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**PATENT TRESPASS AND THE ROYALTY GAP:  
EXPLORING THE NATURE AND IMPACT OF 'PATENT HOLDOUT'**

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# **PATENT TRESPASS AND THE ROYALTY GAP: EXPLORING THE NATURE AND IMPACT OF ‘PATENT HOLDOUT’**

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## **INTRODUCTION**

Across the world, a *transactional* problem known as “*patent holdup*” has gained mainstay in academic and policy circles. Patent holdup is said to occur when a patent owner makes licensing or cross-licensing demands that are more onerous than those anticipated by technology implementers when they decided to enter the industry. Patent holdup is often considered more severe in relation to a category of patents that are declared essential to the implementation of an industrial standard, known as standard essential patents (“SEPs”). SEPs are limitedly open to design around, and when technology implementers have made early sunk investments in a standardized technology, they are locked in with no other choice but to take a licence if they want to practice the standard. With this, patent owners are said to be able to extract royalties in excess of what they could have anticipated had their patent not become essential to the standard or what is known as supra-FRAND rates.

Concerns of patent holdup have informed much of the debate regarding patent and antitrust reform for the past decade, particularly in industries that produce multi-technology products such as wireless communications. In those industries, SEPs are pervasive. As the story goes, if patent holdup is *systematic*, SEP owners unconstrained by each other’s licensing policies collectively impose a “*royalty stack*” on downstream industries, and consumers.<sup>3</sup>

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<sup>3</sup> C. Shapiro, “Injunctions, Hold-Up, and Patent Royalties”, *American Law and Economics Review* 12, no. 2 509-557 (2010).

This, in turn, is considered to wield a *systemic* effect on investments incentives and innovation, in particular by complementary innovators.<sup>4</sup>

In contrast, patent holdout (also known as “*reverse holdup*”<sup>5</sup> or “*licensee holdup*”<sup>6</sup>) has featured less prominently on the agenda of global decision makers. Patent holdout is today understood as the conduct of implementers of patented technology who deliberately choose to avoid the conclusion of a licensing agreement, in the hope of paying either zero or reduced royalties.<sup>7</sup> Admittedly, interest towards patent holdout should increase with the introduction of policies that curtail the enforcement of SEPs – including, in some cases, the setting aside of injunctive relief.<sup>8</sup>

Our study seeks to fill this space. Its first ambition is to dissipate the definitional uncertainty surrounding patent holdout. To that end, we review the meaning of holdout in mainstream economics. This inquiry leads us to an unexpected discovery: holdout is a term of art that invariably defines the conduct of a property owner, not the conduct of technology implementers. On this basis, we open a discussion on why and how the concept of “*holdup*” was preferred by early scholars to “*holdout*” when they sought to formulate a descriptive theory of the conduct of patent property owners.

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<sup>4</sup> Roger G. Brooks, Patent “Hold-Up,” Standards-Setting Organizations And The FTC’s Campaign Against Innovators, 39 AIPLA Q.J. 435, 475 (2011) (discussing a FTC report that talked of a “*systemic problem of patent hold-up*”); M. Lemley and C. Shapiro, “Patent Holdup and Royalty Stacking – A Reply”, 85 *Texas Law Review*, 2163 (“*Because holdup discourages investments and innovation by users, and reduces the return to complementary innovators generally, there are very strong reasons to believe that patent holdup discourages innovation*”).

<sup>5</sup> D. Geradin, “6 Reverse Hold-ups: The (Often Ignored) Risks Faced by Innovators in Standardized Area”, 2010, *The Pros and Cons of Standard Setting*, p.101.

<sup>6</sup> Kieff, F. Scott, and Anne Layne-Farrar. "Incentive Effects from Different Approaches to Holdup Mitigation Surrounding Patent Remedies and Standard-Setting Organizations." *Journal of Competition Law and Economics* (2013): nht030.

<sup>7</sup> Y. Ménière, “Fair, Reasonable and Non-Discriminatory (FRAND) Licensing Terms - Research Analysis of a Controversial Concept”, JRC, Science and Policy Report, 2015 p.15: “*Knowing this, some implementers may commit “hold out” or “reverse hold-up”, not only by using essential technology without a license but also by deliberately choosing not to seek a licence. If this happens, patent “hold out” can induce royalty losses for SEP holders, and significantly reduce their incentives to invest in the development of standards. Typically, hold-out practices are combined with the challenge of validity and essentiality of SEPs in front of a court*”.

<sup>8</sup> C. V. Chien, Holding Up and Holding Out, 21 *Mich. Telecomm. & Tech. L. Rev.* 1 (2014).

Once this is done, we turn to a more empirical discussion of the *strategies* of technology implementers that practice a patent without a license. We substitute the improper concept of patent holdout with the concept of “*patent trespass*”, and look at existing instantiations. In this largely “*undertheorized*” field,<sup>9</sup> we attempt to identify observable conduct features that can serve as proxies to characterize patent trespass.

Our last goal is more theoretical. We try to understand if, in a similar way as with patent holdup, certain circumstances transform patent trespass into a systematic or systemic issue. In the patent holdup literature, systematic effects are said to occur because SEP users face a royalty stack, and systemic effects are anticipated through reduced investment incentives by manufacturers of complementary technologies. As a mirror reflection of this, we say that trespass is *systematic* when a SEP owner faces a “*royalty gap*” – *ie* referring to the unlicensed segment of the market – and that systemic trespass occurs when there are adverse effects on the investment incentives of developers of enabling technologies.<sup>10</sup> With this background, we try to identify the factors that determine the occurrence of transactional, systematic and systemic patent trespass. At this stage our aim is not to conclusively verify if patent trespass is systematic or systemic. Instead, we modestly attempt to grasp the features that may lead to such outcomes and provide some initial empirical evidence. As part of this assessment, we try to understand whether evolutions in the legal environment have created inflexion points in patent licensing discussions.

Our study is based in part on a cross-sectional investigation. Throughout 2016 and 2017, we conducted qualitative interviews with five industry stakeholders on both sides of the patent spectrum, namely SEP holders and SEP implementers. In addition, we organized a structured survey with twelve experienced SEP licensing experts so as to elicit early quantitative measures in relation to the propositions that emerged from our review of the applicable theory and the qualitative interviews. On the basis of the feedback that we have collected, we attempt to separate the wheat of legitimate SEP licensing negotiations from the chaff of patent trespass strategies.

This paper is structured as follows. In Part I, we review the economic theory of holdout, with a specific emphasis on patents. We show that the ordinary concept of holdout

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<sup>9</sup> *Id.*

<sup>10</sup> Ganglmair, Bernhard, Luke M. Froeb, and Gregory J. Werden. "Patent Hold-Up and Antitrust: How A Well-Intentioned Rule Could Retard Innovation." *The Journal of Industrial Economics* 60.2 (2012): 249-273.

refers to the non-transacting conduct of a property owner, and that “*patent trespass*” is a better characterization for technology implementers’ attempt to evade the conclusion of licensing agreements. In Part II, we propose a definition and provide illustrations of patent trespass. For this we rely on the qualitative data gathered during interviews with industry stakeholders. In Part III, we expose the factors that determinatively make patent trespass transactional, systematic and/or systemic. In Part IV, we report on the results of our quantitative analysis.

## I. PATENT HOLDOUT THEORY

### A. HOLDOUT IN MAINSTREAM ECONOMICS

In mainstream economics, holdout is a term of art used to denote the situation that arises when an economic agent cannot act “*unless there is first the consent of some determinate group of individuals*”.<sup>11</sup> For instance, “*B has a holdout position simply by virtue of the fact that A cannot undertake some desired action without her consent*”.<sup>12</sup> In essence holdout means that coordination between economic agents does not occur.

In mainstream economics, holdout belongs to the wider category of situations of failed coordination and collective action problems amongst economic agents.<sup>13</sup> Holdout is often compared, and contrasted, with the concept of *externalities*, which occur when B undertakes some desired action without taking into account the effects of its decisions on A.<sup>14</sup> Holdout is also discussed, and distinguished, from *free-riding* (or freeloading). In free-riding, A provides an imperfectly excludable good, and B can enjoy its benefits without contributing to the cost of provision.<sup>15</sup>

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<sup>11</sup> Epstein, Richard A. “Holdouts, externalities, and the single owner: One more salute to Ronald Coase.” *The Journal of Law & Economics* 36.1 (1993): 553-586 at 559.

<sup>12</sup> *Id.* at 559.

<sup>13</sup> Barak Atiram, “The Wretched of Eminent Domain: Holdouts, Free-Riding and the Overshadowed Problem of Blinded-Riders”, 18 *Berkeley J. Afr.-Am. L. & Pol'y* 52 (2016).

<sup>14</sup> *Id.* who says that holdout arises in opposite situations as externalities.

<sup>15</sup> Miceli, T. J. (2011). “Free riders, holdouts, and public use: a tale of two externalities”. *Public Choice*, 148(1-2), 105-117.

Several real life applications of holdout feature prominently in the economic literature. Consider, for example, common pool problems such as oil field unitization.<sup>16</sup> Competition amongst oil production firms on a reservoir leads to “*extraordinary wastes*” in the form of duplication of wells, inflated capital costs, decreasing extraction efficiency, environmental hazards, etc.<sup>17</sup> The industry consensus is therefore that oil producers should delegate field production to a single firm, and distribute the net returns on the basis of a pre-designated sharing formula. However, field unitization has often been far from complete, because oil firms have tended to holdout from the agreement due to conflicts over the sharing of benefits.<sup>18</sup>

Another possible illustration is land assembly. When a single buyer seeks to consolidate many contiguous but separately owned parcels of land, each potential seller is in position to extract rent from the buyer by holding out from the transaction.<sup>19</sup> A common example is an oil refining company that wants to construct an underground pipeline to transport oil from a field to a refinery, and must obtain rights of way from a variety of parcels owners.<sup>20</sup>

The law and economics literature also consistently discusses holdout in relation to acquisitions by the State. Oftentimes, the Government must purchase “*large tracts of land from many owners in order to provide some public goods, such as military bases, airports, highways, and wilderness areas*”.<sup>21</sup> When those projects demand “*contiguity*”, the last owner may “*hold out*”. If negotiation is not possible and purchase is precluded, takings or the power

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<sup>16</sup> Kim, Jongwook, and Joseph T. Mahoney. “Resource based and property rights perspectives on value creation: the case of oil field unitization.” *Managerial and Decision Economics* 23.4-5 (2002): 225-245.

<sup>17</sup> Libecap, Gary D. *Contracting for property rights*. Cambridge university press, 1993 at 93-95.

<sup>18</sup> Libecap, G. D., and Wiggins, S. N., “The Influence of Private Contractual Failure on Regulation: The Case of Oil Field Unitization.” *Journal of Political Economy* 93 (1985):690-714.

<sup>19</sup> Munch, Patricia. “An economic analysis of eminent domain.” *The Journal of Political Economy* (1976): 473-497.

<sup>20</sup> Merrill, Thomas W. “Economics of Public Use.” *Cornell L. Rev.* 72 (1986): 61.

<sup>21</sup> Cooter, Robert, and Thomas Ulen. *Law and economics*. (2012), 6<sup>th</sup> ed, at 177.

of eminent domain may come into play,<sup>22</sup> within the limits set forth in the Fifth Amendment to the US Constitution.<sup>23</sup>

Corporate takeovers are another example.<sup>24</sup> Suppose that a raider needs to acquire 50% of the shares of a target corporation to gain control, and that shareholding is diluted. In this situation, minority shareholders may holdout of tendering their shares, and undermine the completion of the proposed acquisition. This may be because they hope to extract rent from the raider, up to his opportunity cost. Alternatively, the holdout stakeholders may anticipate that the raider is an efficient manager who will increase the firm's profitability following the acquisition.<sup>25</sup>

Wage negotiation by unions is a last area where holdouts are documented.<sup>26</sup> Holdout is seen as an alternative to strikes by unions when contracts must be renegotiated. Instead of a work interruption, workers continue to work under the terms of the old contract after the contract has expired.<sup>27</sup>

Against this backdrop, it should be unsurprising that the concept of holdout has also been used in relation to intellectual property rights ("IPRs") in general, and patents in particular.<sup>28</sup> Golden defines holdouts as patent owners' "*demands for a better deal*", and

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<sup>22</sup> *Id.* See also Kaplow, Louis, and Steven Shavell. "Economic analysis of law." Handbook of public economics 3 (2002): 1661-1784 at 1688; Hirsch, Werner (1999) *Law and Economics*, 2nd Edition, Boston, MA: Academic Press at 32.

