a rich menu of liability rules the authority can pick from, but also proposes a normative criterion to choose the rule that best maximizes social welfare. The recipe of optional law is that, in order to maximize social welfare i) optimal damages should be set equal to the entitlement's evaluation of the non-choosing party and ii) the decision to choose (and therefore the put or call option) should go to the party that has the most speculative evaluation of the entitlement (see appendix 1 for the derivation of the results).

A normative efficiency criterion. Optional law suggests to adopt a rule that confers the choice of final allocation to the most efficient chooser. Who, between the builder and the landowner, is the most efficient chooser? If the answer to this question must be given case by case, then optional law becomes burdensome to courts. In fact we can easily notice that all rules stylized above are potentially efficient

[10] This is is the "convexity" result of Ayres and Godbart (2001). The authors demonstrate the theoretical existence of a double continuum, one for call and one for put implementation, of rules that without affecting the allocative decision of the chooser, distributes smoothly the expected joint payoffs between the parties.

depending on certain assumptions[11] and therefore judges must gain knowledge of private evaluations of the parties. Therefore the relevant question becomes: is there any specific characteristic of the cases of building encroachments that can lead us to consider the builder regularly as a better chooser vis-à-vis the landowner (or vice versa) and therefore lead us to consistently choose a rule over another in terms of allocative efficiency?

We argue that *builders have more speculative evaluations than landowners.* It seems reasonable to argue that the builder has a more speculative evaluation of the entitlement, that is to say that the distribution of the evaluation of the builder has a higher variance vis-à-vis the one of the landowner *($\sigma_B > \sigma_L$)*. This is because builder's expectations of future returns are based on a risky investment while the landowner usually has a past consistent stream of income to measure with. More important, one may argue that the construction business is usually more speculative and uncertain than the businesses linked with the use of the land, especially if used for agricultural purposes. [12]

If the builder is the party that has the more speculative evaluation of the entitlement, than she is the one that, on average, triggers the generation of higher joint payoffs and, therefore, the authority should pick a rule that delegates her the decision over the final allocation: namely either a Rule II, a Rule V or a Rule VII. Rules that have the landowner as the chooser (IV, VI and VIII) generate inferior aggregate payoffs and the two property rules (I, III) still lower ones.

A normative equity criterion. Optional law offers us guidance on how to pick the correct rules in terms of efficient allocation and leave us choice in terms of which rule achieves an unspecified distributive goal. Which one of the three efficient rules mentioned above should be picked depends on the distributive concerns of the authority. Prima facie, there seems to be a strong argument to favor the landowner; after all, she suffered an impairment and may be forced to give up the land non-consensually without having held any active role on her side to make the encroachment arise. The rule

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[11] At a first glance, one might think that property rules are always less efficient than liability rules because they lack any option and the relative value to its holder. However in the limit case for which the variance of the distribution is zero, the value of the option is also zero and the property rule is as efficient as the liability rule.

[12] An alternative normative ranking criterion could -someone may argue- be derived from the observation that *landowners have higher evaluations of their lands.* Landowners after all, -so the argument may proceed- are the ones that have the greatest evaluation of their land, not least because if it were otherwise they would have transacted it away. Strong defense of land property is often based on the presumed superior capacity of owners to evaluate the risks of their investments in land (Smith, 2004) and also to the idiosyncratic value they attach to their property (see also note 6). In more formal terms this alternative hypothesis implies that $\mu_L > \mu_B$, that is to say that at least on average, landowners have an higher evaluation of the land vis-à-vis builders. We also hypothesize $\sigma_B = \sigma_L$ not least because otherwise it would not be alternative to our main criterion. What does this mean in terms of our ranking of rules?

We have seen how the relative efficiency of putting the option in the hands of the builder or the landowner does not depend upon the means of the two distributions. And given the fact that the variance is the same, then also the value of the options, regardless of their peculiar implementations is the same. Therefore we cannot assess which rule is best as all rules look equally efficient (although they distributional outcomes are obviously different). There is one limit case: assuming that the evaluation of parties are precisely known (so $v_L = \mu_L$ and $v_B = \mu_B$ and also $\mu_L > \mu_B$) then a property rule I that leaves the property in the hand of the landowner is what it is needed to achieve first best allocations under the assumption that there is no bargaining in the shadow of the law, otherwise even Rule III is equally efficient. Indeed, even under any other liability rule with damages set at the non-chooser mean value, the allocation would be exactly the same (in fact if there is no variance in the evaluation, the option is not valuable any longer) thus property rules may be preferable because of lower administrative costs (Calabresi andMelamed, 1972; Smith, 2004). However, it seems quite implausible that the court perfectly knows private evaluations and that the private evaluations of landowners always exceed the one of builders. To conclude, we cannot derive a ranking criterion from the hypothesis that that *landowners' evaluations exceed on average builders' ones* (with equal variance). We have seen that this hypothesis does not offer guidance to single out efficient rules as all rules are equally efficient except for case where landowner' valuation is known to be exceeding builder's one with certainty by the court (a fairly strict assumption); a case for which a rule I achieves first best allocation.

more favourable to the landowner is Rule VIII that confers her the put option as well as the lump sum transfer in addition to damages. At the bottom end of the rank there is Rule V that deprives the landowner of the entitlement to the land and subdues her to builder's allocative will.

Given our two normative criteria, the rules can be ranked in allocative terms (with *builder as the chooser rules* dominating both the *landowner as the chooser* ones and the property rules) and in distributive terms (ordering them according to which ones are more favorable to the landowner) as in Figure 2.

