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Property Rules, Liability Rules and Externalities

Abstract – In this paper we argue that traditional explanations of the dichotomisation of property rules and liability rules are somehow misleading, since they tend to neglect the evolutionary complementarity between the two rules in a world of incomplete property rights characterised by sizeable ex-ante transaction costs in rights' definition. When rights are a complete bundle of well-defined uses, the application of a property rule reaffirms and reinforces the correlation between rights and duties. In a world of incomplete rights, externalities over undefined uses call for a court intervention aimed at defining a new property right through either a property rule or a liability rule. Independently of whether new rights are created by property or liability rules, the nature and the extent of future externalities over conflicting undefined uses could generate new processes of rights' definition. The emergence of an externality always implies an evolutionary complementarity between property rules and liability rules whose boundaries actually depend, in alternative legal systems, on the degree of incompleteness of original rights.

Keywords –Property rule, liability rule, incomplete rights, externalities

JEL classification codes – K10, K11, K12, K13, K14, K21

1. – *Introduction*

The 1972 pioneering article of Guido Calabresi and Douglas Melamed[1] really represented a turning point in the path of how lawyers and economists have being thinking about the functioning of legal rules in protecting property rights. Calabresi and Melamed [1972] (C&M from now on) used the Monet's series of paintings of the Rouen Cathedral as a metaphor to say that, as each Monet's cathedral represented the same subject but was nevertheless unique, so the theory of legal rules needs to be thought of as just *one view of The Cathedral*. Given the powerful and suggestive metaphor that frames the structure of the paper, the article is widely known and referred to as simply *The Cathedral*. Since 1972, many scholars have delivered generous accounts

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of it in their works. Only from 1981 to 1996, Krier – Schwab [1997] counted at least 483 articles quoting *The Cathedral*[2]. As for other famous writings, with which *The Cathedral* shares the top of the most cited ranking, also the work of C&M has been from time to time defined as 'highly subversive' [EPSTEIN, 1997], or either 'landmark' [MELVILLE, 1999], 'seminal' [BEBCHUK, 2001] and 'path-breaking' [BELL – PARCHOMOVSKY, 2002] and if in 1971 it almost risked to be rejected by the Harvard Law Review [CALABRESI, 1997], according to many, *The Cathedral* is one of the few corner-stones on which all the law and economic movement is built upon.

This enormous production of articles about *The Cathedral* is certainly the best proxy of the impact of the intuition made by C&M and also, in our view, a clear evidence of the complexity and richness of their stand. Looking through this wide literature we can certainly affirm that a comprehensive theory on property rules and liability rules, aimed at unifying in a unique theoretical perspective apparently opposed positions, is still controversial.

Inspired by the solemnity of *The Cathedral*, we try to add with this paper another view of the same from its hidden foundations, that is to say from the baseline perspective of the transaction costs that ought to be sustained in order to initially define the rights rather than those faced at a later point to protect the same rights, trying to unify the main theses of a long and uninterrupted debate.

Calabresi and Melamed provided a theory, both positive and normative, on the meaning of property rules, liability rules and inalienability rules as alternative stylised forms to protect legal entitelments[3].

As we will briefly recall in section two, the main message of C&M theory was that, maintaining inalienability aside, legal rules may protect a legal entitlement in two main ways: by inhibiting any taking without owner's consent (property rules) or by imposing on infringers a duty to compensate owners for infringement (liability rules). The new categorisation groups legal rules protecting legal entitlements across different branches of law such as property law, contract law, tort law and criminal law [EPSTEIN, 1997 – POSNER, 2000]. The distinction between property rules and liability rules has, in C&M's view, also a prescriptive nature: property rules should be applied when transaction costs of legal protection are low, whereas liability rules

[1] Calabresi – Melamed [1972]. C&M hereinafter. See for instance Krier – Schwab [1997].

[2] Although a comprehensive survey of the literature is still missing and seems by the way premature, we suggest for an introduction at the property rules vs liability rules debate to Krauss [2000]. For a short introduction to the main points of contention over the C&M findings see Bell – Parchomovsky [2002]. For an account of the impact of the C&M on the law and economic discipline see Krier – Schwab [1997].

[3] The word 'entitlement', was a relatively new concept in law at the time C&M wrote the cathedral and it was used by the US Supreme Court to describe the expanded conception of property as a matter of due process in courts' decisions. See Merrill – Smith [2001].

should be preferred when the transaction costs of legal protection are high. From this initial dichotomy, two main schools of thought have then developed: one stressing the dominance of property rules [EPSTEIN, 1997]; the other emphasising the superior efficiency of liability rules, regardless of the dimension of transaction costs that need to be sustained in protecting rights [AYRES – TALLEY, 1995; KAPLOW – SHAVELL, 1996].

In this article we argue that C&M's contribution, along with the two main subsequent approaches outlined above, relies upon a common assumption which needs to be singled out and made explicit: the hypothesis that ownership of an entitlement implies a complete bundle of uses protected by well-defined property rights. The focus of C&M is on the ex-post transaction costs to be sustained for protecting well-defined property rights from infringement. Our focus here is on the ex-ante transaction costs which ought to be sustained in order to clearly define an entitlement over every use bundled in a property right. The different focus of our analysis is based on the simple idea that in a world of zero ex-ante transaction costs in defining rights, every right is correlated to a correspondent duty not to interfere upon non-owners, as in the well-known contribution of Hohfeld[4] [1917]. In this ideal world, any non-consensual taking is discouraged via property rules regardless of the dimension of transaction costs in protection. Liability rules, in our view, do emerge in a world in which high ex-ante transaction costs in defining a right for every use bundled in a property right inhibit the definition of a complete ownership right and determine ownership as a residual right to control over the bundle of uses; some of which are known, contractible and protected by property rule whereas some others are unknown, undefined and unprotected[5].

As a consequence, we argue, the choice of a property rule versus a liability rule becomes relevant only when there are some undefined uses generating an externality not already protected by a property rule. In our view, this also implies that undefined uses are the main source of an externality. We define an externality as a conflicting reciprocal claim over a rival undefined use since, when rights are well-defined, a non-consensual claim against a well-defined property right could not be enforced without violating a pre-existing jural correlation of rights and duties. Only when there is an externality, and a dispute over it, the choice between property rules and liability rules becomes relevant.

We maintain that, in order to solve an externality, a court may choose either a property or a liability rule, as in C&M's approach. However, in our argument, this choice should not be oriented by the transaction costs of pro-

[4] In general to each legal position corresponds a jural opposite as well as a jural correlative. On further elaboration of Hohfeld's finding, see Morris [1993] and Pagano [2000].

[5] See also Hart – Moore [1995].

tection involved; but rather, when efficiency considerations are taken into account, by court's assessment of parties' future bargaining power which is generated by court's rights definition, given the fact that property rules and liability rules affect parties' default point in future bargaining.

In our setting, the traditional distinction between property rules and liability rules is not dependent on the transaction costs of protection, neither on court's evaluation of asymmetric information, nor on the degree of tangibility of assets. It depends on the degree of completeness of property rights and on court's attitude towards the impact on parties' ex-post contractual power of new right redefinition.

We thus amend the two steps process identified by C&M and articulated in (1) the assignment of property rights and (2) the decision over the rule by which the right should be protected. A third but preliminary step – we argue – should be added to the process of rights definition performed by courts in settling disputes over externalities. When rights are incomplete and when the conflict regards undefined uses (and undefined duties), courts always redefine the original bundle of rights.