<sup>23</sup> U.S. CONST. amend. V, takings clause ("*nor shall private property be taken for public use without just compensation*").

<sup>24</sup> Jarrell, Gregg A. "The wealth effects of litigation by targets: Do interests diverge in a merge?." The Journal of Law & Economics 28.1 (1985): 151-177; Kobayashi, Mami. "The Role of Large Shareholders in Hostile Takeovers." (2005).

<sup>25</sup> Grossman, Sanford J., and Oliver D. Hart. "Takeover bids, the free-rider problem, and the theory of the corporation." The Bell Journal of Economics (1980): 42-64.

<sup>26</sup> Holden, Steinar. "Wage bargaining, holdout, and inflation." Oxford Economic Papers 49.2 (1997): 235-255.

<sup>27</sup> Cramton, Peter C., and Joseph S. Tracy. "Strikes and holdouts in wage bargaining: Theory and data." The American Economic Review (1992): 100-121.

<sup>28</sup> Posner notes generally that "*the longer the patent term, the more likely the invention space is to be cluttered with patents, requiring multiple negotiations and creating potential holdout problems*". See Posner, Richard A. "Intellectual property: The law and economics approach." The journal of economic perspectives 19.2 (2005):

studies how applications for injunctions— “*holdout threats*” – can entitle them to exact high royalties which he calls “*holdout premiums*”.<sup>29</sup> In the literature, concerns for “*patent holdout*” have been essentially observed in the field of biotechnology patents. Heller and Eisenberg who are known for their work on the risk of an “*anticommons tragedy*” in genetic research discuss in their seminal paper the existence of holdouts by patentees.<sup>30</sup> Burk and Lemley, two of the main US patent theorists of the early 21st century have called “*holdouts*” firms that own “*narrow biotechnology patents*” who “*refuse to license their essential sliver of the pie unless bribed*”.<sup>31</sup>

Yet, patent holdout is a term of art that need not be restricted to a specific industry. Lichtman for instance, talks of “*patent holdout*” in relation to technical standards to describe the conduct of patent claimants who sue to extract excessive royalties from unlicensed implementers or who refuse to submit their patents to SSOs.<sup>32</sup>

## B. FIRST ORDER PROPERTIES OF HOLDOUT

From the reviewed literature, several first order properties of holdout emerge. We discuss them in turn.

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57-73. Similarly, Merges, long seen as the US authority on IPR law, has employed the concept of holdout to describe IPR holders who refuse to bargain for strategic reasons. See Merges, Robert P. "Contracting into liability rules: Intellectual property rights and collective rights organizations." *California Law Review* (1996): 1293-1393. The concept has also been used by the DoJ in Letter from Joel I. Klein, Assistant Attorney General, Department of Justice, Antitrust Division, to Gerrard R. Beeney, Esq. (Dec. 16, 1998).

<sup>29</sup> Golden, John M. “Patent trolls and patent remedies.” *Tex. L. Rev.* 85 (2006): 2111.

<sup>30</sup> Heller, Michael A., and Rebecca S. Eisenberg. “Can patents deter innovation? The anticommons in biomedical research.” *Science* 280.5364 (1998): 698-701 (“*the lack of substitutes for certain biomedical discoveries (such as patented genes or receptors) may increase the leverage of some patent holders, thereby aggravating holdout problems*”).

<sup>31</sup> Burk, Dan L., and Mark A. Lemley. “Is patent law technology-specific?.” *Berkeley Technology Law Journal* (2002): 1155-1206; Burk, Dan L., and Mark A. Lemley. “Policy levers in patent law.” *Virginia Law Review* (2003): 1575-1696. And Dreyfus refers to the same term of art to discuss refusals to license patented biotechnology material. Dreyfuss, Rochelle Cooper. “Varying the Course in Patenting Genetic Material: A Counter-Proposal to Richard Epstein's Steady Course.” NYU Law School, Public Law Research Paper 59 (2003).

<sup>32</sup> Douglas Gary Lichtman, “Patent Holdouts and the Standard Setting Process” ( John M. Olin Program in Law and Economics Working Paper No. 292, 2006).



## 1. *Ownership, Property and Private Goods*

In mainstream economics, the holdout firm is a property owner. In the studies reviewed above, holdout invariably occurs when an economic agent owns a private good or service that is excludable. Put differently, the common thread to holdout by landowners, shareholders, workers or patentees is to benefit from entitlements protected by a property rule. Under this system, the entitlement is protected and enforced with injunctions. This ensures that “*no one can take the entitlement to private property from the holder unless the holder sells it willingly and at the price at which he subjectively values the property*”.<sup>33</sup>

The upshot is twofold. *First*, it is improper to talk of holdout to denote the conduct of economic agents who are not property owners. Conversely, if an economic agent impinges on the property of another person, then the concepts that should be used relate to trespass, theft or piracy. This remark has a number of important implications that are explored in the next sections.

*Second*, holdout power is a function of the effectiveness of the property rule. Endogenous or exogenous factors may render property enforcement imperfect, uncertain or costly, and in turn limit holdout power. Patent infringements may for instance be difficult to detect or courts may not grant injunctions automatically. By the same token, if society chooses to make adjustments to the property rule (and/or remedies), and move to a liability rule where entitlements can be transferred with compensation, then holdout is no longer an issue.<sup>34</sup> Similarly, property rights over intangibles, as opposed to “*real property*”,<sup>35</sup> may give less holdout power, simply because detection of infringements is spatially more costly with intangibles than with tangibles.

## 2. *Strangers, Nonmarket Exchange and Coordination Problems*

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<sup>33</sup> Calabresi, Guido, and A. Douglas Melamed. “Property rules, liability rules, and inalienability: one view of the cathedral.” *Harvard law review* (1972): 1089-1128.

<sup>34</sup> *Id.*

<sup>35</sup> Cohen, Lloyd. “Holdouts and free riders.” *J. Legal Stud.* 20 (1991): 351 *supra* \_\_\_\_ at \_\_\_\_.

Holdout corresponds to a situation where strangers do not transact.<sup>36</sup> No coordination occurs between A and B even though it may be in their reciprocal interest to exchange. In particular, the owner of a valuable resource chooses not to sell, even though a positive economic surplus may be shared between him and a buyer.<sup>37</sup>

These features help distinguish holdout from other fields of economics which study the governance of exchange, which looks in particular at the factors that are conducive to agreement (exchange of hostages, of promises, etc.) or that govern a pre-entered agreement (contingency clauses, default rules in incomplete contracts, etc.).

### 3. *Distribution v Efficiency*

Any student of holdout can instantly notice that the scholarship is divided on whether holdout is a distributional or an efficiency problem. On one side of the spectrum, some studies essentially discuss holdout as a bargaining problem. Holdout occurs when economic agents fail to agree over the sharing of economic surplus. Wiggins and Libecap talk of the failure of oil unitization as “*another example of distributional conflicts over rental shares*”. Epstein gives a stylized description of distributional holdout: “*Holdout problems usually arise when the consent that has to be obtained must be obtained from some person whose welfare is negatively affected by A's conduct. But there is no strict reason why this limitation has to be observed. It could well be the case that the power to holdout is given to B, who stands to lose nothing if A has his way. B has a holdout position simply by virtue of the fact that A cannot undertake some desired action without her consent. Where the unique consent of B is necessary for A to act, the question is whether some form of bargaining breakdown will prevent these two parties from achieving the state of affairs that leave both better off than before*”.<sup>38</sup>

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<sup>36</sup> Epstein, Richard A., F. Scott Kieff, and Daniel F. Spulber, , “The FTC, IP, and SSOs: Government Hold-Up Replacing Private Coordination,” 8 *Journal of Competition Law & Economics* 1 (2012) (“*In contrast, the holdout problem is one that arises between strangers who have had no course of dealing with each other*” at \_\_\_\_).

<sup>37</sup> López, Edward J., and J. R. Clark. "The Problem with the holdout problem." *Review of Law & Economics* 9.2 (2013): 151-167.

<sup>38</sup> See Epstein, *supra* \_\_\_\_ at 559. See also, Merrill *supra* \_\_\_\_ at 65 who draws a similar distinction ( “*can lead to monopoly pricing by the seller, to unacceptably high transaction costs, or to both*”).

On the other side, several studies look at holdout through the lenses of economic inefficiency.<sup>39</sup> In this variant, holdout is depicted as a “*market failure*”, which prevents wealth maximizing transactions from taking place<sup>40 41</sup>. The point is that with holdout economic agents undertake a suboptimal amount of socially beneficial activities. For instance, when holdout occurs in land assembly, the market may lead to suboptimal-sized assemblies.<sup>42</sup> Another underlined inefficiency is delay. Hirsch notes that holdouts can “*retard the completion of important projects*”.<sup>43</sup> A last inefficiency is political. When regulators are granted the power to correct socially inefficient holdout (for example, under eminent domain), they may go beyond this and address “*non-holdouts*” too. Lopez and Clark explain that regulators may attempt not only to remedy strategic holdout, but also “*sincere*” holdout.<sup>44</sup> This happens for example when local institutions function as real estate companies, essentially buying and selling properties, leasing to commercial and retail tenants, etc.

But whether holdout is a distributional or an efficiency issue is largely an *empirical* question. And the answer to this need not be binary. Instead, it is a matter of degree, and a function of the existence of imperfect substitutes to the holdout asset. Consider the example of A that is held out by B. If we assume that the distance between the letters of the alphabet denotes imperfect substitutability, then holdout will be distributional if A can turn to C, D and E which are imperfect but close substitutes. However, holdout will produce efficiency losses if A’s alternatives are X, Y and Z which are distant and very imperfect substitutes. At the extreme, holdout or the potential for holdout could result in the lack of transactions altogether.

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<sup>39</sup> See Calabresi and Melamed, *supra* \_\_\_\_.

<sup>40</sup> See Atiram, *supra* \_\_\_\_.

<sup>41</sup> See Cohen, *supra* \_\_\_\_.

<sup>42</sup> See Merrill, *supra* \_\_\_\_.

<sup>43</sup> See Hirsch, *supra* \_\_\_\_\_. See also, Kaplow and Shavell, *supra* \_\_\_\_ at 1688 who note that the takings power can resolve delays encountered in purchases negotiation with a recalcitrant parcel seller, and therefore be socially advantageous.

<sup>44</sup> See Lopez and Clark, *supra* \_\_\_\_.

The upshot of this is that it is inappropriate to talk of holdout firms as “*monopolists*”,<sup>45</sup> to assume that holdout is a “*market failure*”,<sup>46</sup> or to say that holdout occurs in “*thin market*” settings.<sup>47</sup> With exceptions,<sup>48</sup> the economics literature has avoided to follow that route. It treats holdout as a transactional problem that may, depending on the circumstances, degenerate into an efficiency issue<sup>49, 50</sup>.

#### 4. *Self Interest*

In mainstream economics, holdout is described as a form of self-interest. The literature envisions holdout as rational, utilitarian conduct. In some studies, holdout is discussed by reference to “*strategic reasons*”. Cohen writes, for instance, that “*successful holdout requires accurate information and a high degree of negotiating, bargaining, and bluffing skills*”. That said, it is unclear if those authors have in mind anything other than profit maximization. Even the most serious holdout scenarios, such as necessity cases (*eg*, the boat owner stranded in a sudden storm who needs access to a dock), involve no more than ordinary garden-variety profit maximization.<sup>51</sup>

We give weight to this point to stress that the literature does not make *bad behavior determinant* of holdout. There is no moral judgment on the degree of “*honesty*” or “*candor*” of the holdout agent. And neither is there a suggestion that holdout implies any form of “*fraud*”, “*deceit*” or “*guile*”.

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<sup>45</sup> See Hirsch, *supra* \_\_\_\_.

<sup>46</sup> See for instance, Cohen, *supra* \_\_\_\_.