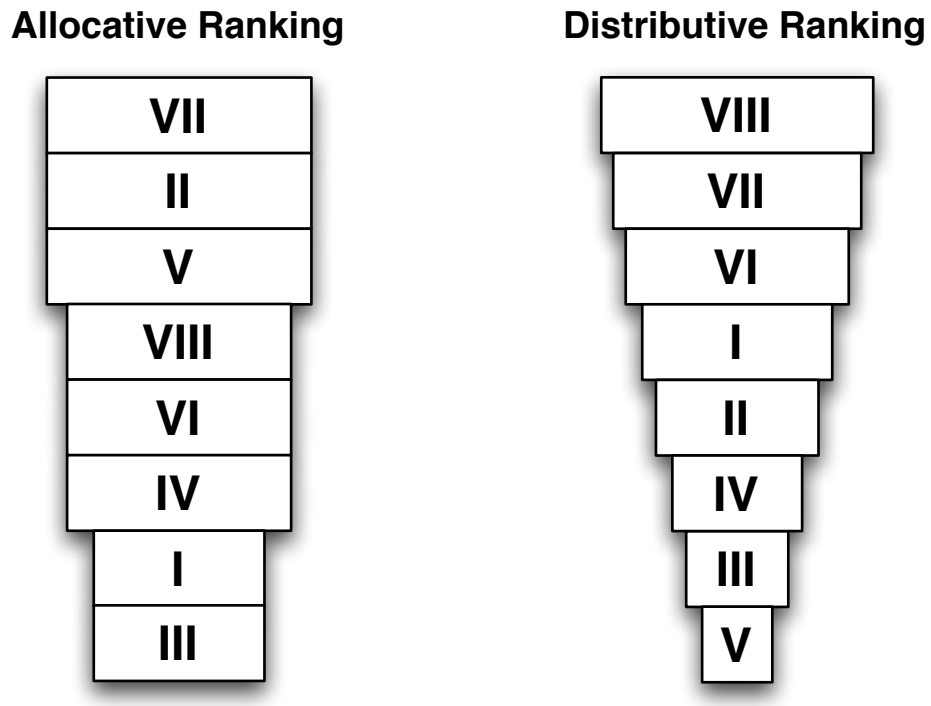

Figure 2: In the first column the rules are ranked according to an allocative criterion (under the assumption that the builder is the more efficient chooser and that the builder and the landowner have the same mean evaluation) and in the second column they are ordered also according to a distributive criterion with the most favorable rules to the landowner on top.

To conclude the paragraph, we have formulated two reasonable normative criterion for ranking rules: the first one –based on the assumption that builder have more speculative evaluations- leverages on optional law and allows us to rank the rules in efficiency terms. The second one is based on the straightforward equity consideration that blameless landowners should not be left worse off. We have now a normative ranking of theoretical rules that will help us to evaluate the efficiency of national laws as they are going to be disentangled in the next section.

3 Building encroachments in different national laws

We have so far presented an entire menu of rules that a hypothetical authority may use in order to allocate an entitlement efficiently and also in accordance with some pre-determined distributional preferences. We now look at how different national legislations address cases of building encroachments. We refer specifically to some civil law legislations such as the French, German, Norwegian, Swiss, Portuguese and Italian rules and to the American rules as well. In analyzing building

encroachment laws we see a variety of rules across different legislations that cover almost the entire spectrum of optional rules presented before.

In addressing building encroachments, remedies range from stringent protection of landowners' property rights, to fictious contracts such as easements or leases and the subsequent payment of permanent damages calculated with a great deal of creativity, to forced sell of the land. Although substantive property law is remarkably constant across different legal systems (Mattei, 2000), this is a corner where we see a peculiar variation. We here present a synthesis of the rules of some countries both of civil law and common law traditions. The codes, which the synthetic rules are built upon, are presented in the appendix 2.

French law. *Rule I*

There is no distinction between encroaching buildings emanating from a builders' property and those erected entirely on landowner's property. Therefore the stringent property rules in favor of the landowner usually apply[13]. The French law is a simple property rule I. We have seen that it can be efficient only under the assumption that $\mu_L > \mu_B$ and that the evaluations are precisely known by the court. If this is the case, the court assigns the land directly to its most efficient user. Under less stringent assumptions however, property rules are dominated in terms of efficiency by all other liability rules (Kaplow andShavell, 1996; Ayres, 2005). In distributional terms, the rule obviously favors the landowner, however, both rule VI and rule VII would achieve higher welfare and a distribution more favorable to the landowner than rule I itself.

Italian law. *t_0) Rule I. If conditions [a) emanating building b) good faith c) 3 months elapsed] are all met then t_1) either Rule VII or VIII are applied. Damages:twice the market value; T:compensation for damages.*

The landowner can eject the builder within three months from the beginning of the construction (Rule I). After this period, and under the presumption of good faith, the court can assign the occupied land to the builder and force her to pay damages to the landowner. Therefore both the builder can ask the judge to force the landowner to sell the land (rule VI) and also the landowner can ask the judge to force the builder to buy the property (rule VIII). As a rule VI, the Italian law confers the decision over the allocation of the entitlement to the builder that is the most efficient chooser. Used as a rule VIII instead, it achieves lower allocative outcomes as it rests on the decision of the landowner. The use of the Italian

[13] The Spanish code is equally strong on the applicability of a straight property rule I (see rule included in the appendix). However, there seems to be a large gap between what the civil code says (it mandates the straight application of Rule I) and what judges actually do in courts where they usually apply rule II if the following conditions are met: a) the building must be built for its large part on the builder's own property; b) the destruction of the part of the encroaching building is uneconomical; c) the value of the building must largely exceed the value of the occupied land; d) the builder was in good-faith. (Peña Bernaldo De Quirós, 2001, pg 227). See also Roldán (1985).

rule as a put-option can be understood in distributional terms since the rule VIII confers all payoffs to the landowner. [14]

Damages are set by the law at "*double the value of the area occupied as well as compensation for damages*" The damage measure can be divided in two parts: the *doubled value* is the exercise price of the option the *compensation for damages* is the lump-sum transfer that must be paid even if the builder eventually returns the land. The damage measure is very favorable to the landowner. A large compensation is not necessarily an inefficient idea: if the builder faces a rule VII, she transfers to the landowner more wealth than optimal damages, however she does so without affecting her allocative decision since part of this wealth is transferred regardless of the decision. The Italian rule however have both the double damages that are transferred only if land is taken and the fixed damages transferred regardless. The lump sum transfer thus looks fine both from the allocative and distributive point of view but the *doubled market price* measure is arguably overcompensatory: it causes builders to take too few times.

Swiss law. *t_0) Rule I. If conditions [a) emanating building b) good faith c)mannerless time elapsed] are all met then t_1) if [d)negligible impairment] than Rule III otherwise Rule II. Damages:adequate.*

The landowner can eject the builder only if it acts in a timely manner (property rule I). Otherwise, and presuming she acted in good faith, the builder can obtain an easement for negligible encroachments (property rule III) and force the landowner to sell the property against adequate compensation for larger encroachments (liability rule II). Damages are meant to be "*adequate*".

The Swiss rule seems to privilege the allocative aspect of building encroachments. In fact when the lost is negligible for the landowner, the transfer is simply set via a property rule III and when the encroachment is more substantial, the landowner cannot aspire to obtain anything more than adequate damages under a rule II; a rule–we have seen- among the best in allocative terms but not the most favorable to the landowner.

Portuguese law. *t_0) Rule I. If conditions [a) emanating building b) good faith c) 3 months elapsed] are all met then t_1) Rule VI. Damages:value of the land+ devaluation –if existent- of the remaining land; T=repair for the resulting prejudice.*

The landowner can eject the builder within three months (rule I). After that and under the assumption of good faith, the builder can force the landowner to sell the land (rule VI). The formulation of the damage measure is particularly detailed and can be disentangled in the exercise price set at the *value of the land* and *as well as compensation for the devaluation –if existent- of the remaining land* while *damages that repair for the resulting prejudice* must be paid regardless of whether the builder eventually buys.