We finally argue that property rules and liability rules, being alternative instruments of defining new rights over undefined uses, co-evolve in a complementary way: new property rights created by a court's decision over an undefined use (regardless of whether they have been created through a property or a liability rule) are always protected by a property rule (non – owner must refrain from interfering), but they are nonetheless exposed to potential externalities which might eventually raise with respect to the undefined uses bundled in the new property right.

The article proceeds as follows. In section two we shortly review some of the main issues raised in the law and economics literature on property rules and liability rules. In section 3 we investigate the complex relationship among property rules, liability rules and externalities. In section 4 we emphasise how our incomplete property rights perspective may cast new light on the property vs liability rules debate and we discuss our hypothesis in favour of an evolutionary complementarity between property rules and liability rules.

2. – *The Cathedral and its representations*

We do not contend that *The Cathedral* was already in sight when Ronald Coase [1960] wrote his masterpiece; however, C&M themselves recognise explicitly the profound influence that *the problem of social costs* exercised on their work. Coase was not very much interested in explaining how legal entitlements were allocated and protected as much as he was concerned with

the problem of externalities: the costs/benefits of somebody's activity that are (i) borne/enjoyed by third parties and that are (ii) not captured via the price system. Overcoming Pigouvian theory, Coase observed that externalities are reciprocal in nature and that – in principle – injurers as well as victims can eliminate harm. Realising this simple evidence allowed him to hypothesise that private bargaining could be a substitute for regulatory intervention and tort disputes as a mean of internalising externalities and thus addressing the problem of social costs. Coase undermined Pigou's analysis by conjecturing a frictionless world in which transacting was costless. In such a world – he showed – entitlements would eventually end-up in the hands of who valued them the most through private bargaining and regardless of whom the entitlements were initially assigned to and provided that clearly defined property rights were in place[6]. The latest part of the previous statement, arguably the most relevant to our purposes, has been proven to be misleading to say the least. In fact Usher [1998] showed that, absent transaction costs, efficient outcomes can be reached even if no clear allocation, hence property rights, are initially in place.

The world Coase had in mind was actually one with positive transaction costs[7]. In this context legal rules that define, assign and protect legal entitlements become relevant. Courts and administrative bodies need to carefully consider costs and benefits of allocating entitlements to one party as opposed to another. Indeed such allocation should be made in such a way as to maximise the value of production since the initial allocation, when transaction costs are significant, inform the final distribution of entitlements. The relevance of Coase's findings is nested in the rehabilitation of private bargaining and contractual arrangements as means of addressing externalities. However Coase's results apply ex-post once property rights are defined and say little about how

[6] The Coase theorem has been widely discussed and harshly criticised in the literature. For an extensive review see Cooter [1987]. For another critical review see Posner [1993]. It is now widely understood that Coase never meant to concede any citizenship to the so-called 'Coasean world' either than for the sake of a theoretical exercise to be used to in opposition to the 'real' world where transaction costs are pervasively present. Stigler [1966] first termed the Coase conjecture as a theorem and Cooter [1982] highlighted the inconsistency of the then-called Coase theorem. Usher [1998] argued that, interpreted as a general reminder that the economy runs on a mixture of price-taking and deal-making and that bargaining is no free good, the Coase theorem is instructive but misnamed as a theorem. Interpreted to mean that costless bargaining promotes efficiency in the economy, the Coase theorem is a tautology, for a bargain among rational people must make each person better off than he was before [...]. Interpreted as implying that efficiency in the economy requires an allocation of property to people, even when bargaining is costless, the Coase theorem is incoherent or wrong.

[7] The world of zero transaction costs has often been described as a Coasian world. Nothing could be further from the truth. It is the world of modern economic theory, one which I was hoping to persuade economists to leave [COASE, 1988].

they should firstly be established and protected after the initial allocation. His masterpiece opened up the grand season of the law and economic movement. However it left courts and lawmakers, already troubled by the daunting mission of promoting equity or social justice, with few practical insights on how to decline their new burdensome task of enhancers of economic efficiency.

2.1 – The first paint

C&M's piece of research was meant at shedding new light on the way legal systems allocate and protect legal entitlements across society. They built upon the contribution of Coase in many respects; nonetheless their achievements outstripped Coase's legal findings especially by offering normative instruments to law practitioners. They borrowed from Coase the disenchantment towards who ought initially to possess the entitlement and took an agnostic position in this respect. The entitlement – they argued – should be assigned according to criteria based on *economic efficiency* as well as on other considerations such as society's *distributional preferences* and other *justice reasons*. In this respect, they simply enriched Coase's account of court's behaviour by recognising that judges have been usually applying other criteria in their decisions that went beyond the mere economic efficiency. However the task of the court did not end there. The next step courts had to go through was to decide by which instruments these entitlements should be defended with. Judges have multiple legal instruments at their disposal. One of *The Cathedral*'s major achievements was to organise these vast array of tools in a coherent tripartite family made of (i) property rules, (ii) liability rules and (iii) inalienability rules, grouped along the lines of a transactional framework that specifies the conditions of legitimate transfer [KRAUS – COLEMAN, 1986]. Property rules confer to the holder of the entitlement the exclusive power to exclude others from using it along with the power of alienating it at the price fixed exclusively by himself. Thus, all non-consensual transfers would meet with an injunction by the court. Conversely, liability rules grant to non-holders the power to take the entitlement, even without consent of the holder, and pay a price accordingly, determined by the court or the legislator. The holder, in this case, retains the right to seek damages but does not control exclusively the entitlement any longer. Finally, inalienability exclude any transfer of the entitlement regardless of the consensual vis-à-vis non-consensual nature of the alienation. Putting aside the inalienability rule[8], C&M further noticed that property and liability rule protection may be granted to either parts of the conflict.

[8] As the same title of *The Cathedral* highlights, C&M also considered inalienability along with the other two rules. However, excluding some remarkable exceptions, inalienability has received much less attention in the literature. On inalienability rules see Rose-Ackerman [1985, 1986].

Table 1 - The matrix of rules according Krier – Schwab [1995]

	A (plaintiff)	B (claimant)
Property rule	Rule I	Rule III
Liability rule	Rule II	Rule IV

This insight swiftly led them to formulate their famous four-rules taxonomy of choices available to courts. Using the C&M example of the polluting factory, let us suppose that society decides that neighbourhood (our plaintiff) interest in clean air is the entitlement that ought to be underpinned. When residents invoke court's intervention, the latter can decide to enhance their right to clean air either by commanding the factory to stop polluting (rule I) or by conditioning the continuation of its activities upon the payment of congruent damages to the residents (rule II). Conversely, if factory's activity is the entitlement that ought to be preserved, then the court can permit it to continue to pollute (rule III) or conferring the right to residents to stop pollution by paying damages to the factory (rule IV).

Courts have traditionally applied rule I, II and III. However, the C&M framework allows us to see the situation is a two-by-two matrix where the columns show that the entitlement could be awarded initially to either *P* or *C*, and the rows show that the entitlement could be protected by a property rule or a liability rule. The matrix immediately reveals a missing element which assigns to *B* an entitlement protected by a liability rule, meaning that *A* can force *B* to stop polluting provided that *A* pays a compensation as it has been determined by the court[9].