<sup>47</sup> See Merrill, *supra* \_\_\_ at p.65. See also, Shelanski, Howard A., and Peter G. Klein. “Empirical research in transaction cost economics: A review and assessment.” *Journal of Law, Economics, & Organization* (1995): 335-361.

<sup>48</sup> See Hirsch, *supra* \_\_\_\_.

<sup>49</sup> See Kim and Mahoney, *supra* \_\_\_\_ (talking of holdout as a contracting problem: “*profit-maximizing incentives of individual oil firms, including potential holdout motives, lead to inflexible economic and political positions, making contracting difficult.*”).

<sup>50</sup> Schlag, Pierre. “The problem of transaction costs.” *Southern California Law Review* 62 (1989) (talking of a “*classic pattern of transactions costs*”).

<sup>51</sup> See Epstein, *supra* \_\_\_ at 577 and following.

This point can be better seen through three examples taken from the market for control of corporations. Consider first a proposed takeover, where it is anticipated that under the new management the share price will increase. The law says that all the shares must be held by a single entity to trigger a change of control. In this setting, each and every rational shareholder has an incentive to hold out, and demand a share of the gain expected to result from the change of control, and there is no guile in this.

Consider next that the raider is a foreign firm, and that one shareholder is an activist patriot. In this variant, the shareholder may holdout of a welfare enhancing transaction, simply by virtue of his own political beliefs.

Last, assume that the raider has already bought a majority of the stock of the target, after having obtained early informal assurances by the minority shareholders that they would sell. Short of control, the reselling value of a majority stake on the market is limited. The minority shareholders who are aware of the raider's substantial opportunity cost may renege on their informal promise, and holdout to extract more than the "*true value*" of their share.<sup>52</sup>

In all three instances, holdout arises. The common thread to all such scenarios is that the incentives of the property owner and the other parties are not aligned. But the occurrence of bad behaviour – in the third scenario – is merely coincidental, not determinative.

### C. THE PERMUTATION HYPOTHESIS

In the area of patent policy, a current of economics literature has abandoned the term of art of holdout, and instead used *systematically* a distinct concept of patent "*holdup*" to refer to patent owners' refusal to license their patents. Below, we describe the turn taken in this current of the economic literature (1). We then expose how the concept of patent holdup deviates from established mainstream economics (2). We finally explain why we call this a permutation (3).

#### 1. Patent Holdup Theory

Instead of resorting to the established concept of holdout, a number of economists interested in patent policy in the early 2000s have *systematically* started to use a concept of

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<sup>52</sup> Miceli, Thomas J., and Kathleen Segerson. "A Bargaining Model of Holdouts and Takings." *American Law and Economics Review*, vol. 9, no. 1, 2007, pp. 160–174

“*holdup*” to talk of patent owners’ strategies.<sup>53</sup> This movement has been widely followed in subsequent economics research. It has progressively spilled over into law and policy papers, and today, there is a substantial body of derivative literature on “*patent holdup*”. Amongst this scholarly thicket, the seminal economic works are essentially traceable to four papers, the common thread of which is to feature Berkeley economist and former US DoJ official Professor Carl Shapiro as author or co-author. Those four papers consist of: a non- formal policy paper of 2001 (“the policy paper”); a formal economics working paper of 2006 which was later published in the *American Law and Economics Review* (“the economics paper”); one interdisciplinary paper of 2007, written with the famous IP lawyer Mark Lemley, funded by several high tech firms, and published in the *Texas Law Review* (“the interdisciplinary paper”); and one antitrust paper of 2007 written with Professor Joseph Farrell and two economic consultants (“the antitrust paper”).<sup>54</sup> Interestingly, those four papers have become a “*standard narrative*” to support remedial initiatives against patent holdup.<sup>55</sup> Yet, they draw on restrictive assumptions, intuitions and specifications that are often ignored in policy debates. In the next subsections, we unearth the specificities of the four holdup papers.

### 1.1. The policy paper

In “*Navigating the Patent Thicket: Cross Licences, Patent Pools and Standard Setting*”, Professor Shapiro discusses generally how “*cumulative innovation*” can be stifled by “*blocking patents*”, and considers the risk that the IP laws have created a “*patent thicket*”. This paper is not technical, but qualitative. It covers several issues, including cross-licensing

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<sup>53</sup> Until then, the concept of patent holdup was only casually used in economics work, and often to denote something slightly different. For instance, the patent “holdup” problem discussed by Chang in 1995 is one whereby a follow-on inventor obtains a patent on an improvement of an initial patent. See Chang, Howard F. “Patent scope, antitrust policy, and cumulative innovation.” *The RAND Journal of Economics* (1995): 34-57. See also Kaplow and Shavell *supra* at footnote 65 who write similarly that “subsequent innovators whose inventions depend on prior patented works will need to obtain licenses from existing patent-holders, and hold-up problems may arise”.

<sup>54</sup> Farrell, J., Hayes, J., Shapiro, C., & Sullivan, T. (2007). “Standard setting, patents, and hold-up”. *Antitrust Law Journal*, 74(3), 603-670.

<sup>55</sup> Barnett, Jonathan, “Has the Academy Led Patent Law Astray?”, Forthcoming, *Berkeley Technology Law Journal* (2017)).

and patent pools, but the central theme is the “*holdup problem*” which is given exposition in several full sections.<sup>56</sup>

Shapiro considers the situation of manufacturers who assemble various inputs and who may design products and place them into large-scale production without information on patents likely to issue.<sup>57</sup> Because of what he later calls “*hidden patents*”,<sup>58</sup> those manufacturers are “*highly susceptible to hold up*” by patent owners, who can shut them down by seeking injunctive relief. As a result, patent owners can extract “*far greater royalties*”.<sup>59</sup> Shapiro says that the “*holdup problem*” would be particularly acute “*in industries where hundreds if not thousands of patents, some already issued, others pending, can potentially read on a given product*”. From a social standpoint, patent holdup arguably generates welfare costs. Some manufacturers “*will refrain from introducing products for fear of hold-up*”. Others will be forced to pay royalties that will be “*reflected in the price of final goods*”.<sup>60</sup>

In this initial paper, Shapiro thus discusses under the label “*holdup*” conduct that other economists have called holdout for ages.<sup>61</sup> Yet, the policy paper nowhere makes a reference to holdout.<sup>62</sup>

## 1.2. The interdisciplinary paper

The interdisciplinary paper is a joint effort with Professor Mark Lemley, a well-known IP and antitrust academic. As its title suggests – “*Patent holdup and royalty stacking*” – the interdisciplinary paper builds on the analytical intuition laid down in the previous policy paper. It is, however, more focused, more formal and more documented.

The problem of “*patent holdup*” is discussed as follows: “*injunction threats*” entitle patent owners to “*negotiate royalties far in excess of the patent holder’s true economic*

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<sup>56</sup> See Shapiro (2001) *supra* \_\_\_\_ at 125.

<sup>57</sup> *Id.* at 119 (“*new products will inadvertently infringe on patents issued after those products were designed*”).

<sup>58</sup> This refers to the fact that patent applications are secret, slow to issue, that information on such patents is not optimal and/or that patent owners may conceal their patent positions.

<sup>59</sup> See Shapiro (2001) *supra* \_\_\_\_ at 125.

<sup>60</sup> *Id.* at 126.

<sup>61</sup> And in particular Heller and Eisenberg who are cited in one section of the paper.

<sup>62</sup> And the paper does not reference to any clear school of economic thinking or legal authority in relation to holdup.

*contribution*". Injunction threats often involve a strong element of "hold up in the common circumstance in which the defendant has already invested heavily in the design, manufacture, market and sell of the product".<sup>63</sup> This is a concern in "the case of private standard setting" because "it is extremely costly or even impossible as a practical matter to "redesign" a product standard to avoid infringing a patented technology".<sup>64</sup> In such settings, the cost borne by the defendant to switch technologies midstream is the one driving the royalties upwards, not the value of the patented technology.<sup>65</sup>

The "basic economic model" on which those claims are made involves a infringer who is already selling the product when it learns of the patent claim, be it because of unawareness, of lack of information on the patent, or of strategic conduct by the patent owner. However, there is an important tweak here. Lemley and Shapiro extend their concept of patent holdup to situations where the "patent holder approaches the downstream firm before that firm has designed its product".<sup>66</sup> Admittedly, in this case, the risk of holdup should be limited. The potential implementer that has not yet sunk investments in the product and can either attempt to design its product around the patent or decide to invest in other markets. In turn, this decreases the level of the royalties that the patent holder can demand. Yet, because the potential implementer will end up taking a license over a patent that is "probabilistic", this leads to the charging of royalties for weak patents.<sup>67</sup> We call this extension the "weak patent holdup theory". It suggests that patent owners are sometimes paid negotiated royalties, which exceed what they could have obtained in court.

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<sup>63</sup> See Shapiro and Lemley (2006) *supra* \_\_\_\_ at 1993.

<sup>64</sup> *Id.* at 2016. The patent holdup problem is also especially acute in relation to cases where the "injunction is based on a patent covering one small component of a complex, profitable, and popular product", like in the information technology sector. Moreover, the model is primarily designed to address patent assertion entities, and the extension to standards is simply implied theoretically and substantiated with two short cases (3G and WiFi), where no empirical evidence of substantial patent holdup effects has been observed as predicted in the ten years since the paper was written.

<sup>65</sup> *Id.* at 2008. Holdup occurs for the patent owner can capture value that has nothing to do with its invention.

<sup>66</sup> *Id.* at 2004.

<sup>67</sup> *Id.* In fact, the weaker the patent, the higher the holdup. They write later about "those weak patents that have the potential to hold up a large proportion of non-infringing contributions" (at 2008). And even if the infringer litigates the validity of the patent, early knowledge of a weak patent may backfire under the patent damages rules on willful patent infringement.



The interdisciplinary paper again applies holdup to the conduct of a property owner, this time with more sophistication. And again, there is a complete absence of reference to the economics discussed previously.<sup>68</sup> This is all the more striking given that Lemley himself had previously talked of holdout to denote the conduct of patent property owners in the biotech industry.

### 1.3. The economics paper

In 2010, Professor Shapiro published a paper entitled “*Injunctions, Hold-up and Patent Royalties*” in the *American Law and Economics Review*. This paper is “pure” economics. It purports to provide a formal demonstration of the conjectures developed in the previous papers.

The economics paper conveys the same understanding of holdup.<sup>69</sup> Essentially, the point is that “*The right to obtain an injunction [...] gives the patent holder the power to hold up an infringing firm that has made specific investments to design, manufacture, and sell the infringing product*”.<sup>70</sup> But in addition to the “*hidden patent*” case where the implementer inadvertently invests without knowing it infringes – here renamed “*patent surprise*” – Shapiro carries on with the expansive weak patent holdup theory introduced in the interdisciplinary paper. This extension – here called “*early negotiation scenario*” – claims that holdup may happen even when the implementer has *not* incurred sunk investments.<sup>71</sup> This scenario contemplates the situation in which the potential licensee “*can design its product to include, or exclude, the patented feature, at no extra design cost, and still have sufficient time to introduce its product as planned at time zero*”.<sup>72</sup> The point is that weak patents may be licensed at rates in excess of the true value that they would garner in damages litigation: “*when early negotiations are valuable to the downstream firm, [the potential licensee] best threat, designing around the patent, is equivalent to conceding that the patent is valid and*

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<sup>68</sup> The main “*economic theory*” that Shapiro and Lemley use is a standard Nash bargaining model.

<sup>69</sup> The paper is the revised version of a “*working paper*” released four years before.

<sup>70</sup> See Shapiro (2010) *supra* \_\_\_ at 284 (“*downstream users ... are subject to holdup because they must make sunk investments that are specific to using the patented technology*”).

<sup>71</sup> *Id.* at 300 (“*this means that the equilibrium in the early negotiations game is the same as in the hold-up game*”).

<sup>72</sup> *Id.* at 285 (“*where the downstream firm is fully aware of the patent infringement claim against it, when it initially designs its product*”).