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[14] Under Italian Law, also the state (and not only private citizens) can acquire property through the institute of inverted accession (see the Supreme Court of Cassation ruling n.1464 of 26-feb-1983 and n. 8597 of 29-aug-1998). It is technically distinct from expropriation (taking). It is worth noticing that, in such circumstances there is no need for the state to prove the emanation of the accession from an adjoin property. Moreover, the state does not pay double damages as would be the case for a private party under art. 938. CC but the much lower compensation envisaged by the norms on takings. If our intuition (see further in the text at section 4) that the requisite of emanation is a filter against the opportunistic use of the law by the builder is true, somebody supporting the idea of a benevolent state may argue that –correctly- this requisite is not necessary when the "builder" happens to be the public authority. However, inverted accession has been often used as a shortcut in order to circumvent some safeguards for the landowner embedded in the norms on takings. Thanks to Maurizio Pontani for the pointer

Norwegian Rule[15]**.** *t_0) Rule I. If conditions [a) emanating building b) good faith c)costs of keeping<benefits of destroying] are all met then t_1) either Rule II or VI are applied. Damages:damage or nuisance incurred.*

The landowner is granted a property rule I unless the removal or correction of the building entails expenses and losses that are disproportionate to the benefits gained and unless the builder operated in good faith. If both conditions apply, then both the builder and the landowner can force the transfer of the entitlement to the builder (by mean of an easement) respectively by asking the authority to apply a Rule II and/or a rule VI. Damages are set at the measure of compensatory damages, however if *the structure was originally placed unlawfully on the neighbouring property* then damages are set at gain-stripping level in such a way as to make the builder disgorges all the gains from the encroaching building. The Norwegian law stands out for this explicit cost-benefit test that -if passed- triggers the switch between a property rule I and one of the two liability rules.

German rule. *t_0) Rule I. If conditions [a) emanating building b)builder in good faith c) builder not in gross negligence d) landowner did not object before or immediately after] are all met then t_1) either Rule II or VI are applied. Damages for rule II:compensatory damages; damages for Rule VI:land market value at the time of the encroachment.*

If the landowner fills an objection before or immediately after the encroachment, it can obtain the ejection of the builder (rule I). If it fails to object and under the presumption that the builder is in good faith and absent gross negligence, the builder may retain the building by paying annual damages (rule II). The landowner can force the sell of the occupied land and recover the value of the land at the time of the encroachment (rule V).

The German law, similarly to the Italian and Norwegean, envisages the use of both a put option and a call option: while the first one is preferable under an allocative point of view, the implementation of the second can be supported by distributional considerations. Note that while under rule II the builder must pay annual compensatory damages that can be waived by contract, under the rule VI the landowner can force the purchase of the land to be recorded in the land registered. Although this difference might be minimal in economic terms, its legal ratio shows how the law has strong distributional preferences for the landowner (conferring her a put option) and imposes upon her the duty to tolerate builder's encroachment only as long as it is strictly necessary (rule II ceases when the encroachment ceases as well).

American rule.

The American rule is here stylized upon the *Corpus Juris Secundum's* synthesis of dozens of cases and statutes. As such the boundaries of the rule are wide and cover the declinations that all other rules take. It is thus difficult to use the American rule to assess its distributive and allocative implications as all cases under each statute and national precedent would need to be disentangled.

As a general matter, what can be derived by the *Corpus Juris Secundum* is that the judge does not recognize landowners the typical property remedies (rule I) such as ejectment if any of the following conditions hold: *the encroachment is slight, there is no evidence that the defendant acted willfully, the encroachment was due mainly to a predecessor in title of the defendant, or the burden of removing the encroachment substantially outweighs the benefit, an order to remove the encroachment is improper.* In all these cases liability rules in the form of easement, lease and damages are granted. There can be several damage measures: if damages are permanent, they can be set equal to the difference in value of

[15] I must thank Endre Stavang for the pointer

the land with and without the building encroachment. If they are temporary they could resemble the reasonable rental value for the land. They are however flexible as to be as much compensatory as possible.

4 Searching for the best solution to building encroachments

There certainly are many similar characteristics and commonalities that are worth emphasizing and are schematized in Figure 3.

Emanation: There is a difference if the building is wholly or only partly erected on the neighbour's land, thus on whether it emanates from a legitimate construction or it is a stand-alone unlawful structure built entirely on other's land. In all codes analyzed, there exist general provisions that address the case of structures entirely built on someone else property and they all threat them severely as the French law. However all legislations, except the French one, have specific provisions for the subset of encroachments that emanate from a construction on an adjoin land.

The Norwegian rule stands apart: a liability rule still applies to stand alone structures but damages are set at a gain-stripping measure instead of a compensatory one. Gain-stripping measures are more punitive for the builder and usually back property rules type of remedies. Therefore, although the rule is technically a liability rule, its goals more closely resemble the ones of property rules (Rizzolli, 2008).

Why is the special treatment of the encroachment granted conditional to the emanation requirement? It is arguable that the emanation condition reinforces the credibility of the non-strategic use of the encroachment by the builder: while it is reasonable that a neighbor slightly encroaches by mistake, it is unlikely that a neighbor or even less a stranger happens to build by mistake entirely on one's property. Absent this condition, the builder could try to build on other's land hazarding that the landowner would not notice it in time to seek ejectment. The condition of emanation thus limits the opportunism of the builder.

Intentionality: In order to obtain any favorable measure (something that is not ejectment), the builder must have acted with good faith. How is it possible to erect a structure by mistake? This may occur due to incorrect surveys, guesses or miscalculations by the builders and/or the landowner[16]. Usually the burden of proving that the builder was not in good faith rests on the landowner. The requirement of good faith prevents the builder from strategically anticipating the granting of a liability rule and thus using encroachments as a mechanism of appropriating the landowner's property non consensually. Good faith implies that the builder has not acted with the purpose of forcing the landowner to sell but only as a consequence of a mistake (see also note 19). The good faith condition again limits the opportunism of the builder.