The Cathedral was an innovative piece of work in at least one further respect. Once established the property rules vis-à-vis liability rules descriptive dichotomy, it offered a simple yet powerful normative criterion to be followed in the choice of using one rule as opposed to the other. And this is where Coase comes suddenly back into the picture, pardon, in the painting. C&M propose property rules to be employed when transaction costs are low: when there are few parties involved and when they are readily identifiable

[9] At the time C&M wrote the *cathedral* there was no record that rule IV had been applied in US courts. Indeed, by the time the paper was published, the Arizona Supreme Court (find ref for the case) applied it in the resolution of a dispute. Indeed, as recognised by Calabresi himself [1997] rule IV was envisaged earlier although C&M where not, at the time, aware of these previous findings.

and prone to bargain. Conversely, liability rules achieve superior outcomes in high transaction costs settings, when strategic bargaining, information asymmetries and all sorts of costs that prevent smooth bargaining are at work.

2.2 – The paint, the picture and the movie of *The Cathedral*

The strength and insightfulness of *The Cathedral* is that it is «little more than an outline, a way of looking at things. As such it leaves room for others» [CALABRESI, 1997]. Indeed in the 35 years since its publication, many *others* have tried to fill that room. Since the first view of *The Cathedral* was painted many other oils, frescos and tapestries have followed. The work of C&M has been first stretched to cover new issues such as antitrust, public law and international relations [MELAMED – DOUGLAS, 1997]. Later the paint has been worked out in a more detailed picture. In the nineties, the C&M framework was adapted to accommodate new legal rules, not originally envisaged by C&M, that were popping-up in the literature and that remarkably enriched the well-known four-items menu. After the comprehensive systematisation by Morris [1993], new rules beyond the 4-items menu envisaged by C&M emerged: adding *put* alongside already discovered *call options* style liability rules[10]. Rule 5, suggesting that the claimant could chose to abate its tortious activity and collect the damages from the victim, was first suggested by Krier – Schwab [1995] and later rule 6 was also added. The breach Krier and Schwab opened in the granitic *cathedral* thrilled many scholars to look for other rules not originally envisaged by C&M. Few years later, Levmore [1997] articulated a full scale of up to sixteen rules[11]. The optional view of *The Cathedral* has progressed since then and it has been well overviewed by Ayres [2005].

The picture became thus more complex, and soon the debate moved from the static world of *The Cathedral's* paintings to a more dynamic set. «By focusing on static property and liability rules, Calabresi and Melamed have obscured the possibility of protecting legal entitlements by means of dynamic rules» [BELL – PARCHOMOVSKY, 2002, p. 5]. The canvas has later become a

[10] See in particular Ayres – Talley [1995]; Ayres – Balkin [1996]; Levmore [1997]; Rose [1997]; Ayres [1998].

[11] Levmore [1997] divided up C&M's four rules along the lines familiar to the common practice of courts. In the context of liability rules recognise that injurers are often recognised liable only if they acted negligently. From the common law distinction between torts and unjust enrichment, Levmore proposed to distinguish when proper compensation is measured upon the victim's loss or rather on the injurer's gain. He also noted that the court may choose whether to grant compensation for either past or future damages and so on.

cinemascope in order to get a sense of what in going on over time in the evolution of property rules and liability rules[12].

2.3 – The bell-towers of *The Cathedral*

It is worth noting that all the refinements to the C&M framework still insist upon the dichotomy between property rules and liability rules. One of the remarkable achievements of *The Cathedral* was that it pointed out for the first time the paradigmatic distinction between property rules and liability rules [POSNER, 2000][13], as a distinction between ex-ante consent and ex-post compensation as sufficient conditions for private taking. However, it is arguable that C&M intended this distinction to be only *one view of The Cathedral*: a metaphor that comes to be of normative significance once the Coasean[14] theory of transaction costs comes into the picture. C&M's work suggests that in contexts where transaction costs are high the court should opt for liability rules whereas when transaction costs are low the opposite holds true. By moving into the normative side, C&M focus on the role of transaction costs rather than on what property rules and liability rules are. The innovative descriptive side of their work (having conceptually organised the protection of legal entitlements in property rules and liability rules) is mainly functional to their normative part (when transaction costs are high, liability rules are preferable). Absent transaction costs, the dichotomy becomes almost meaningless because both rules are equally efficient [POLINSKY, 1980]. Absent transaction costs there would be little reason to group up legal instruments and divide them in property rules and liability rules.

As Kraus – Coleman [1986] argued, the property-liability-(inalienability) framework concerns only transactional aspects of institutional entitlements: it is *one view of The Cathedral* taken from the transactional standpoint.

However, once the two bell-towers of *The Cathedral* were erected, the debate got somehow stuck into the dichotomy eventually loosing the sight of the transaction costs problem that was originally lying at the hearth of the distinction. In particular the debate has ended up in being a contest to find out which rule is more efficient at minimising overall transaction costs. A dis-

[12] See also Avraham [2001]; Zheng [2001]; Gomez – von Wangenheim [2005]; Nicita *et al.* [2006].

[13] Indeed Posner highlights how this distinction grew out of their dissatisfaction with Gary Becker's theory of crime and punishment. See Becker [1968].

[14] Coase developed his theory of transaction costs already in his early work on the nature of the firm [1937]. However, the relevance of transaction costs fully spills out of his second masterpiece on the problem of social costs [COASE, 1960].

pute that has been, from time to time, fought on the ground of: consistent investment decisions[15]; strategic bargaining[16]; information harnessing activity by the court[17]; and by parties[18] strategic information[19]; victims behaviour and injurer behaviour[20]; undercompensation [STANDEN, 1995] and overcompensation [COOTER, 1985]; risk aversion [KORNHAUSER, 1986], the endowment effects [FARNSWORTH, 1999; KAHNEMAN *et al.*, 2000; SUNSTEIN, 2000], idiosyncratic entitlement's valuation[21] among other things[22].

No clear winner emerges from the contest, and indeed supporters of one rule or the other must cope with the fact that we live in a world where property rules and liability rules coexist and we observe a variety of reasons why a rule is applied instead of the other.

Those that underpin the superiority of the property rules cannot explain the growing recourse to liability rules in the context, among others, of environmental externalities: neither they can stand the growing creative ways in which liability rules are increasingly applied in tort law as well as, to name two examples, in the field of intellectual property and antitrust law [BELL – PARCHOMOVSKY, 2002].

On the other side, all those that support the superiority of liability rules can hardly explain why property rules are so pervasive throughout the legal system [EPSTEIN, 1997; SMITH, 2004] and seem to survive any *death knell* that from time to time have been ringed for [MERRILL – SMITH, 2001].

As Judge Calabresi pointed out, this debate is certainly worth *heaving*, but it is not as interesting as the question of when we want to use a remedy rather than another for broader reasons [CALABRESI, 1997]. Furthermore, we argue that the debate over whether property rules are superior vis-à-vis liability rules and *viceversa* is worth having only as long as we stay within those boundaries of transaction costs that were first envisaged by C&M.

[15] [BEBCHUK, 2001]. He argues that the choice of the legal rule affects the ex-ante investment decision.

[16] [AYRES – TALLEY, 1995]. They argue that liability rules cause an 'identity crisis' in the contracting parties that lead them to less strategic bargaining. See also Kaplow – Shavell [1995].

[17] [KAPLOW – SHAVELL, 1996]. They argue that liability rules harness information about the contracting parts' evaluations and thus are superior to property rules in the context of asymmetric information.

[18] [SMITH, 2004]. He argues that property rules have an Hayekian informational advantage vis-à-vis liability rules.

[19] [BEN-SHAHAR – BERNSTEIN, 2000]. They argue that the costs to acquire information in the case of liability rules as compared to the case where property rules are in place may be higher due to strategic play with private information.

[20] [SHAVELL, 1986; KAPLOW – SHAVELL, 1996]. They argue that liability rules may fall to efficiently deter takings because of the anticipated impossibility of compensation of the injurer.