*infringed without a fight. In this situation, the downstream firm does not get any reduction in royalties to reflect the probabilistic nature of the patent, so the royalty rate,  $\beta v$ , is not discounted at all to reflect any weakness of the patent”.*<sup>73</sup>

#### 1.4. The antitrust paper

The antitrust paper pays more heed to prior economic research. The authors explain that their focus is on a problem “*that economists call “opportunism” or “hold-up”*”,<sup>74</sup> which branches into a specific field of economics known as “*transaction cost economics*” (“TCE”).<sup>75</sup> In turn, their understanding of holdup seems restricted to cases where users have made “*sunk specific investments in the course of beginning (or preparing) to use the patented technology*”. This is congruent with TCE, which posits specific investments as a necessary condition of holdup. However, TCE theory seems also to be given a tweak. The authors consider that patent holdup is conceivable without “*opportunism*” or “*guile*”, as requested in the seminal works of Oliver Williamson. The antitrust paper argues that the “*patent holdup*” concept applies beyond cases where the patent owner engages in “*deception*” or “*strategically postpone disclosure to SSOs*”. This entitles its authors, in particular, to characterize as patent holdup cases where a patent owner and an implementer do not conclude a license because they disagree on the level of FRAND royalties.<sup>76</sup>

## 2. Patent Holdup v Mainstream Economics

Now that we have a rounded exposition of the current of literature that some call patent holdup theory,<sup>77</sup> we can detect that it marks a deviation from the frame of reference of

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<sup>73</sup> *Id.* at 299.

<sup>74</sup> See Farrell et al. *supra* \_\_\_ at 603. They then define this as “*opportunism or hold-up arises when a gap between economic commitments and subsequent commercial negotiations enables one party to capture part of the fruits of another’s investment, broadly construed*”.

<sup>75</sup> But in reality, it goes as far as Ronald Coase, 1937. See Williamson, Oliver E. “Transaction cost economics: The natural progression.” *Journal of Retailing* 86.3 (2010): 215-226.

<sup>76</sup> Though the authors say that in this situation, there is almost guile in the sense of the breach of a promise. See Farrell et al. *supra* \_\_\_ at 659: “*Conceptually, demanding non-FRAND royalties ex post is either deceptive (the patent holder’s representation that it would offer FRAND licenses was untruthful) or the breaking of a commitment (the patent holder subsequently decided not to honor its FRAND commitment)*”.

<sup>77</sup> They could be complemented by other papers, cited in the four reviewed, and in particular Farrell, Joseph, and Carl Shapiro. “How strong are weak patents?.” *The American Economic Review* 98.4 (2008): 1347-1369;

mainstream economics. As has been shown, it has been conventional in economics literature to call holdout the position held by a property owner whose consent must be obtained by a third party willing to undertake market activity. This situation corresponds to the problem studied in the four papers: a patent owner's ability to shut down an economic agent willing to manufacture products that use the patented technology. We observe, in particular, the three constituent features of holdout. *First*, we are witnessing the conduct of a property owner – namely the patent owner – who owns a good or service that is *excludable*. This important property exists through the ability of the patent owner to seek (or threaten to seek) injunctive relief in court, even though the good or service is not *tangibly* but *intangibly* excludable.

*Second*, we see that the patent owner's conduct does not necessarily involve “*bad behaviour*”. Like the minority shareholder who refuses to sell his shares in anticipation of higher profits or the parcel owner who refuses drilling rights to an oil company on environmental grounds, the patent owner may have legitimate reasons to refuse a license (like proprietary exploitation). This point is actually central in all four papers, which repeatedly insist that the theory shall not be restricted to cases of “*opportunism*”, “*guile*”, “*ambush*” or “*deceit*”.

*Third*, we discuss here the conduct of economic agents who have had little if no course of *transacting* with each other (even within SSOs which do not govern commercial transactions).<sup>78</sup> In both the “*patent surprise*” and the “*early negotiations*” scenarios, we are in an *antecedent* situation of “*non market exchange*” characteristic of holdout.<sup>79</sup> This situation is distinct from the typical holdup setting,<sup>80</sup> which assumes prior coordination through contract, and *subsequent* hazard in exchange relationships. The submission of a FRAND commitment changes nothing to this, and does not create a pre-contractual framework or agreement, because such declarations are general in content and impersonal in scope. In holdup, the parties know each other. To achieve a contractual effect, a symmetrical commitment should

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Lemley, Mark A., and Carl Shapiro. “Probabilistic patents.” *The Journal of Economic Perspectives* 19.2 (2005): 75-98.

<sup>78</sup> Epstein, Kieff, and Spulber, *supra* \_\_\_ at \_\_\_\_: “*In contrast, the holdout problem is one that arises between strangers who have had no course of dealing with each other*”.

<sup>79</sup> The argument would be if you are aware of the potential opportunism of FRAND ex ante and believe it to be a significant problem, then why would you make investments in specific assets..

<sup>80</sup> Shelanski, Howard A., and Peter G. Klein. "Empirical research in transaction cost economics: A review and assessment." *Journal of Law, Economics, & Organization* (1995): 335-361.

be taken *ex ante* by prospective implementers, which would manifest the general acceptance of the patent owner's FRAND commitment before the SSO. Short of such acceptance, the sole contract that may be envisioned, if at all, is with the SSO.<sup>81</sup>

This should have driven Shapiro and colleagues to use the concept of "*patent holdout*". Instead, however, they chose to discuss the issue under the "*patent holdup*" label. This terminological orientation is not, in itself, a problem. There is fortunately no prescription that commands the use of specific concepts in social science. Yet, all theories (even the most generic) are language-specific and hypotheses-dependent. In a famous article on the methodology of positive economics, Milton Friedman wrote:

*"A theory is, in general, a complex intermixture of two elements. In part, it is a "language" designed to promote "systematic and organized methods of reasoning." In part, it is a body of substantive hypotheses designed to abstract essential features of complex reality".*<sup>82</sup>

Therefore, when existing theories, concepts, and frames of reference are adapted or disregarded in subsequent research, this deserves to be acknowledged, and reasoned, on pain of yielding confusion and suspicion. Put differently, the proper methodological conduct of economics imposes a degree of verification of prior art and adherence to established terminology. That the holdup papers do not give any exposition to the pre-existing concept of holdout in general, and to patent holdout in particular, is perplexing.

To be sure, the four papers tie their findings to the economics of holdup, and in particular to TCE. This would certainly suffice to assuage our methodological concerns, provided that TCE theory is a better fit to their subject of inquiry. But this is less than certain. Alexander Galetovic and Stephen Haber have demonstrated that the reviewed literature marks a deviation from the classic understanding of holdup in that it dispenses with the requirement of "*opportunistic surprise*".<sup>83</sup> As they write, this is a significant omission, because opportunism

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81 Ullrich, Hanns, "FRAND access to open standards and the patent exclusivity: restating the principles, Max Planck Institute for Innovation and Competition Research Paper No. 17-04 (who notes about the EU: "*in short, in the EU, the contractual road to the enforcement of FRAND commitments, if available at all, is rather unsafe, the more so as SSOs have proved highly unwilling or unable to enforce contractual obligations (potentially) resulting from the FRAND commitments made by their participants*").

<sup>82</sup> Friedman, Milton. "The methodology of positive economics." (1953): 259.

<sup>83</sup> Galetovic, Alexander, and Stephen Haber. "The Fallacies of Patent Holdup Theory." (2016). Mimeo.

is deemed a necessary condition of holdup by virtually all TCE scholars<sup>84 85</sup>. This omission may have been driven by an ambition to extend the scope of the theory to the open and participative context of standardized technologies, where surprise is by definition absent.

But the most important issue lies elsewhere. The literature dispenses with perhaps the most foundational requirement of holdup in TCE, namely “*asset specificity*” which creates the potential for opportunism.<sup>86</sup> This problem can be seen at several levels. Let us recall the standard holdup example in the literature: firm A contracts with publishing firm B, and commits to install a site-specific printing press at the premises of B, anticipating a rental price of \$5,500. But now that the printing press exists, and knowing that it would be operated even if its owner got as little as \$1,500 (which is the press salvage value), B seeks *ex post* excuses to renege on the contract to get the weekly rental down to \$1,500. The publisher, for example, might plead that he is experiencing depressed business conditions, and that he will be unable to rent, unless the terms are revised.

What we can see is that holdup necessitates one or more firm’s specific investment,<sup>87</sup> the printing press in our example A. But Shapiro and colleagues’ work fails to make this a

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<sup>84</sup> *Id.*

<sup>85</sup> Only a minor fringe of the scholarship envisions the existence of firms without opportunism. See Love, James H. "On the opportunism-independent theory of the firm." *Cambridge Journal of Economics* 29.3 (2005): 381-397.

<sup>86</sup> See Williamson, *supra* \_\_\_ at 219 (“*For transaction cost economizing purposes, the critical dimensions of transactions are complexity, the condition of asset specificity, and the disturbances to which a transaction is subject. As among these three, the attributes of transactions that have been most important to an understanding of the governance of contractual relations are the conditions of asset specificity and outlier disturbances for which unprogrammed adaptations are needed*”); Benjamin Klein, Robert G. Crawford, and Armen A. Alchian, Vertical Integration, Appropriable Rents, and the Competitive Contracting Process, 21 *J L & Econ* 297,298-300 (1978), (at 298: the particular circumstance that makes opportunism likely is the “*presence of appropriable specialized quasi rents. After a specific investment is made and such quasi rents are created, the possibility of opportunistic behavior is very real*”); See Shelanski, Howard A., and Peter G. Klein *supra* at \_\_\_ (noting at 337 that amongst the several conditions of TCE, “*asset specificity is held to be particularly important*”); Rindfleisch, Aric, and Jan B. Heide. "Transaction cost analysis: Past, present, and future applications." *the Journal of Marketing* (1997): 30-54 (talking at 30 of asset specificity as one “*independent variable*” of transaction costs analysis)

<sup>87</sup> The definition of asset specific investment is: investment in “*an asset [that] may be so expensive to remove or so specialized to a particular user that if the price paid to the owner were somehow reduced the asset's services*

necessary condition of patent holdup. True that specific investments are present in their “hidden patent”/“patent surprise” scenario, where the downstream manufacturer had designed his products in a way that infringed on the patent. Yet, their proposed expansion to “early negotiation” settings where none of the firms has yet made design choices removes specific investments from the picture. Recall that the policy paper purports that patent holdup can occur even when the “patent holder approaches the downstream firm before that firm has designed its product”.<sup>88</sup>

There are also other ambiguities regarding the proposed connection between TCE and patent holdup theory. For example, TCE views holdup as a multidirectional phenomenon. It can come from both parties to an exchange, seller and buyer. And in fact, in the initial holdup example, the seller makes a specific investment, and the buyer holds him up by depressing the price.<sup>89</sup> This should have driven Shapiro and colleagues to contemplate the possibility holdup of patent owners by downstream manufacturers. By this, we mean whether technology developers, namely patent holders, who make specific investments into R&D that possibly leads to patents, can be *ex post* held up by technology implementers who want to bring licensing terms down.<sup>90</sup> Yet, not a trace of that hypothesis can be found in the patent holdup literature. This point is particularly apt because R&D investments are the canonical example of sunk costs in mainstream economics. And, as is well-known, sunk costs elevate exit barriers, which trap firms in business even though they earn low or negative returns.<sup>91</sup>

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to that user would not be reduced”. See Benjamin Klein, Robert G. Crawford, and Armen A. Alchian, *supra* \_\_\_\_ at 299.

<sup>88</sup> See Shapiro (2006) *supra* \_\_\_\_\_. The economics paper says even more explicitly that: ““The standard theory of hold-up and opportunism tells us that a downstream firm will be disadvantaged if it must negotiate for a patent license after it has made such specific investments. The contribution of this paper is to identify the key determinants of the hold-up component of patent royalties for probabilistic patents. One insight emerging from the model is that downstream firms can be subject to hold-up even if they are aware that they will be subject to a patent infringement suit before they make any specific investments”.

<sup>89</sup> In reality, holdup can be bidirectional.

<sup>90</sup> See Shelanski and Klein, *supra* \_\_\_\_ at 337 who point out R&D as a possible asset specific investment. They then talk of “R&D expenditure, as a proxy for physical asset specificity”.