Time: Usually, the more time elapses between the beginning of the construction and the objection of the landowner, the less likely the landowner is to obtain the full property rule I. After a relatively short amount of time (*three months* in the case of the Italian and Portuguese case, *immediately after* in the German one), the property rule switches to one of the liability rules. The ratio seems to imply that, after a reasonable amount of time, the builder may have operated non-trivial and irreversible investments and therefore it would be socially wasteful to mandate it to undo the building all together. Better weight these costs against the costs for the landowner of giving up her entitlement and being compensated for the loss suffered. Absent this condition, a landowner may find convenient to wait for the builder to accumulate specific investments and then seek to hold her up by treating ejectment. Conversely, the

[16] Notice that the German rule also adds gross negligence to the factors limiting the applicability of the rule.

short time limit induces the landowner to come up early if she wants to maintain the land or wait and seek instead monetary compensation. Contrary to the previous ones, the short time condition serves the purposes of keeps in check the potential opportunistic behavior of the landowner.

Relevance and cost-benefit test. The more negligible is the encroachment for the landowner and the more burdensome is the removal of the encroachment for the builder, the more likely the encroachment will be remedied via a liability rule. This variable is explicitly considered in both the Swiss and American rules. A more sophisticated variant, that considers the costs of destroying builder's investment to be weighted against the gains of restoring landowner's property is present in the Norwegean law. In both variants, the ratio seems pretty much straightforward: the more negligible is the encroachment, the more the costs of undoing the investments must be weighted against in terms of social welfare. However there might be a slight difference upon whose opportunistic behavior the two conditions are meant at. The relevance condition seems to target the landowner willing to make a great deal out of a negligible encroachment while the cost-benefit test seems to be also meant at builders whose encroachments are less valuable than the impairment they caused and nevertheless want to pursue with the construction (maybe in the hope of forcing the landowner to bribe them out).

	condition: emanation	**condition: builder's good faith**	**condition: short time notice of the landowner**	**condition: relevance /cost-benefit**	**Damages as the option exercise price**	**Damages as lump sum transfer**	**rules applied if conditions are not met**	**rules applied if conditions are met**
French	no	-	-	-	-		rule I	
Italian	yes	yes	3 months	no	twice the market value	compensation for damages	rule I	rule VII, VIII
Swiss	yes	yes	timely manner	yes	compensatory		rule I	rule II, III
Portuguese	yes	yes	3 months	no	value of land	compensation for resulting prejudice	rule I	rule VII
Norwegian	yes	yes	no	yes	compensatory/ gain-stripping		rule I	rule II, VI
German	yes	yes	before or immediately after	no	compensatory/market value		rule I	rule II, VI
American	yes	yes	yes	yes	market value		rule I	rule II?

Figure 3: In this table we can recognize some patterns between the rules as well as the main differences.

Amount of damages. Damages are computed in many ways. We must however distinguish between those damages transferred regardless of the final allocation of the entitlement from those that need to be paid only if the ownership eventually changes. As for the former type, this lump-sum transfer is envisaged by both the Italian and the Portughese laws and it is computed for instance by looking at the damages suffered during the temporary impairment. As for the later type, we have previously seen how optimal damages should be based on the non-chooser mean valuation of the entitlement. This can be approximated by a standard compensatory measure of damages that is often found in the laws here analyzed (see in particular the Swiss and Portughese laws). Other laws seem to favor a *market value* measure of damages: a measure that refers to a recurrent price of the land practiced by intermediaries. Both ways have their arguments for and against. Determining exact compensation of idiosyncratic values is a daunting task for authorities especially, when they attempt to compensate idiosyncratic valuations that are often attached to long lasting ownership of land. On the other hand, a market value is difficult to assess in thin markets characterized by low homogeneity and substitutability of traded goods such as the land market. There are some peculiarities: the German law seems to apply a compensation measure of damages if the builder opts for the periodical payments but switches to a market value measure if it decides to redeem the land. The Italian rule instead, sets the amount of damages equal to *double the value of the land occupied;* perhaps an excess of care towards the impairment suffered by the landowner (see note 8 on why this measure is *excessive*).

Once all these conditions are put together we can see how these laws are crafted in such a way as to filter the cases for which building encroachments' provisions are applicable. The law strives to keep two opportunistic behaviors by both the builder and the landowner at bay. On one hand a strong rule favoring the landowner induces her to wait for the builder to accumulate specific investments and then try to hold the builder up. On the other hand a weak rule may induce the builder to venture into the construction on other's land anticipating a non-consensual acquisition of the property.

These laws all follow the same scheme: by default they attempt to defend landowner's interests with a property rule I and only if i) the landowner behaves negligently or opportunistically (she "forgets" to seek ejection in a timely manner and asks unreasonable compensation) and ii) the builder proves the encroachment is an unintentional mistake (she proofs emanation and her good-faith) then they switch to rules that allow for a non-consensual transfer of the land to the builder.

It is in this last part of the scheme where we see the great variation among the laws. After the switch takes place, laws differ widely in the type of rules they implement and the way they assess damages. Most laws include rules II (Swiss, German, Norwegean American), some a more vigorous variant of it that is the Rule VII (Italian and Portuguese) some (German and Norwegian) have also a put-option style rule VI, Italian law even embeds a stronger variant of the put-option rule (rule VIII) and at least one (Swiss law) also has a property rule III[17]. Why is this the case? Which one is more efficient? And which one best fulfils our normative equity criteria?

Accepting our normative efficiency criterion (that states that the builder is the most efficient chooser), all national laws that embed in one way or another a rule II produce the highest total payoffs. Rule II however ranks middle ground under an equity point of view as it penalizes somewhat the landowner in

[17] we should not forget that the doctrine of adverse possession, that recognizes a rule III after *n* years of continuous open and hostile possession lays in the background of all the rules mentioned here. See further in section 4.1 on the relation between building encroachments and adverse possession

distributive terms. Rules VII and V would be equally efficient. For what concerns the former rule, we have seen laws (such as the Italian and Portuguese) that envisage the *lump-sum transfer* damages in addition to *options's exercise price* damages to be paid only if the builder finally acquires the land. The initial transfer transforms a rule II in a rule VII and biases the distribution towards the landowner without affecting the allocative decision of the builder. As for Rule V we have not encountered any. In fact rule V, although efficient, shoulders the distributional burden of the allocation totally on the landowner. On equity grounds this seems unacceptable. The absence of rule V is however not the end of put options. Rule VI, that mirrors rule V with the put option in the hands of the landowner, is found in both the German and Norwegian rules. Under our criterion this rule is less efficient then the three seen before, but it is at least distributionally acceptable as it concentrates the gains in the hands of the landowner. The Italian law implements rule VIII, a stronger variant of rule VI, On distributive ground, both rule VI and VIII are more preferable than rule II and this might explain why they surface as competing rules in the Italian German and Norwegian systems. Rule III is only applied in the border cases of minimal encroachments although as we will see shortly, rule III lays somewhat in the background of all rules as it intervenes in case of adverse possession once the statutes of limitations expire.