[21] Hylton [2006] argues that property rules better defend idiosyncratic valuations of entitlements.

[22] The account of the arguments on the superiority of liability vis-à-vis property rule is borrowed from Brooks [2002].

2.4 – Kaplow and Shavell's view of *The Cathedral*

Kaplow's – Shavell's contribution [1996] certainly was one of the most important steps of the *fine-graining* exercise that the academic community has conducted over *The Cathedral*. They added an important distinction to the universe of entitlements by suggesting that we shall distinguish between (i) *externalities* and (ii) *takings*; since these two are different sources of disputes over entitlements. Their paradigmatic example of an externality is the recurring case of the factory polluting a neighbourhood and generating nuisance. As an example of a taking, they took the case of a dispute over the property of a laptop computer. In a nutshell, they argued that property rules are superior in cases of takings, irrespective of whether transaction costs are high or low. This is because liability rules generate problems of reciprocal takings, meaning that a thing can be sequentially and endlessly subtracted from one part to the other upon the payment of a fixed amount of damages[23]. Conversely, in case of an externality, the optimal choice of legal rules crucially depends upon the magnitude of the transaction costs at work. When transaction costs are low, as argued before, the two rules are perfect substitutes since parties can bargain effortlessly to achieve an optimal allocation of resources. However, when transaction costs become high, courts should opt for liability rules because they minimise information costs to the courts and not because – as C&M argued – of the impossibility of bargaining. This conclusion relies on the observation that in allocating an entitlement via a property rule, the court must know both the damage to the victim and the prevention cost to the injurer, whereas, when using a liability rule, the court needs to know only the damage to the victim. This means that liability rules, in the context of high transaction costs, are less costly, thus more efficient for the courts[24].

The analysis of Kaplow – Shavell [1996] sets out the important distinction between *takings of things* and *harmful externalities*; however it leaves the division between the two categories largely unspecified. Although they recognise they failed to provide a clear-cutting borderline between the two concepts, they argue that the distinction is largely used in such contexts as industrial pollution, automobile accidents, and transfer of things as well as

[23] Kaplow – Shavell [1996] pointed out that the problem could be addressed if any of these takings could be accompanied by, in a auction fashion, an increment of the price of the damage. For a challenge to the effort of Ayres and other scholars to apply put and call options borrowed from the financial economics, see Kaplow – Shavell [1998]. In his critique, he pointed out that puts are never imposed as a matter of law on stranger, but are the outgrowth of consensual transactions over organised markets. See also Epstein [1997].

[24] This result can be undermined in some circumstances such as when the injurer is not judgment-proof.

Table 2 – Kaplow – Shavell's distinction between *takings* and *harmful externalities*

	Taking of things	*Harmful externalities*
Low TCs	Property rules (avoid reciprocal takings)	Either property or liability rules
High TCs		Liability rules (lower costs unless there are judgment-proof problems)

in the legal literature. Moreover – they argue – *takings* imply problems of potential reciprocal *takings* whereas harmful externalities present an high level of independence between the injurers benefit and victim harm [KAPLOW – SHAVELL, 1996].

3. – *Property, liability and externalities*

The generous debate that followed the article by Calabresi and Melamed, and in particular the clash between those who defend the dominance of property rules and those who invoke the superior efficiency of liability rules, shows surprisingly a common distinguishing feature: the idea that either the original property or the entitlement whose best protection device need to be assessed is a clear defined or *complete* right. A number of relevant implications and ambiguities stem from this implicit assumption; implications that need to be clearly singled out in order to properly assess the meaning and the extent to which property and liability rules may be applied.

3.1 – Towards a theory of incomplete property rights?

According to one of the most well known definitions of a property right, property is a bundle of rights[25]. «These rights describe what a person may or may not do with the resources he owns: the extent to which he may possess, use, transform, bequeath, transfer, or exclude others from his property. [...] The owner is free to exercise his rights over his property, by which we mean that no law forbids or requires him to exercise those rights. [...] The legal conception of property is, then, that of a bundle of rights over resources that the owner is free to exercise and whose exercise is protected from interference by others. [...] Property creates a zone of privacy in which owners can exercise their will over things without being answerable to others» [COOTER, 1985].

[25] The definition of property as a bundle emerged in the discipline in the 1920s and 1930s, also on the wave of the Hohfeldian innovations on the nature of entitlements as a package of legal positions. Although Hohfeld never used the expression bundle of rights, the linkages with its theory emerged immediately. Before Demsetz [1967], the metaphor of rights as a bundle of rights mostly meant that property could be reduced to a recognisable collection of functionalist attributes such as the right to exclude, transfer, inherit, use, etc. For a short review of the emergence of the concept of bundle of rights see Merrill – Smith [2001].

Using Hohfeld's correlatives [1913], we may thus suggest that a property right induces correspondent duties grouped in others' bundles: non-owners have a duty not to interfere with every single use bundled in the property right. How rich is however this bundle? How to define the content of the bundle of uses corresponding to a property right, and consequently the content of correspondent duties?

The traditional theory of property as a bundle of uses disregards this question and it seems to assume that property rights are complete in the sense that the bundle of uses included in a property right is always complete and well-defined. A complete property right is thus a right whose bundled uses are clearly defined, known and *contractable*. In a complete property right, every use carries out a correspondent entitlement, which is clearly protected against non-owners' interference. This means that a complete property right induces also a complete bundle of duties for non-owners: for every defined use embedded in the owner's property right, non-owners have the duty not to interfere. In our view this means that, in a world of complete property rights, there are no interferences among owners and non-owners, but eventually only Coasean exchanges of well-defined property rights.

The above argument implies that, in a world of complete rights, there are no externalities, since the correlation between rights and duties harvests at start each potential interference among owners and non-owners. The only possibility for such an interference to go off is to imagine a situation in which some uses bundled in the neighbouring property rights of Mr. A and Mr. B are not well-defined in the first instance so that both Mr. A and Mr. B exercise a rival claim over those uses with the expectation of inducing a corresponding duty to each other. The rival claim over an undefined use results in a sort of reciprocal veto between the plaintiffs (claimants) over the full exercise of their reciprocal claims over that use.

In terms of Hohfeld's classification we may say that when rights are not well-defined, also correspondent duties are equally not defined and thus rival supposed owners will both exercise a conflicting privilege or liberty. For an externality to grow we have thus to imagine a world of incomplete rights and some joint claim over undefined uses bundled in neighbouring property rights. There is an inverse relationship, we may say, between the degree of completeness of property rights and the emergence of externalities.

This is a re-formulation of Demsetz's [1967] original theory on the emergence and on the evolution of property rights. According to Demsetz, property rights do emerge as an efficient legal response to externalities: «What converts a harmful or beneficial effect into an externality is that the cost of bringing the effect to bear on the decisions of one or more of the interacting persons is too high to make it worth-while» [DEMSETZ, 1967, p. 348]. The creation of a property right over an externality reduces the costs of inducing interacting agents to create a market for beneficial or harmful effects. In Demsetz's view «the emergence of new property rights takes place in response to the desires of the interacting persons for adjustments to new benefit-cost possibilities» [p. 350]. The main intuition provided by Demsetz is that externalities induce the emergence of property rights and, for a given legal system, new externalities (generated for instance by technological change) induce either new rights or a change (but not necessarily an exchange) in existing rights: «Property rights develop to internalise externalities when the gains of internalisation become larger than the cost of internalisation. Internalising such effects requires a process, usually a change in property rights» [p. 350].