<sup>91</sup> See Kathryn R. Harrigan, “Deterrents to divestiture,” *Academy of Management Journal* 24, no. 2 (1981): 306–323; Michael E. Porter, “Please Note Location of Nearest Exit: Exit Barriers and Planning,” California

Finally, there is one last major discrepancy between Shapiro and colleagues' subject of inquiry and TCE theory. Holdup in TCE requires a contracting framework, which is what triggers firms' commitment of resources into specific assets.<sup>92</sup> This initial contract, be it complete or incomplete, does not exist when patent owners enter into licensing talks with implementers, and the FRAND commitment given to SSO is hardly a substitute to a contract.<sup>93</sup> As explained previously, in the US and even more in the EU, FRAND commitments are generally incapable of creating an enforceable contract between SEP owners and implementers.<sup>94</sup> True, in the US, a doctrine of reliance has been occasionally applied by some courts. Yet, those judicial events remain too discrete in authority and intensity to generate the type of complete or incomplete contractual paradigm that constitutes the basis of TCE.<sup>95</sup>

### 3. *Permutation*

Why have the four papers disregarded the established term of art of holdout, and instead discussed the issue in terms of holdup? Given the standing of the papers' authors in the field, we cannot believe that this choice is inadvertent. Hence, we talk of a permutation to denote a deliberate choice of concepts in early scholarship.

Interestingly, the substitution of holdout with holdup has been accompanied by another transformation, this time at a more granular level. The substitution of holdup to holdout has necessitated distortions in the standard theory of holdup, as known in TCE. This can be seen in the "*early negotiation*" scenario (or "*weak patent holdup theory*") where the necessary conditions of "*opportunism*" and "*asset specificity*" are removed. Under this extended theory, patent holdup is deemed to arise simply because implementers license probabilistic patents,

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Management Review 19, no. 2 (1976) and Paul Geroski, Richard J. Gilbert and Alexis Jacquemin, "Barriers to entry and strategic competition," *Fundamentals of Pure and Applied Economics*, (1990): 41, 97.

<sup>92</sup>Id. at 341.

<sup>93</sup> Petit, Nicolas, *EU Competition Law Analysis of FRAND Disputes* (December 13, 2016). The Cambridge Handbook of Technical Standardization Law, Jorge L. Contreras, ed., Cambridge University Press, Forthcoming. Available at SSRN: <https://ssrn.com/abstract=2884749> or <http://dx.doi.org/10.2139/ssrn.2884749>.

<sup>94</sup> See Ullrich, *supra* \_\_\_\_.

<sup>95</sup> See Joskow, Paul L. "The role of transaction cost economics in antitrust and public utility regulatory policies." *Journal of Law, Economics, & Organization* 7 (1991): 53-83.

and the licensing fees do not discount the patents' possible weakness. There is not yet any specific investment on the side of the technology implementer. And there is no suggestion of “*guile*” by the technology developer.

#### D. RATIONALE

We are not the first to notice that the language of the holdup papers deviates from accepted terminology. In a 2007 reply to the Interdisciplinary paper, Professor John Golden noted in a footnote that Lemley and Shapiro had not used the classic term of “*hold-out*” which “*primarily suggests a demand for a better deal*”, and preferred a more “*judgmental*” concept of “*holdup*” which “*suggests both criminal conduct and a threat of immediate harm*”.<sup>96</sup> In this section we carry this intuition further, and explore possible reasons underpinning the permutation.

##### 1. *Normative v Positive Economics*

Our first explanation for the permutation hypothesis builds on Golden’s intuition. The selection of a *loaded* concept like “*holdup*” might have been a deliberate choice, designed to convince policy makers to address the issue. Semantic traps of this kind are not unprecedented. In the early 2000s, when the debate on the existence of global warning was closing in against the skeptics, the later introduced a novel, and looser concept of “*climate change*” in order to convince the public opinion that scientific uncertainty remained in climate debates.<sup>97</sup> On close examination, this conjecture has some appeal. With the exception of the economics paper, all three papers constitute exercises in *normative* economics, not positive economics (knowledge of “*what ought to be done*” v knowledge of “*what is*”). Their common thread is to carry a policy agenda, and an ambition for reform. The policy paper advocates a relaxation of antitrust inhospitality vis-à-vis cooperative efforts by technology firms to bring licensing terms down. The interdisciplinary paper proposes a reform of the rules of reasonable damages calculation as well as a selective limitation of the award of

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<sup>96</sup> See Golden, *supra* \_\_\_ footnote 16.

<sup>97</sup> Terry Anderson and Kurt R. Leube, The Climate Of Word Change, Wednesday, March 8, 2017 available at <http://www.hoover.org/research/climate-word-change>



injunctions by courts.<sup>98</sup> And the antitrust paper proposes to rely on antitrust enforcement in order to “*lim[it] royalties and other license terms to those that would have resulted had the patents been disclosed and licensing terms been bindingly negotiated ex ante*”.

The normative nature of the papers can be further detected through sociological signs. Several of their authors, and in particular Professors Shapiro and Farrell have repeatedly held senior positions with US antitrust and regulatory agencies. This may denote a proximity to government or a closer understanding of what may prompt agencies and regulators to intervene in the economy.<sup>99</sup>

We now move on to consider why the permutation could be particularly effective in policy debates.<sup>100</sup>

## 2. Anchoring

Building on the previous paragraph, behavioral sciences can help us understand why using holdup instead of holdout may not have been an innocuous choice. All advocates of a cause – scientists (us) included – understand the power of framing effects. The selection of holdup as a starting point is likely to *anchor*, in the behavioral sense, towards a benevolent and informed reader, including policy makers but also industry players and general public opinion, presenting a series of biases, priors and prejudices about patent owners and implementers.<sup>101</sup>

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<sup>98</sup> The economics paper advanced the same agenda, plus called on the courts “*to grant stays on their injunctions, giving downstream firms time to redesign non-infringing versions of their products*”. See Shapiro, *supra* \_\_\_ at 308.

<sup>99</sup> The normative nature of the papers, and the appearance of two of them in law and policy journals, may to a certain degree give the beginning of an explanation – not justification – to the resilience of various distortions in the treatment of the theories of holdout and holdup.

<sup>100</sup> That said, patent holdout has remained used to denote the conduct of patent owners by a number of patent scholars and practitioners: Lichtman, Douglas. "Patent holdouts and the standard-setting process." U Chicago Law and Economics, Olin Working Paper 292 (2006); George, Gavin D. "What Is Hiding in the Bushes-Ebay's Effect on Holdout Behavior in Patent Thickets." Mich. Telecomm. & Tech. L. Rev. 13 (2006): 557; Douglas Gary Lichtman, "Patent Holdouts and the Standard Setting Process" ( John M. Olin Program in Law and Economics Working Paper No. 292, 2006).

<sup>101</sup> Furnham, Adrian, and Hua Chu Boo. "A literature review of the anchoring effect." The Journal of Socio-Economics 40.1 (2011): 35-42 at \_\_\_\_\_. Technically, the “*anchoring bias is caused by insufficient adjustment because final judgements are assimilated toward the starting point of a judge’s deliberations*”.

As said before, holdup is a loaded concept. It embeds a host of strict assumptions. And it triggers a variety of normative inferences. Let us sift through some of them. *First*, using patent holdup accommodates the implicit idea that the patent owner must have at some point taken a *commitment* to license (at a certain specific rate level) vis-a-vis an unlicensed implementer.<sup>102</sup> In a standards context, a commonly heard story is that of “*quid pro quo*”:<sup>103</sup> a patent has eventually been deemed essential by SSO participants – included in a standards’ specification – in exchange for a FRAND commitment by its owner. On the facts, however, this idea is entirely disingenuous, because (i) essentiality declarations are unilaterally made by patent owners from the outset, not collectively by SSO participants at the onset of the standardization process; and (ii) many patents that are declared essential by their owners are ultimately not included in standards.

*Second*, the term holdup is connoted with a sense of *unfair* conduct. To be a little extreme, it portrays the firm that *shirks* on the alleged promise as a cheater, a villain, a liar. With this, even the most ordinary use of judicial remedies can be seen as bad, unethical behavior by the patent owner.<sup>104</sup> This helps to obfuscate the general acceptance that all economists deem property rules and injunctions appropriate when there are no transaction costs.<sup>105</sup>

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<sup>102</sup> See Farrell et al. *supra* \_\_\_ at 659: “Conceptually, demanding non-FRAND royalties *ex post* is either deceptive (the patent holder’s representation that it would offer FRAND licenses was untruthful) or the breaking of a commitment (the patent holder subsequently decided not to honor its FRAND commitment)”.

<sup>103</sup> Banasevic, Nicholas. “The Implications of the Court of Justice’s Huawei/ZTE Judgment.” *Journal of European Competition Law & Practice* 6.7 (2015): 463-464.

<sup>104</sup> The antitrust paper by Farrell et al. is a good example of this, because it keeps throwing suspicion on patent holdup conduct through the use of subtle qualifications, *see supra* \_\_\_ at 604: “*Bad*” behavior (such as deception) is not logically necessary for such inefficiency, but hold-up can powerfully reward deception and concealment. Emphasizing how parties may inefficiently seek hold-up power, Oliver Williamson famously described opportunism as “self-interest seeking with guile”. They add that “The pure economics are largely unaffected by whether or not guile is involved, but of course policy and legal treatment may be strongly affected”. And further, they say “While we focus primarily on such deception or failure to disclose patents, a similar economic logic underlies some cases where patents were disclosed but users assert that the patent holder is not meeting its duty to license in a reasonable fashion”. And later, again, they write about “more fundamentally, deceiving buyers or keeping them in the dark about the terms on which a technology will be available subverts the competitive process”.

<sup>105</sup> See Calabresi and Melamed *supra* \_\_\_ at 1127: “that where transaction costs do not bar negotiations between polluter and victim, or where we are sufficiently certain who the cheapest cost avoider is, there are no

*Third*, the use of holdup suggests that the infringing firm is the weak party to the exchange, because it is hostage of the patent owner by virtue of asset specific investments. Again, this completely leaves out of the picture that the patent owner may also have incurred sunk investments (eg, in R&D) and that the power play between both parties is entirely relative. This also presupposes that injunctions are automatically granted, which is untenable as a matter of law and practice. Since the US Supreme Court judgment in *eBay Inc. et al. v. MercExchange, L. L. C.* of 2006, injunctions are a subsidiary remedy that only becomes available when patent damages are proven inappropriate. And in *Huawei v ZTE*, the Court of Justice of the EU has accepted that antitrust law can bring limitations to the free and unfettered exercise of patent remedies by FRAND-pledged SEP owners.

The permutation of holdout with holdup thus moves the terms of the debate, in a sense that throws a whiff of suspicion on patent owners. It acts as a filter that colors the discussion and conveys preconceptions on patent holders and implementers.

Had the discussion been conducted in holdout terms, and not through the filter of holdup, a wholly different picture would have emerged, and new policy directions may have been followed. *First*, when A uses B's property without its consent, this can be called trespass, theft or piracy. In patent terms, A steals B's intellectual property by infringing. And theft does not only lead to welfare losses – investments into detection, protection and correction, for instance. It is also a moral wrong.

*Second*, the conventional remedy to solve holdout problems is a government taking. The state takes A's property, and provides just compensation. In a taking, as opposed to a purchase, the amount received by owners is not determined by negotiation, but unilaterally by the State.<sup>106</sup> In the patent field, the functional equivalent of a taking is a compulsory license: a court or agency suppresses the rights of a property owner, and sets a price for the license. And with euphemism, we can say that this is not an uncontroversial subject.

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*efficiency reasons for allowing intentional takings, and property rules, supported by injunctions or criminal sanctions, are appropriate”.*

<sup>106</sup> See Kaplow and Shavell *supra* \_\_\_\_ at 1688.

To close, if we are right that the holdup papers are primarily normative, rather than positive, the permutation of holdout with holdup is not surprising. However, this leaves open the question of why so little objection has been leveled by academics at this turn in the theory.