4.1 Building encroachments and adverse possession

Before moving to the conclusions it is necessary to clarify how cases of building encroachments stand against other fundamental cornerstones of property law: the doctrine of adverse possession and -its equivalent in civil law systems- the doctrine of *usucaption*. By the virtues of adverse possession, most property laws allow long-standing, persistent encroachers to acquire title of land after some time has elapsed without the actual owner having actively sought to regain legitimate control of the property.[18] The law thus already provides a mean –albeit rough- of resolving conflicts arising from building encroachments: the landowner must prevail by mean of a property rule I until the statute of limitations under the doctrine of adverse possession shifts the entitlement to the builder and enforces it through a property rule III. In between these two distant and opposite outcomes of the conflict, civil codes and common law provide smoother tools of addressing building encroachments.

Inverted accession or other similar doctrines addressing building encroachments differ from adverse possession in many ways: first, building encroachments are applicable only to structures emanating from an adjoin land whereas adverse possession has much broader applications. Second, the time-length is considerably shorter (few months against multiple years). Third, good faith and other conditions must be fulfilled in order for building encroachments' doctrines to apply whereas under

[18] The doctrine of adverse possession is a common core principle in most property laws (Mattei, 2000): After a number of years of *actual, open and notorious, exclusive, continuous and hostile* possession (Miceli andSirmans, 1995) the law assigns the title of land to the trespasser. Adverse possession is not a simple statue of limitations that isolates the encroachment from action of the legitimate owner but it is also a transfer of title from the owner to the encroacher (see Miceli andSirmans, 1995; Stake, 2001). There exist a considerable variation among national laws on the time-length: the term is 5 years in California , 12 years in England, 20 years in many countries including Italy and much of the US, 30 years in Luisiana, France and Germany (Netter *et al.*, 1986).

adverse possession good faith at most triggers shorter statutes of limitations.[19] Fourth, while adverse possession is an abrupt switch from a rule I to a rule III, building encroachments make a wider use of liability rules. Foremost the scopes of the two doctrines diverge: while adverse possession is a tool that -inter alia- clears titles and triggers the productive use of land (Miceli andSirmans, 1995; Baker *et al.*, 2001), remedies to building encroachments are measures meant at conciliating the incentive of the landowner to hold-up the builder with its legitimate claim of not being made worse off by the builder's negligent trespass.

5 Conclusions

Building encroachments represent a peculiar niche of property law. If ownership is fully enforced, then the building must be taken down; but if the building is kept standing, then the encroachment is not addressed and property is undermined. In this context both parties may behave opportunistically: the builder may *try to build* in the hope of obtaining a non-consensual transfer of property and the landowner may be tempted to *wait and see* the builder accumulating specific investments in the hope of holding her up later on. This tension has stimulated authorities to come up with a range of legal remedies that explore almost entirely the spectrum of Ayresian's optional rules.

All laws considered have in common a filtering mechanism that try to screen and prevent the strategic use of encroachments by both parties to the conflict. These filters are based on some combinations of the following requirements: i) good faith (the builder must ignore she is building on other's land); ii) the condition that ejectment is granted if the landowner asks it timely (the builder must stop building if the landowner asks so within a limited period from the beginning of the construction), iii) the condition that the investment is not negligible or that builder's investment is not inferior to landowner's impairment and iv) the condition that the building emanates from the builder's land. If these conditions are not met, then the encroachment is always addressed simply with a property rule I that fully restores landowner's rights. If conditions are met then different national statutes take different routes. Why do we see this degree of variety? Our answer is that the variety spurs from the tension between the allocative and the distributional concerns of the authority. On allocative ground, holding true the normative criterion that builders generally have more speculative evaluations of the land, we prefer rules where the builder chooses the final allocation of the land. On equity ground however, the inclination of lawmakers is to let the landowner to be fully compensated; the landowner after all, has been the passive subject of the encroachment. In allocative terms rules II, V and VII are more efficient than rules IV, VI and VIII. Least efficient are the two property rules. However, on distributional grounds, a rule VIII is preferable to a Rule VI that is in turn preferable to a rule I and so on (see Figure 2). On distributional grounds we can thus justify the implementation of put option rules in some of the rules we have seen; quite an oddity in property law.

Efficient allocation or just distribution? This seems to be the irreconcilable puzzle that lies at the bottom of these different rules. This does not need however to be necessarily the case. To begin with, notice that rule II that is embedded in some of the rules analyzed here, ranks top in the allocative

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[19] There are diverging views on what role the good faith requirement plays in adverse possession. While most scholars reject the idea that the applicability of adverse possession should depend on trespasser's intent (however see Merrill (1985) advocating a good-faith standard and Fennell (2006) for an argument in favour of a bad-faith requirement), most judges in American courts have constantly made their decision about granting adverse possession depending on the trespasser's state of mind (Helmholz, 1983) By the same token most adverse possession provisions in civil codes recognize that, in case of good faith possession, the time requirement is reduced at a rate that varies among legal systems between one-third (Germany and France) and one-half (Italy).

ranking and fairly bad in the distributional ranking. This suggests that, after all, rule II has been correctly understood as being efficient but also quite unfair. Fairer than this –so the German Norwegean and Italian legislator may have hypothetically thought- there could be rule VI and VIII that squeezes distribution further in favor of the landowner but let's the allocative decision resting in the hands of the wrong part. Interestingly, there is a rule that is as favorable to the landowner as rule VI without being less efficient than rule II: it is the rule VII, that envisages a transfer from the builder to the owner and it is paid regardless of the final builder's decision over the allocation of the land. We find traces of this rule in the Portuguese and in the Italian statute (this last one however fails to be efficient in the way it determines damages).

The normative contribution of the paper can thus be synthesized with the Ayresian suggestion of implementing rule VII more widely whenever we have a party at fault (thus in need to be penalized distributionally) that is nevertheless the most efficient chooser.

On the positive side, the modest accomplishments of the present paper are twofold: it casts light on this area of the law, contiguous to adverse possession although far less explored by scholars, and it spots some put-option rules in the context of property law, the very existence of which has been –the word fits well- *ruled out* by leading property scholars.

6 Appendix 1: Derivation of first normative criterion

The resent appendix follows closely the derivation of the convexity result in Ayres & Goldbart (2001).