3.2 – On the distinction between property and externality

The important thing to be stressed here is that the standard law and economics literature on property rights usually treats property and externality as two distinct questions. Property rights are generally intended as complete bundle of defined uses, while externalities are mainly represented as nuisance problems coming from social interaction or interdependence in specific cases. Cooter – Ulen [1988] defines externalities as the (particular) problem of *non-separability of individual property rights* rather than as the question of incompleteness of property rights. As a consequence they confine the emergence of externality or nuisance problems to specific or sectorial cases or phenomena (as polluting activities) rather than representing them as a pervasive feature of property rights in a world of incomplete rights. A similar approach is followed by Kaplow – Shavell [1996] who distinguish between *taking of things* and *harmful externalities*. They base all their findings on this distinction however leaving largely unexplained why an externality actually differs from a taking[26]. However, once we introduce the concept of bundle of rights

[26] Kaplow – Shavell [1996] seem well aware of the slippery slope they have grounded their reasoning upon since they state that an harmful externality can be often described as the taking of a thing Similarly, the taking of a thing can be described as the doing of harm to a victim. They nevertheless emphasise that the distinction between harmful externalities and the taking of things is useful even if imperfect [1996].

incompleteness, the distinction becomes evident. Takings regard the transactions of entitlements from a legitimate owner (which is in the legal position of commanding rights over the use of the resources) to a scofflaw individual who previously was subject to the owner's right. Conversely, externalities occur when the ownership of the use over a resource was not previously specified and rival claims are advanced over it. In other words, externalities arise when the bundle is incomplete and some uses are unspecified (or specified but not allocated) whereas takings emerge when a resource (whose bundle of uses is clearly singled out and allocated) is subtracted unlawfully.

3.3 – Externalities, ex-ante and ex-post transaction costs

The complex relationship between incomplete property rights and externalities is, in our view, at the core of the distinction between property rules and liability rules as complementary tools of legal protection.

One of the main ambiguities surrounding the relationship between property rights and externalities can be traced back to the Stigler's version of the Coase Theorem [COASE, 1988]. In its simplest form, the theorem suggests that any externality could be solved efficiently by exchanging rights over resources, regardless of any original allocation of those rights, when rights are well-defined and transaction costs are negligible[27]. We have already seen how the above formulation could be easily depicted as a being wrong or at least tautological[28]. In our words we argue that if entitlements are well defined and complete they involve a bundles of defined uses to which some legal positions in the form of rights correspond. These positions are in turn mirrored by their jural correlatives which are corresponding bundle of defined duties for non-owners not to interfere. In a world of complete rights any interference would not be an externality, rather it would be an illegitimate taking or a sort of theft. This means that the exchange of well-defined property rights in the Coasean framework is not aimed at solving an externality: it is finalised

[27] Another famous formulation of the Coase theorem has been produced by Posner: If transaction costs are zero, the initial assignment of a property right – for example, whether to the polluter or to the victim of pollution – will not affect the efficiency with which resources are allocated [POSNER, 1993].

[28] To say that, absent transaction costs, resources will be allocated and employed efficiently, is quite trivial. In fact, absent transaction costs, individuals can bargain effortlessly and they presumably will do so until they reach a mutually advantageous outcome. On the other side, Pareto-efficiency can be defined as the absence of any further mutually advantageous bargain. So the Coase theorem boils down to the proposition that if people can agree upon an efficient outcome, then there will be an efficient outcome [USHER, 1998].

at improving efficiency with respect to original assignments of property rights, unless we accept the idea that any time we have a potential for a Pareto improvement in a market, the status quo is given by an externality configuration.

While we can admit, according to Buchanan – Stubblebine [1962], that the process of absorption of a Pareto relevant externality is always a Pareto improvement, we certainly cannot say that any time we have a Pareto relevant exchange we are solving a pre-existent externality. Some confusion between these two distinct situations may mislead the reasoning upon externalities and transaction costs. Some potential Pareto improvements could be inhibited in the market by relevant transaction costs but the resulting status quo is not an externality. If Mr. A values the assets owned by Mr. B more than B does but transaction costs reduce the expected benefits of Mr. A to a point that Mr. A gives up, the missed Pareto relevant exchange is certainly not an externality. At the same time, if A takes without consent the assets from Mr. B, the negative effect for Mr. B is not an externality: it is the direct negative effect of a theft. On the other side, if Mr. A' s use of the river in his land, which trespasses also Mr. B' s property, is inhibiting a rival use of the river by Mr. B and if those rival uses were not clearly defined in either Mr. A' s or in Mr. B' s bundle of property rights, then an externality is occurring.

In a world of complete rights, there are no indirect effects of human actions, which do not pass through market exchange of well-defined, contractible rights. According to Coase [1960], in this complete world we can still have inertia due to the existence of transaction costs, but this inertia is not an externality. An externality is thus defined as joint claim over a rival use of an undefined entitlement.

In Demsetz's view, the process of internalising Pareto relevant externalities is carried out through a *change* in existing property rights, rather than an *exchange* of existing property rights. We can thus distinguish ex-ante transaction costs as the costs that ought to be sustained to define or rather to refine property rights as bundles of complete uses and ex-post transaction costs as the costs to be sustained to carry out a market transaction over well-defined complete bundle of uses. We can conclude now that the emergence of externalities has to do with the ex-ante transaction costs whereas the persistence of externalities has to do with ex-post transaction costs.

What the Coasean approach may suggest is that when there is a Pareto-relevant externality, if ex-ante transaction costs are low, parties may bargain over the rival uses so as to define and assign the conflicting use to the party who values it the most. While private bargaining includes two functions (definition and assignment of a right over a use), legal intervention performs just one function (definition of a new right over a previously undefined use) and leaves the process of efficient assignment to decentralised market allocation.

Moreover, while private bargaining defines an entitlement over a use only with respect to contracting parties, legal intervention operates a definition of rights *erga omnes*.

3.4 – Property rules and liability rules reconsidered

Once we have outlined the relationship between the incompleteness of rights and the emergence of externalities, we can better understand the way in which the contribution by C&M could be intended as being complementary to the Coasean approach.

C&M add to the Coasean framework the idea that, beside privately stipulated agreements among interested parties, the process of definition of new rights over previously undefined rival uses could be carried out by the legal intervention of the judge. When an externality occurs, the judge has to define a right over a use, which has been revealed by parties' conflict as being not well defined in the first instance. Let first suppose that the right was a well-defined right. This means that the right was correlated to a well-defined duty not to interfere by non-owners. In this case the judge does not have to solve an externality neither to decide over a dispute. He is simply supposed to sanction the non-owner for having not respected her obligation not to interfere against the legitimate owner. As a consequence, when rights are well-defined, there are no externalities and illegitimate claims are refrained and sanctioned by a property rule. On the opposite side when an externality occurs, a decision over a definition of a new right over rival uses needs to be taken.

Let us assume that Mr. A and Mr. B are the owners of two adjacent fields and that both exercise a rival claim over the use of the common river trespassing the two properties with the expectation of inducing a corresponding duty to the neighbour (say A claims to use the river for irrigation purposes while B, the upstream owner, claims to use the river as a recipient for polluting activity). Let us further assume that parties fail to reach an agreement over the use x and that they invoke court's intervention to solve the dispute over x.