### 3. *Terminology and the State of IP Economics*

With the exception of the works of Golden (and of Haber and Galetovic in relation to holdup), the semantic trap described above has gone almost entirely unnoticed in the profession? One possible reason is that economists use non-standardized, though elegant, language, that only economists can understand.<sup>107</sup> Ian Ayres and Gideon Parchomovsky provide a good illustration, discussing the work of Shapiro in terms of holdout.<sup>108</sup>

The problem, of course, is that economists are not only read by economists, and that terminological accuracy matters when economic theories make their way towards policy, law and regulation. Lawyers, officials and judges who are accustomed to a strong degree of semantical discipline often take for granted that different words bear distinct meanings. In turn, the variance in qualifications in economics scholarship may drive non-economists into category errors if those accustomed to the ‘*one word–one meaning*’ norm draw irrelevant, unnecessary and/or superfluous distinctions amongst concepts. To be more concrete, the introduction of holdup as a new term of art may be understood as denoting a novel kind of market failure worthy of policy consideration, when in fact the phenomenon has been well-known for decades.

This problem that we underline here may be particularly acute in relation to IP economics. Unlike other areas of the law such as antitrust, economic theory has generally received less attention in intellectual property scholarship.<sup>109</sup> This is particularly true of TCE or the theory of the firm. In turn, many concepts of IP economics are still in a state of flux and have not reached the analytical maturity observed in other areas. Ron Katznelson and John Howells remark for instance that “*There is rich metaphorical vocabulary in the patent literature, describing patent litigation and “prohibitive” demands for royalties for licensing under key*

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<sup>107</sup> Another one is that economists do not read law articles and even less footnotes.

<sup>108</sup> Ayres, Ian and Parchomovsky, Gideon, "Tradable Patent Rights" (2007). Faculty Scholarship Series. Paper 1166

<sup>109</sup> Noting this in relation to the theory of the firm, *see* Burk, Dan L. "Intellectual property and the firm." *The University of Chicago Law Review* (2004): 3-20.

*basic patents, which conveys essentially the same meaning as patent ‘hold-up’ such as patent logjam, thicket, deadlock, gridlock and impasse”.*<sup>110</sup>

#### 4. *The Conduct of Economics*

In a critique of the commonplace “*holdup*” explanation for the acquisition of Fisher Body by General Motors, Ronald Coase noted that “*the belief in the truth of a theory leads to a lack of interest in what actually happens is not uncommon in economics*”.<sup>111</sup>

The patent holdup theorists may have been victims of the same illusion. Their discussion of injunction on FRAND-pledged SEPs as a new instantiation of “*holdup*” does not seem based on a careful empirical investigation, but instead displays a “*casual attitude toward checking the facts*”.<sup>112</sup> As we have already stressed, the patent holdup theorists dispense with explaining how their proposed theory can stand alive absent the basic conditions of opportunism and asset specificity.

Moreover, their “*early negotiations*” scenario or “*weak patent holdup theory*” pays lip service to the reality of patent transactions. Recall that this variant of the theory suggests that there can be holdup when negotiations between the patent holder and the downstream firm occur and the latter has not yet designed its product. This is because the royalty rate that will be negotiated does not involve *any* discounting based on patent strength so that royalties are paid for weak patents. According to Lemley and Shapiro, there is “*no such discounting because if licensing negotiations break down, the downstream firm will design its product to avoid infringing, which involves foregoing the use of the patented feature for sure, not merely in the*

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<sup>110</sup> Katznelson, Ron D. and Howells, John, The Myth of the Early Aviation Patent Hold-Up – How a U.S. Government Monopsony Commandeered Pioneer Airplane Patents (September 14, 2013). *Industrial and Corporate Change*, Vol. 24(1), pp.1-64, (February 2015). Similarly, Professor Robert Merges, an economics savvy lawyer, talks of conduct of the blocking conduct of a patent owner as holdup in 1994 and as holdout in 1996. Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 *Colum. L. Rev.* 2655 (1994) ; Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 *Tenn. L. Rev.* 75 (1994). Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 *Cal L. Rev.* 1293, (1996).

<sup>111</sup> Coase, Ronald. "The conduct of economics: the example of Fisher Body and General Motors." *Journal of economics and management strategy* 15.2 (2006): 255 at 275.

<sup>112</sup> *Id.* at 275.

*event that the patent would be proven invalid*".<sup>113</sup> However, this somewhat strong claim posits arbitrarily that the downstream firms will not make the argument of the patent's probabilistic weakness to maximize their surplus. We would question why the downstream firm would forego a bargaining argument that can further decrease the royalty rate below the higher default point of redesign cost. Even more importantly, this point ignores that, on the facts, a licensee does not indeed discount because he can anticipate to be refunded at some point due to the operation of non-challenges clauses – which cannot be prohibited under modern antitrust laws – or through the invalidation of the patent by other licensees.<sup>114</sup>

Besides, the patent holdup literature does not contemplate that all patents are not homogeneously probabilistic. In this regard, the four papers fail to discuss whether there is (i) an endogenous threshold level of patent weakness at which “*holdup*” becomes problematic; and (ii) an exogenous set of factors that affect the probabilistic validity of a patent. For instance, it is widely known that the rate of patent invalidity is lower in the EU than in the US. Similarly, the fact that SSOs share their documentation with patent offices such as the USPTO or the EPO gives rise to fewer patents being issued, and in turn increases patent quality.

A third aspect that lacks in factual backing can be seen in the bold claim that patent holdup results in a loss of efficiency.<sup>115</sup> The papers indeed pretend that patent owners exact a tax on new products, which impedes rather than promotes innovation.<sup>116</sup> Again, the emerging empirical scholarship on holdup and royalty stacking invalidates this conjecture, and no counter evidence has yet been advanced by the patent holdup scholars to corroborate their

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<sup>113</sup> See Lemley and Shapiro *supra* \_\_\_\_ at 2004-2005.

<sup>114</sup> Similarly, the statement that “*The downstream firm cannot adopt a strategy of “redesign only if the patent is valid” without exposing itself to holdup if the patent is valid*” is disingenuous because if there is a valid patent, then redesign will be ex hypothesi complex. Moreover, the idea that there is overcompensation (holdup) is strange, because here the patent can be deemed strong.

<sup>115</sup> See for this finding, Benjamin Klein, Robert G. Crawford, and Armen A. Alchian, *supra* \_\_\_\_ at 301.

<sup>116</sup> See Lemley and Shapiro, *supra* at 1993.

early conjectures.<sup>117</sup> Instead, both Shapiro and Lemley have sought to get away with this emerging empirical literature by criticizing it for being “*faith-based*” or “*myth*”.<sup>118</sup>

## II. PATENT TRESPASS: DEFINITIONAL ISSUES

Now that we have argued that holdout is an improper term to denote the conduct of an unlicensed implementer, we must come up with a distinct, better term. As hinted above, a more appropriate characterization may be patent “*trespass*”.<sup>119</sup> This concept captures the idea that the product of a technology implementer involves a “*relatively gross invasion*” over a technology developer’s patent claims.<sup>120</sup>

In this Part, we attempt first to provide a definition of patent trespass, using prior works on what was until now called patent holdout (A). We then rely on the output of qualitative interviews to propose stylized examples of patent trespass (B).

### A. PATENT TRESPASS: A REVIEW

The scholarship on patent trespass is scant, possibly because of the initial concept’s deviation from standard economic theory. At a general level, patent trespass can be said to arise when a SEP holder’s licensing revenue decreases, because some (or all) technology implementers avert, either temporarily or permanently, the conclusion of a licensing agreement on terms that correspond to recognized industry practices. Golden refers to this as a “*catch me if you can problem*”.<sup>121</sup>

Beyond this general definition, the literature documents many variants of patent trespass. A common form of trespass arises when willful SEP infringement remains

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<sup>117</sup> See Haber and Galetovic, *supra* \_\_\_\_.

<sup>118</sup> Lemley, Mark A. "Faith-Based Intellectual Property." *UCLA L. Rev.* 62 (2015): 1328 ; Shapiro, Carl, “patent holdup: myth or reality”, mimeo.

<sup>119</sup> We are grateful to Steve Haber for pointing out to this concept as a good substitute for “*holdout*”.

<sup>120</sup> Merrill, Thomas W. "Trespass, nuisance, and the costs of determining property rights." *The Journal of Legal Studies* 14.1 (1985): 13-48.

<sup>121</sup> See Golden, John M. "Patent trolls and patent remedies." *Tex. L. Rev.* 85 (2006): 2111.

undetected, and implementers wait to get sued.<sup>122</sup> A related version of patent trespass occurs when detected infringers refuse or delay negotiation and/or payment.<sup>123</sup> Patent trespass can also arise before courts, when infringing defendants resort to “*diversionary tactics*” in litigation.<sup>124</sup> Technology implementers may attempt to challenge the validity and/or essentiality of the SEP as counterclaims before the same court,<sup>125</sup> or as independent demands before other judicial forums. In this discussion, the limit between trespass and legitimate patent defenses – laches, estoppel and equity –<sup>126</sup> is not always entirely clear. Other studies are more outcome-spirited, and single out patent trespass in valuation terms. Langus, Lipatov and Neven – who talk of “*reverse holdup*” – consider that patent trespass occurs when the proposed, negotiated or settled royalties lead to “*below FRAND rates*” or are “*below the fair rate*”. Last, some include in patent trespass the advocacy efforts deployed by technology implementers’ to weaken the enforceability of SEPs with SSOs, regulatory agencies and policy makers.<sup>127</sup> Kieff and Layne Farrar talk of “*using the courts or agencies to obtain better terms and conditions than could be achieved through good faith negotiations*”.<sup>128</sup> Again, however, the threshold level between the fundamental right to petition government and patent trespass lacks in clarity.

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<sup>122</sup> Egan, E., and D. Teece. "Untangling the Patent Thicket Literature." Tusher Center for Management of Intellectual Capital. Working Paper 7 (2015).

<sup>123</sup> Barani, Marie. "From Patent Hold-Up to Patent Hold-Out?." International Journal of Standardization Research (IJSR) 14.1 (2016): 1-19. For instance, they may insist on specific licensing terms, to put the SEP owner in breach of its duty of non discrimination under a FRAND commitment. See Israel, Sharon A. 2015. Draft AIPLA Comments to Japan FTC IP Guidelines. Drafted July, 21, 2015, updated August 6, 2015.

<sup>124</sup> Egan, E., and D. Teece., *supra* \_\_\_\_.

<sup>125</sup> Ménière, Yann and Thumm, Nikolaus, Fair, Reasonable and Non-Discriminatory (FRAND) Licensing Terms – Research Analysis of a Controversial Concept, European Commission Joint Research Centre Institute for Prospective Technological Studies, 2015.

<sup>126</sup> See Lichtman, *supra* \_\_\_\_ for an exposition of ordinary patent defenses.

<sup>127</sup> J. Gregory Sidak, “Patent Holdup and Oligopsonistic Collusion in Standard-setting Organizations,” 5 Journal of Competition Law & Economics 123 (2009); Kieff, F. Scott, and Anne Layne-Farrar. "Incentive Effects from Different Approaches to Holdup Mitigation Surrounding Patent Remedies and Standard-Setting Organizations." Journal of Competition Law and Economics (2013): nht030.

<sup>128</sup> Kieff, F. S., & Layne-Farrar, A. (2013). Incentive Effects from Different Approaches to Holdup Mitigation Surrounding Patent Remedies and Standard-Setting Organizations. Journal of Competition Law and Economics, nht030.



In the scholarship, the determinants of patent trespass are equally heterogeneous, yet even more elusive. Some scholars stress transactions costs, in the form of detection costs, negotiation costs and litigation costs, as a possible driver.<sup>129</sup> In particular, the litigation time reduces the litigation payoff of the patent owner, as injunctions are less powerful.<sup>130</sup> At the same time, it is entirely unclear why SEP owners would systematically face transaction costs disadvantages over technology implementers.

SEP owners may also be undercompensated – a by-product of patent trespass – when there is “*uncertain detection*”.<sup>131</sup> Yet, what causes uncertain detection is not discussed in the literature.

A firm’s organizational structure, size or reputation is said to expose it to higher risks of patent trespass.<sup>132</sup> For instance, small firms, new entrants or pure innovators which cannot leverage a reputation effect may be at risk.<sup>133</sup> Similarly, some claim that the “*relative size of the infringer as compared to the SEP owner*” may play a role, entitling big implementers to resist claims of legitimate compensation vindicated by small developers.<sup>134</sup> But, a plausible counter-argument is that when the implementer is small relative to the SEP owner, the later may renege on lost licensing revenue in particular if transaction costs are high.