Because of the put-call parity proprieties of options[20] the equation of the total payoffs for rules with the builder as the chooser (rule II/V) can be also rewritten as

$$(1) \qquad E(\pi \ \ builder \ \ is \ \ the \ \ chooser) = \mu_L + \int_{\mu_L}^{\infty} (v_B - \mu_L) f_B(v_B) dv_B = \mu_B + \int_{\mu_B}^{\infty} (v_B - \mu_B) f_B(v_B) dv_B$$

Note that μ_L is the exercise price, $\int_{\mu_L}^{\infty} (v_B - \mu_L) f_B(v_B) dv_B$ is the value of the call option, μ_B is the average builder's evaluation of the entitlement and $\int_{\mu_B}^{\infty} (v_L - \mu_B) f_L(v_L) dv_L$ is the value of the put-option.

By the same token the equation of total payoffs for rules for which the landowner is the chooser can be rewritten as:

$$(2) \qquad E(\pi \ \ landowner \ \ is \ \ the \ \ chooser) = \mu_B + \int_{\mu_B}^{\infty} (v_L - \mu_B) f_L(v_L) dv_L = \mu_L + \int_{\mu_L}^{\infty} (v_L - \mu_L) f_L(v_L) dv_L$$

we have now two equations, (1) and (2) that describe the relative efficiency in terms of total expected payoffs of the two sets of rules: the *builder as the chooser* one and the *landowner as the chooser* one.

$$\begin{cases} (a) \quad \mu_L + \int_{\mu_L}^{\infty} (v_B - \mu_L) f_B > \mu_L + \int_{\mu_L}^{\infty} (v_L - \mu_L) f_L \\ (b) \quad \mu_L + \int_{\mu_L}^{\infty} (v_B - \mu_L) f_B > \mu_B + \int_{\mu_B}^{\infty} (v_L - \mu_B) f_L \\ (c) \quad \mu_B + \int_{\mu_B}^{\infty} (v_B - \mu_B) f_B > \mu_B + \int_{\mu_B}^{\infty} (v_L - \mu_B) f_L \\ (d) \quad \mu_B + \int_{\mu_B}^{\infty} (v_B - \mu_B) f_B > \mu_L + \int_{\mu_L}^{\infty} (v_L - \mu_L) f_L \end{cases} = \begin{cases} \int_{\mu_L}^{\infty} (v_B - \mu_L) f_B > \int_{\mu_L}^{\infty} (v_L - \mu_L) f_L \\ \mu_B - \mu_L < \int_{\mu_L}^{\infty} (v_B - \mu_L) f_B - \int_{\mu_B}^{\infty} (v_L - \mu_B) f_L \\ \int_{\mu_B}^{\infty} (v_B - \mu_B) f_B > \int_{\mu_B}^{\infty} (v_L - \mu_B) f_L \\ \mu_B - \mu_L > \int_{\mu_L}^{\infty} (v_L - \mu_L) f_L - \int_{\mu_B}^{\infty} (v_B - \mu_B) f_B \end{cases}$$

Here above there are the four equivalent conditions upon which (1) is greater than (2); that is to say that Rules II, V and VII produce larger aggregate payoffs than rules IV, VI and VIII. Conditions *(a)* and *(c)* suggest that the relative efficiency of the rules crucially depends upon the variance of the distribution of $f(v_B)$ and $f(v_L)$, that is to say that, the more the valuation of the builder is speculative relative to the valuation of the landowner, the more the rules that give the option to the builder are more likely to produce higher aggregate payoffs.

Conditions *(b)* and *(d)* suggest how neither the mean evaluation nor the difference in mean is relevant to determine which type of rules is more efficient. To see why notice that *(b)* where the landowner has an higher mean seems to imply the likelihood that she is the more efficient chooser while *(d)* seems to hold the opposite. Since these are equivalent conditions both cannot be true. As it turns out, neither

[20] Put–call parity defines a relationship between the price of a call option and a put option - both having the same underlier, strike price and expiration date (Stoll, 1969). The rule can be generally stated as *call + exercise price = put + underlying asset.* See also Knoll and Center (2002).

intuition is true because the values of the options at the other end of the inequality also change in ways that offset the direct impact of the change in litigants.[21] To see how, notice that if the mean evaluation of the builder increases relative to the one of the landowner so–other things equal- the value of both the put option in the hand of the builder and the call in the hand of the landowner must increase as well. If instead it is the mean evaluation of the landowner to gain a head, then the call option in the hand of the landowner gains further *in the money* and the put option of the builder decreases in value. Therefore if in the left hand side of *(b),* μ_L increases vis-à-vis μ_B, so does the call option $\int_{\mu_B}^{\infty}(v_L - \mu_B) f_L(v_L) dv_L$ in respect to $\int_{\mu_L}^{\infty}(v_B - \mu_L) f_B(v_B) dv_B$

To conclude: the fundamental findings of the Ayres and Goldbart (2001) characterization of the optional law are two: first, seemingly opposite rules containing put and call (like the II and V) lead to identical solutions in terms of aggregate allocative efficiency and vary only as a matter of distribution among the parties[22] and –second- the variance of parties' evaluations of the entitlement is the most important factor in assessing which rule is likely to achieve higher levels of aggregate payoffs.

[21] More than this: the two inequalities are actually equivalent. The rigorous demonstration that is beyond the scope of the present article is available in the appendix of Ayres and Goldbart (2001).

[22] The decoupling of efficiency concerns from the allocative concerns is the most impressive achievement among the accomplishments of optional law (Ben-Shahar, 2006).

7 Appendix 2: national laws relevant to building encroachments

7.1 French rule

Code Civi

Article 545

Nul ne peut être contraint de céder sa propriété, si ce n'est pour cause d'utilité publique, et moyennant une juste et préalable indemnité. l

Article 555 (Loi no 60-464 du 17 mai 1960)

Lorsque les plantations, constructions et ouvrages ont été faits par un tiers et avec des matériaux appartenant à ce dernier, le propriétaire du fonds a le droit, sous réserve des dispositions de l'alinéa 4, soit d'en conserver la propriété, soit d'obliger le tiers à les enlever. Si le propriétaire du fonds exige la suppression des constructions, plantations et ouvrages, elle est exécutée aux frais du tiers, sans aucune indemnité pour lui ; le tiers peut, en outre, être condamné à des dommages-intérêts pour le préjudice éventuellement subi par le propriétaire du fonds. Si le propriétaire du fonds préfère conserver la propriété des constructions, plantations et ouvrages, il doit, à son choix rembourser au tiers, soit une somme égale à celle dont le fonds a augmenté de valeur, soit le coût des matériaux et le prix de la main-d'oeuvre estimés à la date du remboursement, compte tenu de l'état dans lequel se trouvent lesdites constructions, plantations et ouvrages. Si les plantations, constructions et ouvrages ont été faits par un tiers évincé qui n'aurait pas été condamné, en raison de sa bonne foi, à la restitution des fruits, le propriétaire ne pourra exiger la suppression desdits ouvrages, constructions et plantations, mais il aura le choix de rembourser au tiers l'une ou l'autre des sommes visées à l'alinéa précédent.