In particular, following C&M, the judge may:

(a) define a right for the specific use x and include that use in the bundle of Mr. A (this implies defining a duty upon B not to interfere);

(b) define a right for the specific use x and include that use in the bundle of Mr. B (this implies defining a duty upon A not to interfere);

(c) define a right for the specific use x and include that use in the bundle of Mr. A subject to the right of B to access that specific use at a price equal to A' s opportunity costs to avoided use (this implies defining a duty upon B not

to interfere with A's right and a duty over A not to interfere with B' s right);

(d) define a right for the specific use x and include that use in the bundle of Mr. B subject to the right of A to access to that specific use at a price equal to B's opportunity costs to avoided use (this implies defining a duty upon A not to interfere with B' s right and a duty over B not to interfere with A' s right).

What the court does in cases (a)-(d) is to define a new right for the specific use x and to simultaneously re-define in a narrower sense the original bundle of rights owned by A and B.

The table below shows how the process of definition of previously undefined rights may invoke a either property or a liability rule.

The table above constitutes only a stylised case to describe possible ways of defining new rights over undefined uses, but several others have been pointed out[29].

It is worth noting that the process of defining new rights may be done via either a property or a liability rule and in the next session we outline some possible criteria followed by the courts in deciding the rule to be applied and the evolutionary complementarity which could be generated among the two rules. Before moving to the next session it may be worth to shortly sum up some of the conclusions we have achieved.

First, the case when the court settles an externality dispute by defining a new right should be clearly distinguished from the case in which there is a mere infringement of a cleary defined right (and thus a violation of a duty not to interfere). A property rule could be applied to both cases but the underlying purpose for its use is rather different: in the later case a property rule performs the full protection of a well-defined property right, in the former one it implements a way of defining a new right over undefined uses. When rights are well defined, the property rule performs exclusively its ex-post function of protection against non consensual taking; when uses are undefined, the property rule constitutes an indirect way to define a new property right. When either rights are incomplete or the conflict regards undefined uses (and undefined duties), court's intervention always redefines the original bundle of rights.

Second, from the perspective of courts' rights definition choices, property rules and liability rules are not dissimilar: they both are tools for defining new rights and they both have distributional consequences on parties' ex-post bargaining power over the new right market exchange. Property rule and liability rule define alternative default points in the bargaining area generated by court's rights definition [AGHION *et al.*, 1994; AYRES – TALLEY, 1995]. This means that in the process of defining new rights, the court may apply, among others, both property and liability rules according to efficiency, justice reasons and society distributional preferences, as emphasised by C&M. When efficiency considerations are taken into account, the choice between either property or liability rules depends on court's assessment of parties' future bargaining power generated by court's rights definition.

Third, in our setting, the traditional theoretical distinction as well as the court's choice between property rules and liability rules is not based upon assessing monitoring transaction costs [C&M, 1972] evaluation of asymmetric information [AYRES – TALLEY, 1995; KAPLOW – SHAVELL, 1996; BROOKS, 2002], or the degree of tangibility of assets [KAPLOW – SHAVELL, 1996]. It rather depends on the degree of completeness of property rights and on court's attitude towards the impact on parties' ex-post contractual power of new right's redefinition.

Fourth, property rules and liability rules, being alternative instruments of defining new rights over undefined uses, co-evolve in a complementary way: the assignment of a property rule vis-à-vis a liability rule induces the creation of a new property right and thus of a new duty upon non-owners not to interfere. This means that the new property right created by a court's decision over an undefined use (regardless of having been created through a property either a liability rule) is always protected by a property rule (non owner must not interfere), but it is nonetheless exposed to potential externalities which might eventually arise with respect to the undefined uses bundled in the new property right. These externalities could in turn be solved again by a new court's decision implementing either a property or

[29] We are not just thinking about inalienability rules, but also about rule 5 and following extensions [AYRES, 2005]. In Table 3, the case of a put option could be represented as the owner's right to force the injurer's sell of her right to access.

Table 3 – The four rules reconsidered

		Property rights over x	
Right to access to x at a given price		A	B
	A	Property rule in favour of A	Liability rule in favour of A
	B	Liability rule in favour of B	Property rule in favour of B

a liability rule, and so on. The consequence of the above argument is that in some cases a property rule may generate a liability rule and in some others a liability rule can generate a property rule, showing a relationship of evolutionary complementarity among the two. The next session will analyse this last result.

4. – *Understanding the evolutionary complementarity between property rules and liability rules*

Once we have pointed out that property and liability rules are not only, as C&M first envisaged, alternative ways to protect property rights but also, and more appropriately, two possible tools available to a court for defining new rights over undefined rival uses, we may investigate the peculiar relationship existing between the two rules. Before that, there are two main objections against our argument that it is necessary to clarify.

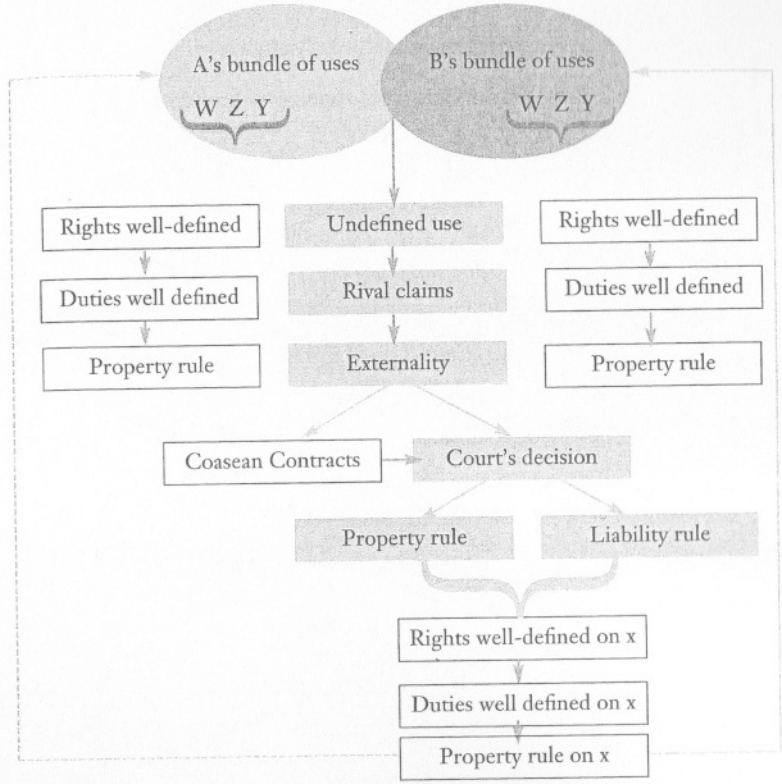
4.1 – Property rules to defend the core of the bundle

First, if property rights are inherently incomplete bundles of uses, why do we ever observe property rules rather than having only liability rules?

Our answer is that the idea that property rights are an *incomplete* bundle of uses does not mean that the whole bundle contains only undefined uses[30]. Some of these uses are well-defined and are actually at the core of the property right. They constitute standardised rights and generate corresponding duties commonly known and traditionally enforced by the legal system. For those uses there is generally the presumption that they constitute the heart of the right and ambiguity or uncertainty over the content of these uses could not be advanced by infringers as a partial relief.