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<sup>129</sup> Epstein, Richard A., F. Scott Kieff, and Daniel F. Spulber. "The FTC, IP, and SSOs: Government Hold-Up Replacing Private Coordination." *Journal of Competition Law and Economics* 8.1 (2012): 1-46 (“*The situation is difficult enough if the patentee is in a position to identify and pursue, often at great cost, the large number of infringers. But these assumptions ignore the high costs in the detection and enforcement of these rights [...]*”).

<sup>130</sup> Langus, Gregor, Vilen Lipatov, and Damien Neven. "Standard-Essential Patents: Who Is Really Holding Up (and When)?." *Journal of Competition Law and Economics* 9.2 (2013): 253-284.

<sup>131</sup> Vincenzo Denicolò, Damien Geradin, Anne Layne-Farrar, & Jorge Padilla, “Revisiting Injunctive Relief: Interpreting eBay in High-Tech Industries with Non-Practicing Patent Holders,” 4 *Journal of Competition Law & Economics* 571 (2008).

<sup>132</sup> Chien, Colleen V. "Holding up and Holding out." *Mich. Telecomm. & Tech. L. Rev.* 21 (2014): 1.

<sup>133</sup> ECSIP, “Patents and standards: A modern framework for IPR-based standardization”, Study prepared for the European Commission Directorate-General for Enterprise and Industry, \_\_\_ at \_\_\_ (“*Small, financially constrained innovators or new entrants that cannot leverage a “reputation effect” are thus particularly at risk among SEP owners*”).

<sup>134</sup> Chien, *supra* \_\_\_\_.

The risk of adverse effects and asymmetrical stakes is often advanced as a source of patent trespass. An SEP owner who decides to assert SEPs against an unlicensed implementer brings himself under the risk of patent invalidation before the court where the case is litigated or before other forums (patent offices, etc.).<sup>135</sup> Even if the patent is not invalidated, the court may offer an original reading of the patent in suit, and exclude certain acts of implementation of infringement.

Above and beyond all those factors, one area of relative consensus is that limitations to the availability of injunctive relief – categorically or discretely – contribute to the formation of patent trespass.<sup>136</sup> Consider an extreme case where injunctive relief is off the table. Assume that the maximum liability faced by a SEP infringer is compensatory damages capped on the outcome of a hypothetical *ex ante* negotiation. In this setting, technology implementers have no incentives whatsoever to enter into a licensing agreement.<sup>137</sup> At best, their infringement will go unnoticed, or will be belatedly detected by the SEP owner. At worst, they will be sued, but over the lifetime of the lawsuit, many contingencies occur, and they may be better off “*tak[ing] their chance*” in court.<sup>138</sup> Risk aversion, litigation fatigue or some factors previously outlined above may cause an SEP owner to enter into a favorable settlement. In the worst-case scenario, the technology implementer will pay fully compensatory damages, and this will be akin to a deferred payment (possibly inflated by the plaintiffs’ lawyers fees outside of the US).<sup>139</sup> Camesasca, Langus, Neven and Treacy note that

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<sup>135</sup> *Id.*

<sup>136</sup> For an example of a proposal to categorically restrict injunctions, see Morton, Fiona Scott, and Carl Shapiro. “Patent Assertions: Are We Any Closer to Aligning Reward to Contribution?”. No. w21678. National Bureau of Economic Research, 2015.

<sup>137</sup> Kieff, F. Scott, and Anne Layne-Farrar, *supra* note \_\_\_\_ at \_\_\_\_ arguing against a categorical rule limiting injunctions when a FRAND commitment has been given: (“*For example, interpreting a RAND commitment as preventing patent holders from ever seeking an injunction would overlook the dynamic impact it would have on incentives for putative licensees to take a license up front.66 More specifically, infringers would rationally consider the benefits of simply avoiding any up front offer to take a license on any terms, RAND or not, knowing that on the back end they will not have to face an injunction for any patent that makes its way into any RAND commitment from within an SSO*”).

<sup>138</sup> Geradin, Damien. "6 Reverse Hold-ups: The (Often Ignored) Risks Faced by Innovators in Standardized Area." *The Pros and Cons of Standard Setting* (2010): 101.

<sup>139</sup> Kattan, Joe, and Chris Wood. "Standard-Essential Patents and the Problem of Hold-Up." Available at SSRN 2370113 (2013).

denying injunctions gives prospective licensees “*enhanced ability and incentives to free ride on SEPs*”.<sup>140</sup>

Virtually all authors agree that injunctions seek to promote the conclusion of licensing contracts when technology is relevant.<sup>141</sup> Restricting their availability may be particularly conducive to trespass in relation to technologies subject to rapid life cycles, such as wireless communications.

Examples of trespassing conduct have been reported in several jurisdictions: US,<sup>142</sup> EU,<sup>143</sup> India and Brazil.<sup>144</sup> Beyond those individual occurrences of patent trespass, a more obscure question concerns the overall welfare impact of patent trespass. Much of the abovementioned scholarship makes the qualitative point that patent trespass is likely to affect technology developers’ incentives to contribute to SSOs and, even before this, to make long term innovation investments.<sup>145</sup> However, only few studies have formally or empirically studied the adverse economic effects of patent trespass. Langus, Lipatov and Neven find that reverse hold up (royalties below the fair rate) may arise in equilibrium even when injunctions

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<sup>140</sup> Camesasca, Peter, et al. "Injunctions for Standard-Essential Patents: Justice Is Not Blind." *Journal of Competition Law and Economics* 9.2 (2013): 285-311.

<sup>141</sup> Epstein, Richard A., F. Scott Kieff, and Daniel F. Spulber. *supra* note \_\_\_\_ at \_\_\_\_ (about injunctions as a common remedy in patent law: “*The combined effect of this approach to patent remedies is that parties in the patent marketplace are encouraged to contract with each other during the time frame in which the patented technology was put to significant use*”).

<sup>142</sup> Lim, Daryl, Patent Holdups (September 30, 2015). Daniel D. Sokol & Roger D. Blair (eds.), *Antitrust Intellectual Property and High Tech Handbook* (Cambridge University Press, Forthcoming) .

<sup>143</sup> Picht, Peter, \_\_\_\_ (reporting on German cases illustrative of holdout conduct).

<sup>144</sup> Barani, Marie., *supra* note \_\_\_\_.

<sup>145</sup> Vincenzo Denicolò, Damien Geradin, Anne Layne-Farrar, & Jorge Padilla, *supra* \_\_\_\_ at \_\_\_\_ (“The main point here is how the granting of an injunction would affect incentives for innovation. While in the short-term limiting injunctions may protect the investments of manufacturing firms, long-term innovation might be chilled. In particular, if injunctions are granted on the basis of whether the patent holder actually practices its invention or whether the product incorporates multiple patented inventions, the viability of a worthy business model would be hindered and incentives for innovation would be reduced. For all of these reasons, we agree with the majority opinion in the eBay decision: categorical limits on injunctive relief are not needed and could do much harm”).

are systematically granted, but they do not associate any welfare estimate to that effect.<sup>146</sup> Ganglmair, Froeb and Werden explain that when licensing negotiations occur after the innovator's investment in R&D is sunk and before the implementer sinks its investment in the standard, any reduction in the availability of injunctive relief "*reduc[e] the payoff from R&D and makes some projects no longer worth pursuing*".<sup>147</sup>

## B. PATENT TRESPASS STRATEGIES

### 1. *General Properties of Patent Trespass Strategies*

At a very general level, patent trespass occurs when a firm practices a patented technology, a SEP in the context of this paper, yet refuses to take a license. Our sample of interviews highlights several specificities of patent trespass (note that our respondents were interviewed on "holdout", but for the reasons previously explained, we document our results in terms of trespass). *First*, patent trespass is *intentional*. A firm that trespasses knowingly practices a patented technology. As mentioned by one respondent, patent trespass is a situation that develops after a SEP holder writes to a company to say that there is actual or future infringements. Patent trespass can therefore be distinguished from inadvertent patent infringement and the customary vetting process required to ascertain essentiality and validity in patent disputes in so far as this process is undertaken without the specific purpose to delay as discussed below.

*Second*, while patent trespass consists of a refusal to take a license, it often manifests itself through less explicit strategies. Most respondents insist that patent trespass is essentially about seeking to *delay* the initiation or progression of licensing negotiation with the goal of eliminating or reducing the amount of royalties paid to the SEP holder. Given that licensing negotiations and litigation can take many years, the combination of direct costs and the uncertainty of judicial outcomes favors a strategy of delay on behalf of the SEP implementer in the absence of accessible injunctive relief.

*Third*, even if the patent owner can successfully claim compensatory damages with interest rates, patent trespass is not simply akin to a deferred payment. The reasons for this

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<sup>146</sup> Langus, Gregor, Vilen Lipatov, and Damien Neven. "Standard-Essential Patents: Who Is Really Holding Up (and When)?" *Journal of Competition Law and Economics* 9.2 (2013): 253-284.

<sup>147</sup> In other words, fewer socially beneficial R&D projects are undertaken. See Ganglmair, Bernhard, Luke M. Froeb, and Gregory J. Werden. "Patent Hold-Up and Antitrust: How A Well-Intentioned Rule Could Retard Innovation." *The Journal of Industrial Economics* 60.2 (2012): 249-273.

are diverse. One of them is that interest rates are lost on the pre-negotiation period. Another one is that interest rates are generally much lower than internal rates of return.<sup>148</sup> And a last, important consideration is that depending on the rules on legal fees, the patent owner may bear some (or all) of the costs of litigation. At the extreme, if delaying tactics work to their full extent, even the prospect of getting compensatory damages from a court may become uncertain, for instance when the patent approaches expiry or when the standard has been phased out and replaced by a new generation.<sup>149</sup>

*Fourth*, most respondents consider that there is some symmetry between patent holdup and trespass. A patent holdup situation necessitates that injunctive relief be available, otherwise there is no compulsion to pay supra-FRAND rates. In contrast, patent trespass exists when injunctive relief is not available, potentially leading to the compulsion to settle on sub-FRAND rates. That said, most respondents explain that patent trespass can occur even where injunctive relief is available. This could be due to the fact that the transaction costs of litigating for an injunction may be prohibitively high as compared to the value of the case.<sup>150</sup> In particular, when implementing firms are small and medium sized enterprises (SMEs), they may represent too little revenue for SEP owner as compared to the transaction costs of seeking a license (for instance, there are thousands of small consumer electronic firms that implement WiFi standards). Implementing firms who know this can deliberately holdout from licensing negotiations.<sup>151</sup>

*Fifth*, trespassing firms may pursue strategic goals that go beyond pure revenue sharing. Trespassing firms competing in the product market that eschew licensing payments can sell their products at lower prices and outcompete rivals who have taken licenses and paid

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<sup>148</sup> It should be noted that the delay of payment calculated at the internal rate of return of both the SEP licensor and licensee can be quite substantial for both parties. For example, a licensee that is ordered by a court to pay interest for back payments at a risk-free rate could save over 10% compounded annually over the time of the delay in relation to its actual cost of capital.

<sup>149</sup> Respondents give this as a reason why many smaller SEP holders often do not attempt to collect royalties at all or employ patent assertion entities (PAEs) to handle the collection.

<sup>150</sup> This hypothesis is made by Chien who talks of “[t]he practice of companies ignoring patents and patent demands because the high costs of enforcing patents makes prosecution unlikely” or the “practice of companies routinely ignoring patents and resisting patent demands because the odds of getting caught are small”).

<sup>151</sup> This is analogous to patent holdup when a PAE makes a license offer at a level below initial costs of due diligence in litigation.

royalties. This allows trespassing firms to capture greater profits or market share and disincentivizes any firm from taking a license unless the whole market is licensed, creating a collective action problem.