7.2 Spanish rule

Codice civil derecho civil de cosas

Artículo 362. El que edifica, planta o siembra de mala fe en terreno ajeno, pierde lo edificado, plantado o sembrado, sin derecho a indemnización.

*Artículo 363.*El dueño del terreno en que se haya edificado, plantado o sembrado con mala fe puede exigir la demolición de la obra o que se arranque la plantación y siembra, reponiendo las cosas a su estado primitivo o a costa del que edificó, plantó o sembró.

Artículo 364. Cuando haya habido mala fe, no sólo por parte del que edifica, siembra o planta en terreno ajeno, sino también por parte del dueño de éste, los derechos de uno y otro serán los mismos que tendrían si hubieran procedido ambos de buena fe. Se entiende haber mala fe por parte del dueño siempre que el hecho se hubiere ejecutado a su vista, ciencia y paciencia, sin oponerse.

Artículo 365. Si los materiales, plantas o semillas pertenecen a un tercero que no ha procedido de mala fe, el dueño del terreno deberá responder de su valor subsidiariamente y en el solo caso de que el que los empleó no tenga bienes con que pagar. No tendrá lugar esta disposición si el propietario usa del derecho que le concede el artículo 363.

7.3 Italian rule

Codice Civile, Libro III, Della Proprietà

Art. 938 Occupazione di porzione di fondo attiguo

Se nella costruzione di un edificio si occupa in buona fede una porzione del fondo attiguo, e il proprietario di questo non fa opposizione entro tre mesi dal giorno in cui ebbe inizio la costruzione, l'autorità giudiziaria, tenuto conto delle circostanze, può attribuire al costruttore la proprietà dell'edificio e del suolo occupato. Il costruttore e tenuto a pagare al proprietario del suolo il doppio del valore della superficie occupata, oltre il risarcimento dei danni.

7.4 Swiss Rule

Code Civil Suisse

Art. 674 Constructions empiétant sur le fonds d'autrui

(1) Les constructions et autres ouvrages qui empiètent sur le fonds voisin restent partie intégrante de l'autre fonds, lorsque le propriétaire de celui-ci est au bénéfice d'un droit réel. (2) Ces empiétements peuvent être inscrits comme servitudes au registre foncier. (3) Lorsque le propriétaire lésé, après avoir eu connaissance de l'empié- tement, ne s'y est pas opposé en temps utile, l'auteur des constructions et autres ouvrages peut demander, s'il est de bonne foi et si les cir- constances le permettent, que l'empiétement à titre de droit réel ou la surface usurpée lui soient attribués contre paiement d'une indemnité équitable.

7.5 Portughese Rule

Portughese Civil Code

*Artigo 1343***. Prolongamento de edifício por terreno alheio.**

(1) Quando na construção de um edifício em terreno próprio se ocupe, de boa fé, uma parcela de terreno alheio, o construtor pode adquirir a propriedade do terreno ocupado, se tiverem decorrido três meses a contar do início da ocupação, sem oposição do proprietário, pagando o valor do terreno e reparando o prejuízo causado, designadamente o resultante da depreciação eventual do terreno restante. (2) É aplicável o disposto no número anterior relativamente a qualquer direito real de terceiro sobre o terreno ocupado.

7.6 Norwegean Rule

Norwegian Act No. 15 of 16th June 1961 § 11

§ 11. Hus eller anna byggverk som ulovleg står såleis at noko av det er inne på granneeigedom, har grannen krav på vert bortteke eller retta opp. I tilfelle då dette kom til å valda så store utlegg eller tap elles at det klårt stod i mishøve til gagnet, og det ikkje er noko nemnande å leggja eigaren av byggverket til last, kan det gjerast unnatak frå rettingsskyldnaden mot at grannen får vederlag som ikkje må setjast mindre enn skaden eller ulempa.

Var byggverket frå fyrst av sett ulovleg inn på granneeigedom, må vederlaget for rett til å ha det ståande til vanleg ikkje setjast mindre enn vinninga av innpåbygginga.

Vert byggverket retta oppatt eller flytt eller går det til grunne, fell retten over granneeigedomen bort.

7.7 German rule

Bürgerliches Gesetzbuch. BGB German Civil Code 2002

§ 912 Überbau; Duldungspflicht

(1) Hat der Eigentümer eines Grundstücks bei der Errichtung eines Gebäudes über die Grenze gebaut, ohne dass ihm Vorsatz oder grobe Fahrlässigkeit zur Last fällt, so hat der Nachbar den Überbau zu dulden, es sei denn, dass er vor oder sofort nach der Grenzüberschreitung Widerspruch erhoben hat. (2) Der Nachbar ist durch eine Geldrente zu entschädigen. Für die Höhe der Rente ist die Zeit der Grenzüberschreitung maßgebend.

§ 913 Zahlung der Überbaurente

(1) Die Rente für den Überbau ist dem jeweiligen Eigentümer des Nachbargrundstücks von dem jeweiligen Eigentümer des anderen Grundstücks zu entrichten. (2) Die Rente ist jährlich im Voraus zu entrichten.

§ 914 Rang, Eintragung und Erlöschen der Rente

(1) Das Recht auf die Rente geht allen Rechten an dem belasteten Grundstück, auch den älteren, vor. Es erlischt mit der Beseitigung des Überbaus (2) Das Recht wird nicht in das Grundbuch eingetragen. Zum Verzicht auf das Recht sowie zur Feststellung der Höhe der Rente durch Vertrag ist die Eintragung erforderlich.(3) Im Übrigen finden die Vorschriften Anwendung, die für eine zugunsten des jeweiligen Eigentümers eines Grundstücks bestehende Reallast gelten.

§ 915 Abkauf

(1) Der Rentenberechtigte kann jederzeit verlangen, dass der Rentenpflichtige ihm gegen Übertragung des Eigentums an dem überbauten Teil des Grundstücks den Wert ersetzt, den dieser Teil zur Zeit der Grenzüberschreitung gehabt hat. Macht er von dieser Befugnis Gebrauch, so bestimmen sich die Rechte und Verpflichtungen beider Teile nach den Vorschriften über den Kauf. (2) Für die Zeit bis zur Übertragung des Eigentums ist die Rente fortzuentrichten.

7.8 American rule

2 C.J.S. Adjoining Landowners § 57 - Ejectment; equitable relief (Mayer, 2007)

An encroachment on the land of another may support an action of ejectment[23], unless a different remedy is expressly provided by statute[24].