As Merrill – Smith [2001] have outlined, property rights are always perceived as having a clear and well-known standard meaning. In this respect, the old-fashioned distinction between *in rem* rights and *in personam* rights seems to keep on holding. *In rem* rights are the rights, privileges duties and so forth that reside in a person, insofar as they have a certain relationship to the same thing, and avail against persons constituting a very large and indefinite class of people: in other words they are valid erga omnes. Conversely *in personam* rights are unique rights that reside in a person and are enforceable against one or few definite persons [HOHFELD, 1917]. Without this distinction is indeed impossible to explain what Merrill – Smith [2000] call the *mystery of the numerus clausus* by which, under both civil and common law, the forms property can take are only few. In other words, there is only a closed number of forms of property rights courts are willing to recognise and protect: meaning that the bundle of uses cannot be freely arranged. Moreover, when confronted with the challenge of creating new forms of proper-

[30] Looking at property as a bundle of rights has been one of most important steps towards understanding the functioning of this economic institution. The idea was so much successful that had lead to some abuses of it, in the sense that some scholars have lost sight of some of the inherentl characteristics of property, and of how it is deployed in under both common and civil legal systems, that are not fully captured by the metaphor of the bundle. See also note 24.



ty, intended as novel bundling of rights, courts tend to discourage these attempts and drive the parties back to the already existing pigeonholes. This back-to-the-standard exercise is in sharp contrast with the high degree of customisation allowed in other areas of law such as contract law. Why is it so? Coming back to the *in rem* nature of property we realise that if the property interests must be defended against the world, then a vast class of duty-holders must know what constrains on their behaviour such rights impose. As a consequence, the standard core of a property right makes the distinguishing characteristics of ownership intelligible by all the duty-holders around and always call for property rule application. All other uses which go beyond that core are poorly defined and potentially exposed to a rival claim and thus to the generation of a reciprocal externality. Property rules and liability rules as the court's instruments to define new property rights could be eventually applied to those undefined uses. That is why in a world of incomplete rights we observe both property and liability rules.

4.2 – Liability rules to allow innovation at the periphery of the bundle

Second, if both property rules and liability rules are alternative ways for a court to define new property rights and correlated duties, in turn protected by a property rule, why don't we observe an evolutionary tendency towards the progressive dominance of property rules?

Our answer here is that incompleteness of rights is pervasive in the sense that notwithstanding the ex-post role played by courts (and regulations) in completing rights over time, there is always a positive degree of incompleteness which implies the potential for some uses to be poorly defined and to cause the rise of externalities. Changes in technology, preferences, information, knowledge, wealth may affect the nature and the extent of undefined uses in a bundle of rights so that externalities might always be regenerated. As Demsetz pointed out, «changes in knowledge result in changes in production functions, market values, and aspirations. New techniques, new ways of doing the same things, and doing new things – all invoke harmful and beneficial effects to which society has not been accustomed». Therefore, «given a community's tastes in this regard, the emergence of new private or state owned property rights will be in response to changes in technology and relative prices» according to «a principle that associates property rights changes with the emergence of new and revaluation of old harmful and beneficial effects» [1967, p.350].

The above quotations clearly show the dynamic and evolutionary complementarity between property rules and liability rules. These rules are implemented by courts as alternative ways to define new property rights. In

turn, these newly created rights are protected by a property rule until a new externality over undefined uses bundled in those rights does emerge. At that point courts might be called for a decision which may involve again either a property or a liability rule. We can thus have alternative evolutionary paths which can both increase and decrease the dominance of property or liability rules, altering each time the balance between the two, according to the frequency of externalities, courts' attitudes, and the evolution of legal and economic systems.

5. – *Conclusions*

Throughout the vast literature that followed the original *Cathedral*, the role of Coase's work on the problem of social costs is widely recognised as been key to C&M grand building. Coase was indeed interested in looking at the efficiency role played by market exchange in rights allocation when property rights are well defined, regardless of initial assignment of the same. C&M tried to break through Coase's departing point and explored the way property rights are first allocated and then protected. Indeed they assumed perfect definition and specification of all uses bundled in a property right. With the present paper we have tried to look beyond the texture, which the original C&M's *Cathedral* is painted upon. We have contended the idea that the bundle of uses, which property rights are made of, are well defined in the first instance. We have argued that talking of externalities in a world of well-defined rights has no relevance. When property rights are well defined any claim against owners is per se inhibited in virtually almost all legal systems. Thus, we have concluded that the only reason why externalities and disputes over private property rights do emerge is because property rights are a bundle of both specified and unspecified uses. While the first ones are always protected by rights to which the jural opposite of a duty correspond, the second ones, being unspecified uses, are the domain of privileges and no-rights in Hohfeldian tradition. Unspecified uses may lead to conflicts before courts when private bargaining fail to reach Pareto outcomes.

We have thus proposed to make a step back with respect to both Coase's work and C&M's one. If Coase pointed out the role of the court in allocating property rights, and C&M emphasised the role of the choice of legal rules to protect them, we add that courts also intervene on the degree of completeness of property rights and thus on the same definition of rights.

We have now set the stage for reconsidering C&M findings in another light. Property rules and liability rules are not opposed instruments of defending property rights; rather they are two alternative ways courts can

take to redefining the rights. This result has several consequences in terms of the evolutionary complementarity between property rules and liability rules. Also, it provides a framework which allows us to unify C&M with Kaplow and Shavell approach and provide insights consistent with them.

With respect to C&M's approach, the choice between property rules and liability rules is still consistent in our framework with the dimension of transaction costs. But these are, in our case, the costs associated with the ex-ante definition of property rights rather than the ex-post cost of protection. At the same time, our proposal is consistent with Kaplow and Shavell distinction between *taking of (tangible) things* (which in our case are simply well-defined uses in a property bundle) and *harmful externalities* or taking of intangible things (which in our setting represents the case in which there is a rival claim over undefined uses).

The last section of the article has finally pointed out that the debate over the dominance of a rule over another is simply misplaced: since incompleteness is a pervasive feature of every bundle of property rights, both property rules and liability rules co-evolve over time as a result of complex dynamics which involves changes in technology, preferences, information, knowledge, wealth and institutional setting. After all, in Monet's paints it was sufficient a slight change in sunshine light to have another *Cathedral*, and another, and another.

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REFERENCES

AGHION, P. – DEWATRIPONT, M. – REY, P., 1994, «Renegotiation Design with Unverifiable Information», *Econometrica*, 62, pp. 257-282.

AVRAHAM, R., 2001, «Modular Liability Rules», *Michigan Law and Economics Research Paper*.

AYRES, I., 1998, «Monsanto Lecture in Tort Reform and Jurisprudence: Protecting Property with Puts», *Valparaiso University Law Review*, 32, pp. 783-793.

AYRES, I., 2005, *Optional Law: The Structure of Legal Entitlements*, University of Chicago Press, Chicago.

AYRES, I. – BALKIN, J. M., 1996, «Legal Entitlements as Auctions: Property Rules, Liability Rules, and Beyond», *Yale Law Journal*, 106, pp. 703-750.

AYRES, I. – TALLEY, E., 1995, «Solomonic Bargaining: Dividing a Legal Entitlement to Facilitate Coasean Trade», *Yale Law Journal*, 104, pp. 1027-1117.

BEBCHUK, L. A., 2001, «Property Rights and Liability Rules: The Ex Ante View of *The Cathedral*», *Michigan Law Review*, 100, pp. 601-639.

BECKER, G., 1968, «Crime and Punishment: An Economic Approach», *Journal of Political Economy*, 76, pp. 169-217.

BELL, A. – PARCHOMOVSKY, G., 2002, «Liability Rules», *Michigan Law Review*, 101, pp. 1-79.

BEN-SHAHAR, O. – BERNSTEIN, L., 2000, «The Secrecy Interest in Contract Law», *Yale Law Journal*, 109, pp. 1885-1925.

BROOKS, R. R. W., 2002, «Broken Elevators in *The Cathedral*: The Burden of Determining Property Rules & Liability Rules», *Berkeley Program in Law & Economics Working Paper Series*.