An owner whose land is subjected to an encroachment may seek equitable relief against its further maintenance or to compel its removal[25], unless the encroachment is not removable without considerable expense[26], even though no actual damage is sustained[27].

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[23] Del.—Haitsch v. Duffy, 10 Del. Ch. 280, 92 A. 249 (1914). Wis.—Fisher v. Goodman, 205 Wis. 286, 237 N.W. 93 (1931).

[24] D.C.—Frizzell v. Murphy, 19 App. D.C. 440 (App. D.C. 1902).

[25] Iowa—Miller v. McClelland, 173 N.W. 910, 10 A.L.R. 1317 (Iowa 1919). Mass.—Goldstein v. Beal, 317 Mass. 750, 59 N.E.2d 712 (1945)

[26] Cal.—Nebel v. Guyer, 99 Cal. App. 2d 30, 221 P.2d 337 (3d Dist. 1950). Okla.—Kasner v. Reynolds, 1954 OK 56, 268 P. 2d 864 (Okla. 1954).

[27] Mass.—Harrington v. McCarthy, 169 Mass. 492, 48 N.E. 278 (1897).

An owner may be required to remove a structure[28] or a part of a structure[29], which encroaches on adjoining property. However, under certain circumstances, as where the encroachment is slight[30], there is no evidence that the defendant acted willfully[31], the encroachment was due mainly to a predecessor in title of the defendant[32], or the burden of removing the encroachment substantially outweighs the benefit[33], an order to remove the encroachment is improper[34]. Rather, the court may award damages[35], order defendants to take steps to rectify any problems caused by the encroachment[36], and compensate the plaintiff properly for easements on its property[37]. A statute may allow a court to require one who constructs an encroachment on land in good faith to obtain a servitude upon payment of compensation[38].

2 C.J.S. Adjoining Landowners § 57 - Damages - Amount and measure

The measure of damages varies with the nature of the encroachment as permanent or temporary, and the correct rule to be followed is that rule which will attain the amount of damage most accurately. Generally, a landowner is entitled to damages in an amount that will compensate for the loss sustained on account of the encroachment[39]. An owner is not entitled to an award of compensatory damages in excess of the loss[40].

Where the encroachment is of such a permanent nature that defendant is not required to remove it, the measure of damages is the difference between the value of the property before and the value of the

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[28] N.H.—Pugliese v. Town of Northwood Planning Bd., 119 N.H. 743, 408 A.2d 113 (1979). N.Y.—Hedden v. Bohling, 112 A.D.2d 23, 490 N.Y.S.2d 391 (4th Dep't 1985).

[29] Or.—Zerr v. Heceta Lodge No. 111, Independent Order of Odd Fellows, 269 Or. 174, 523 P.2d 1018 (1974).

[30] Christopher v. Rosse, 91 A.D.2d 768, 458 N.Y.S.2d 8 (3d Dep't 1982).

[31] Minn.—Olson v. Lindberg, 286 N.W.2d 692 (Minn. 1979). N.Y.—Christopher v. Rosse, 91 A.D.2d 768, 458 N.Y.S.2d 8 (3d Dep't 1982).

[32] Or.—Zerr v. Heceta Lodge No. 111, Independent Order of Odd Fellows, 269 Or. 174, 523 P.2d 1018 (1974).

[33] Ill.—Terwelp v. Sass, 111 Ill. App. 3d 133, 66 Ill. Dec. 878, 443 N.E.2d 804 (4th Dist. 1982). N.Y.—Christopher v. Rosse, 91 A.D.2d 768, 458 N.Y.S.2d 8 (3d Dep't 1982). Or.—Zerr v. Heceta Lodge No. 111, Independent Order of Odd Fellows, 269 Or. 174, 523 P.2d 1018 (1974).

[34] Ill.—Mari-Mann Herb Co., Inc. v. Borchers, 216 Ill. App. 3d 1014, 159 Ill. Dec. 827, 576 N.E.2d 496 (4th Dist. 1991). Or.—Zerr v. Heceta Lodge No. 111, Independent Order of Odd Fellows, 269 Or. 174, 523 P.2d 1018 (1974).

[35] Ill.—Terwelp v. Sass, 111 Ill. App. 3d 133, 66 Ill. Dec. 878, 443 N.E.2d 804 (4th Dist. 1982). N.Y.—Christopher v. Rosse, 91 A.D.2d 768, 458 N.Y.S.2d 8 (3d Dep't 1982).

[36] Or.—Seid v. Ross, 120 Or. App. 564, 853 P.2d 308 (1993).

[37] Ill.—Mari-Mann Herb Co., Inc. v. Borchers, 216 Ill. App. 3d 1014, 159 Ill. Dec. 827, 576 N.E.2d 496 (4th Dist. 1991). Or.—Seid v. Ross, 120 Or. App. 564, 853 P.2d 308 (1993).

[38] La.—Porterfield v. Spurgeon, 379 So. 2d 56 (La. Ct. App. 3d Cir. 1979), writ denied, 381 So. 2d 1235 (La. 1980).

[39] Cal.—Richard v. Mead, 141 Cal. App. 2d 866, 297 P.2d 680 (2d Dist. 1956). Mich.—Sokel v. Nickoli, 356 Mich. 460, 97 N.W.2d 1 (1959). W.Va.—Kincaid v. Morgan, 188 W. Va. 452, 425 S.E.2d 128 (1992).

[40] N.Y.—Jenss Bldg. Corp. v. Nikitas, 20 A.D.2d 616, 244 N.Y.S.2d 875 (4th Dep't 1963).

property after the encroachment[41]. Value may be based on the property's reasonable rental value[42]. The rules governing the measure of damages in such cases are not completely rigid and may be modified to suit the particular situation, the correct rule to be followed being that rule which will attain the amount of damage most accurately[43]. Damages may be based on the fact that a landowner was delayed in using land and forced to buy other land by reason of the encroachment of a building from a neighboring lot[44] (Mayer, 2007, § 57).

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[41] Md.—Easter v. Dundalk Holding Co., 233 Md. 174, 195 A.2d 682 (1963). N.Y.—Generalow v. Steinberger, 131 A.D.2d 634, 517 N.Y.S.2d 22 (2d Dep't 1987).

42 Mont.—Goodover v. Lindey's Inc., 255 Mont. 430, 843 P.2d 765 (1992).

[43] Utah—Mary Jane Stevens Co. v. First Nat. Bldg. Co., 89 Utah 456, 57 P.2d 1099 (1936). Tex.—Allen v. Virginia Hill Water Supply Corp., 609 S.W.2d 633 (Tex. Civ. App. Tyler 1980).

[44] Conn.—Ferrigno v. Odell, 113 Conn. 420, 155 A. 639 (1931).

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