BUCHANAN, J. – STUBBLEBINE, W. C., 1962, «Externality», *Economica*, pp. 371-384.

CALABRESI, G., 1997, «Remarks: The Simple Virtues of *The Cathedral*», *Yale Law Journal*, 106, pp. 2201- 2207.

CALABRESI, G. – MELAMED, A. D., 1972, «Property Rules, Liability Rules, and Inalienability: One View of *The Cathedral*», *Harvard Law Review*, 85, pp. 1089-1128.

COASE, R. H., 1937, «The Nature of the Firm», *Economica*, 4, pp. 386-405.

COASE, R. H., 1960, «The Problem of Social Cost», *Journal of Law and Economics*, 3, pp. 1-44.

COASE, R. H., 1988, *The Firm, the Market, and the Law*, University of Chicago Press, Chicago.

COOTER, R. H., 1982, «The Cost of Coase», *The Journal of Legal Studies*, 11, pp. 1-33.

COOTER, R. D., 1985, «Damages for Breach of Contract», *California Law Review*, 73, pp. 1432-1489.

COOTER, R. D., 1987, «The Coase Theorem», in EATWELL, J. M. M. – NEWMAN, P. (eds), *The New Palgrave: A Dictionary of Economics*, New York, Mac Millan Station Press, pp. 457-460.

COOTER, R. D. – ULEN, T., 2004, *Law and Economics*, 4th edition, Boston, Pearson Addison Wesley.

DEMSETZ, H., 1967, «Toward a Theory of Property Rights», *American Economic Review*, 57, pp. 347-359.

EPSTEIN, R. A., 1997, «A Clear View of *The Cathedral*: The Dominance of Property Rules», *Yale Law Journal*, 106, pp. 2091-2120.

EPSTEIN, R. A., 1998, «Protecting Property Rights with Legal Remedies: A Common Sense Reply to Professor Ayres», *Valparaiso University Law Review*, 32, pp. 833-838.

FARNSWORTH, W., 1999, «Do Parties to Nuisance Cases Bargain after Judgment? A Glimpse inside *The Cathedral*», *The University of Chicago Law Review*, 66, pp. 373-436.

GOMEZ, F. – VON WANGENHEIM, G., 2005, *The Complex Economics of Nuisance Law:*

The Tragedy of Bargaining under Property and Liability Rules, paper presented at the first annual conference of the Italian Society of Law and Economics, Siena, November 25-26, 2005.

HART, O. – MOORE, J., 1995, «Property Rights and the Nature of the Firm», *Transaction Cost Economics*, 1, pp. 316-355.

HOHFELD, W. N., 1913, «Some Fundamental Legal Conceptions as Applied in Judicial Reasoning», *Yale Law Journal*, 23, pp. 16-69.

HOHFELD, W. N., 1917, «Fundamental Legal Conceptions as Applied in Judicial Reasoning», *Yale Law Journal*, 26, pp. 710-770.

HYLTON, K. N., 2006, «Property Rules and Liability Rules, Once Again», *Review of Law and Economics*, 2, pp. 137-191.

KAHNEMAN, D. – KNETSCH, J. L. – THALER, R. H., 2000, «Experimental Tests of the Endowment Effect and the Coase Theorem», *Behavioral Law and Economics*, pp. 211-231.

KAPLOW, L. – SHAVELL, S., 1995, «Do Liability Rules Facilitate Bargaining? A Reply», *Yale Law Journal*, 105, pp. 221-233.

KAPLOW, L. – SHAVELL, S., 1996, «Property Rules Versus Liability Rules», *Harvard Law Review*, 109, pp. 713-790.

KORNHAUSER, L. A., 1986, «An Introduction to the Economic Analysis of Contract Remedies», *University of Colorado Law Review*, 57, pp. 683-725.

KRAUS, J. – COLEMAN, J., 1986, «Rethinking the Theory of Legal Rights», *Yale Law Journal*, 95, pp. 1335-1371.

KRAUSS, M. I., 2000, «Property Rules vs Liability Rules», *Encyclopedia of Law and Economics*, 2, pp. 782-794.

KRIER, J. E. – SCHWAB, S. J., 1995, «Property Rules and Liability Rules: *The Cathedral* in Another Light», *New York University Law Review*, 70, pp. 440-483.

KRIER, J. E. – SCHWAB, 1997, «*The Cathedral* at Twenty-Five: Citations and Impressions», *Yale Law Journal*, 106, pp. 2121-2147.

LEVMORE, S., 1997, «Unifying Remedies: Property Rules, and Startling Rules», *Yale Law Journal*, 106, pp. 2149-2173.

MELAMED, A. D., 1997, «Remarks: a Public Law Perspective», *Yale Law Journal*, 106 pp. 2209-2213.

MELVILLE, D. W., 1999, «Liability Rules, Property Rules, and Incentives Not to Bargain: The Effect of Competitive Rivalry on the Protection of Legal Entitlements», *Seton Hall Law Review*, 29, pp. 1277-1297.

MERRILL, T. W. – SMITH, H. E., 2000, «Optimal Standardization in the Law of Property: The Numerus Clausus Principle», *Yale Law Journal*, 110, pp. 1-70.

MERRILL, T. W. – SMITH, H. E., 2001, «What Happened to Property in Law and Economics?», *Yale Law Journal*, 111, pp. 357-398.

MORRIS, M., 1993, «The Structure of Entitlements», *Cornell Law Review*, 78, pp. 822-898.

NICITA, A. – PARDOLESI, R. – RIZZOLLI, M., 2006, «Le opzioni nel mercato delle regole», *Mercato Concorrenza Regole*, 8, pp. 239-284.

PAGANO, U., 2000, «Public Markets, Private Orderings and Corporate Governance», *International Review of Law and Economics*, 20, pp. 453-477.

POLINSKY, A. M., 1980, «Resolving Nuisance Disputes: The Simple Economics of Injunctive and Damage Remedies», *Stanford Law Review*, 32, pp. 1075-1112.

POSNER, R. A., 1993, «Nobel Laureate: Ronald Coase and Methodology», *Journal of Economic Perspectives*, 7, pp. 135-140.

POSNER, R. A., 2000, «Gary Becker's Contributions to Law and Economics», *The Collected Economic Essays of Richard A. Posner*, 1, pp. 32-36.

ROSE, C. M., 1997, «The Shadow of *The Cathedral*», *Yale Law Journal*, 106, pp. 2175-2200.

ROSE-ACKERMAN, S., 1985, «Inalienability and the Theory of Property Rights», *Columbia Law Review*, 85, pp. 931-969.

ROSE-ACKERMAN, S., 1986, «Efficiency, Equity and Inalienability», in *Law and Economics and the Economics of Legal Regulation*, pp. 11-37.

SHAVELL, S., 1986, «The Judgment Proof Problem», *International Review of Law and Economics*, 6, pp. 45-58.

SMITH, H. H., 2004, «Property and Property Rules», *New York University Law Review*, 79, pp. 1719-1798.

STANDEN, J., 1995, «The Fallacy of Full Compensation», *Washington University Law Quarterly*, 73, pp.145-226.

STIGLER, G. J., 1966, *The Theory of Price*, MacMillan, New York.

SUNSTEIN, C. R., 2000, *Behavioral Law and Economics*, Cambridge University Press, Cambridge.

USHER, D., 1998, «The Coase Theorem Is Tautological, Incoherent or Wrong», *Economic Letters*, 61, pp. 3-11.

ZHENG, M., 2001, «Liability Rules and Evolutionary Dynamics», *Journal of Institutional and Theoretical Economics*, 157, pp. 520-535.