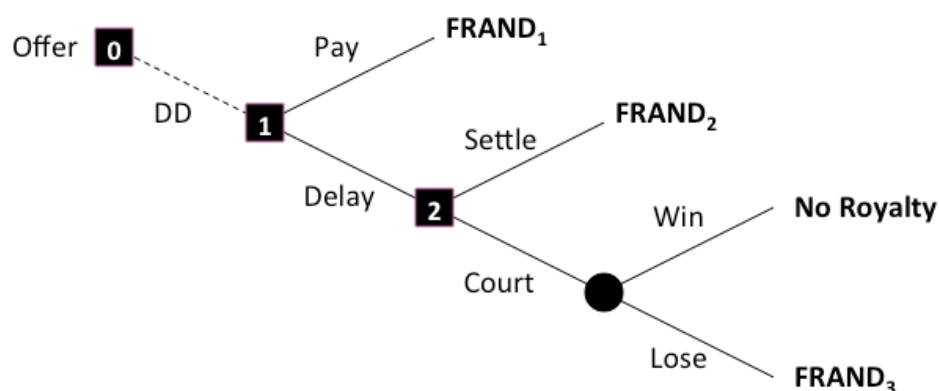


Figure 2.1 Patent trespass decision model

Figure 2.1 illustrates the decision process for delay from the perspective of the SEP implementer based on the proposed elements of patent trespass defined above. The model depicts an initial offer ( $FRAND_1$ ) followed by the decision to accept or delay.<sup>152</sup> If delay is chosen, this strategy continues until a settlement is agreed upon ( $FRAND_2$ ) or a final court decision is adjudicated ( $FRAND_3$ ).<sup>153</sup> When  $FRAND_3 \leq FRAND_2 \leq FRAND_1$  is perceived to be true, delay and litigation will be preferred over payment up until the point when the certainty of the outcome (e.g. in relation to court decision) makes settlement a better financial choice than delay.<sup>154</sup> Under this model of behavior, the SEP holder will automatically face a reduction in their initial offer ( $FRAND_1$ ) by the costs associated with delay and litigation as

<sup>152</sup> There can of course be different stages of delay in negotiation and litigation, including appeal. However, the reasonable time required to vet validity, infringement, and essentiality is not considered to be deliberate delay in the model.

<sup>153</sup> At the time of the initial offer (point 1 in Figure x), a rational SEP implementer would evaluate the potential time value of delay ( $FRAND_1(1+IRR)^t - FRAND_1$ ), the potential value of a favorable court decision ( $FRAND_1 - (1-p)FRAND_3$ ), the potential value of the SEP holder giving up ( $FRAND_2=0$ ) and the potential costs associated with the delay and litigation ( $c(t)$ ).

<sup>154</sup> For example patent damages under US law are typically determined using a standard of reasonable royalties - see 35 U.S.C. § 284, Georgia-Pacific. Thus it is not likely that a court-determined FRAND rate would exceed the initial FRAND offer made by the SEP holder. This has been shown to be true in recent US FRAND cases - see Heiden, Bowman. "Valuing Standard Essential Patents in the Knowledge Economy: A Comparison of F/RAND Royalty Methodologies in US Courts." *International Journal of Standardization Research (IJSR)* 13.1 (2015): 19-46.

well as the time value of money and the probability of success in court. In essence a potential SEP licensee is indemnified against a FRAND royalty payment up to the amount of these transaction costs. As the difficulty of litigation increases (for example, in jurisdictions where patents are more difficult to enforce), the value of patent trespass increases. Thus, this model suggests that the value of patent trespass strategies will vary across different geographical jurisdictions, producing a portfolio of decision models depending on the geography of current and future markets.<sup>155</sup>

Given that licensing negotiations and litigation can take many years, the combination of direct costs and the time value of money can erect transaction cost barriers that could block or at least diminish SEP holders ability to collect reasonable royalties. In addition, the result of patent litigation is uncertain due to the probabilistic nature of patents<sup>156</sup>, which could result in the finding of very low or no royalties depending on the jurisdiction. Moreover, the valuation theories deployed by courts in the world may differ dramatically. Finally, SEP implementers benefit from delay through improved competitive positioning in relation to licensed actors on the market. Without the availability of injunctive relief, all of these factors benefit the potential licensee and incentivize delay indefinitely, which in effect, provides the SEP implementer with a low cost option to wait.<sup>157</sup> The situation is exacerbated when there are multiple implementers, as each implementer is incentivized to trespass the longest (i.e. be the last to be sued and pay as little rent accruing to the SEP owner), as this maximizes their competitive advantage relative to their competing implementing firms. This will be especially true for technology implementers with low margins competing on cost advantage strategies.

## 2. *Stylized Examples of Patent Trespass Strategies*

Let us now turn to some instantiations of patent trespass. At this stage of our research, we can document four interesting types of delaying tactics. *First*, the trespassing firm may offer negotiation terms that are not industry practice, whereby:

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<sup>155</sup> For example, the duration, the amount and payer of court costs, and the determination of patent damages are all variables that can differ greatly across jurisdictions. The impact of these differences is apparent from the strategies deployed by global firms to choose their legal jurisdictions for dispute resolution.

<sup>156</sup> See Lemley, Mark A., and Carl Shapiro. "Probabilistic patents." *The Journal of Economic Perspectives* 19.2 (2005): 75-98.

<sup>157</sup> The strategy of delay in patent holdout could be modeled as a call option where the SEP implementer has the right but not the obligation to purchase a license from the SEP holder.

- the SEP implementer insists to discuss a license on a patent by patent basis, where portfolio licensing is the industry norm;
- the SEP implementer requests a country specific license, whilst the technology is the same worldwide and it is a multinational corporation (MNC);
- the SEP implementer constantly postpones negotiation meetings or sends a corporate envoy with no authority to conclude a licensing agreement.<sup>158</sup>

Similarly, a *second* trespass strategy can occur also in relation to litigation/arbitration strategy. For instance, the trespassing firm may agree to third party determination through arbitration, but take steps to delay the process by endlessly debating over specifications, such as the choice of the place of arbitration, the appointment of arbitrators, the number of arbitrators, etc.

A *third* possible example of trespass is reported to occur when infringers take affirmative steps to weaken the SEP holders position, including by starting invalidity proceedings before courts and patent offices, initiating antitrust complaints with competition agencies, and vindicating changes to patent policies before Standard Setting Organizations (SSOs).<sup>159</sup>

Last, within their corporate organization, some trespassing firms have set up “*licensing-in*” departments whose job it is to avoid paying anything for patent implementation, including “*licensing-in litigation groups*” whose purpose is to litigate against patent holders.

Certainly, legitimate arguments can be made by SEP implementers regarding the strategies described above as many of these actions involve issues fundamental to patent law, such as validity, infringement, jurisdiction, etc. The main question then becomes: at what point does a willing licensee, reasonably conducting due diligence and price negotiation, transition into an unwilling licensee, participating in a deliberate strategy of delay with the

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<sup>158</sup> Multiple versions of delay in negotiations have been put forward by interviewees and survey respondents including, for example, corporate restructuring, changing contacts persons on a regular basis, pretending to be close to deal and then changing opinion, requiring excessive amounts of detailed information, and delaying court proceedings.

<sup>159</sup> The *Intex v Ericsson* case in India and the recent changes to the IEEE IPR policy would be illustrations of these tactics.



primary intention to reduce or avoid completely its FRAND royalty obligation? A framework to answer this question and determine the economic impact will be discussed next.

### III. DETERMINANTS OF TRANSACTIONAL, SYSTEMATIC AND SYSTEMIC PATENT TRESPASS

In economic theory, holdup (holdout in mainstream economics) and trespass are traditionally perceived as transactional problems, and no obvious reason seems to justify a different treatment for patent holdup and patent trespass. However, the claims that patent holdup can evolve into royalty stacking and degrade innovation incentives logically invites a discussion on whether and how some factors can symmetrically turn transactional patent trespass into a systematic and systemic issue. We first define what we mean by transactional, systematic and systemic patent trespass (A) and then discuss a few “plus factors” that can influence such outcomes (B).

#### A. FRAMEWORK

At a quantum level, patent trespass is a transactional problem. In classic economic terms, patent trespass is a situation in which two firms are trying “*to divide up the pie*” through “*tough negotiations*”.<sup>160</sup> Egan and Teece refer to this in the patent world as a simple case of “*transfer payments*”,<sup>161</sup> meaning that SEP owners and implementers attempt to share economic surplus. When these negotiations and transfer payments become structured into market norms, one group of actors may hold a consistent, recurrent and predominant bargaining position over other market actors. In this case, the sharing of economic surplus no longer occurs at a discrete level, and can be described as *systematic*. Certainly, transactional and systematic bargaining power can have an impact on the performance of market actors. However, the economic significance of a transactional and systematic problem is primarily distributional, and thus incapable to force firms to reallocate their resources to other markets. Short of such a deadweight loss, it does not have an impact on economic efficiency and aggregate welfare, and as such, is not a reason for policy intervention as the only issue is one

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<sup>160</sup> L. Cohen, “Holdouts and Free riders”, *Journal of Legal Studies*. vol. XX (June 1991) at 359.

<sup>161</sup> Egan, E., and D. Teece. “Untangling the Patent Thicket Literature” Tusher Center for Management of Intellectual Capital. Working Paper 7 (2015).

of rent distribution between private actors.<sup>162</sup> To continue the analogy above, only when the quality or the size of the “*pie*” is affected, is the impact of bargaining power considered *systemic*. In this regard, transactional, systematic, and systemic market impact can be seen as different degrees on the bargaining power spectrum as shown below in Figure 3.1.

We now turn to the question of whether patent trespass can yield systematic and systemic effects similar in nature to those associated to patent holdup.

Shapiro and Lemley point out the potential systematic dimension of the patent holdup problem as “*a simple problem of arithmetic*” the problem of patent holdup is magnified when “*a single product potentially infringes on many patents, and thus may bear multiple royalty*”.<sup>163</sup> This is because, from the perspective of the patent user, all the “*different claims for royalties must be [...] stacked together to determine the total royalty burden*”.<sup>164</sup> With this background – and some paraphrasing – systematic patent trespass can thus be defined as the situation in which a *single SEP is potentially infringed by many users, and may thus forbear multiple royalty*. In turn, from the perspective of the patent owner, this produces a of royalty gap, as opposed to a royalty stack.

Let us now turn to systemic patent trespass. Shapiro and Lemley again consider that the dynamic effect of patent holdup and royalty stacking is to exact a “*tax on new products incorporating the patented technology, thereby impeding rather than promoting innovation*”. They write that “*holdup discourages investments and innovation by users, and reduces the return to complementary innovators generally*”.<sup>165</sup> Systemic patent holdup primarily implies a decrease in static efficiency through reductions in consumer surplus and a disincentive for

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<sup>162</sup> In a famous dissent in *Eastman Kodak*, Justice Scalia enumerated a long list of examples of circumstantial “leverage” due to specific investments unworthy of antitrust policy consideration (see “*the leverage held by an airplane manufacturer over an airline that has "standardized" its fleet around the manufacturer's models; or the leverage held by a drill press manufacturer whose customers have built their production lines around the manufacturer's particular style of drill press; the leverage held by an insurance company over its independent sales force that has invested in company specific paraphernalia*”). *Eastman Kodak Co. v. Image Technical Servs., Inc.*, 504 U.S. 451 (1992).

<sup>163</sup> C. Shapiro and M. Lemley, “Patent holdup and royalty stacking” (2007) *Texas Law Review*, 85(1991), 2049.

ISO 690

<sup>164</sup> *Id.*

<sup>165</sup> In a subsequent policy paper, Shapiro writes that “*SEP holdup can harm innovation and force consumers to pay higher prices*”. C. Shapiro, “Patent Holdup : Myth or Reality ?”, October 2015, mimeo.

complementary innovators that could reduce dynamic efficiency. A market experiencing systemic patent holdup would be characterized by low entry rates of new actors, increase in product prices over time, slowing market growth, and eventually total market failure as implementing firms exit the market.

Transposed in a trespass scenario, a systemic effect can be envisioned as a tax on new R&D and patents that decreases the incentives of patent owners to invest into future technologies that may become relevant to standards or to participate and contribute technology to SSOs.<sup>166</sup> In other words, the systemic effect of patent trespass can be seen as the opportunity costs for the innovator not yet committed to the project.<sup>167</sup> Systemic patent holdup would therefore result in a decrease in dynamic economic efficiency. In the context of SEPs, this would manifest itself in a reduction in performance or delay in the development of new standards, possibly through the reduction of R&D spending by technology firms in general and the exit from consensus-based standard-setting processes in particular. A market experiencing systemic patent trespass, would therefore be characterized by a reduction in technology contributions to consensus-based SSOs, increased development of de facto standards, and vertical integration or acquisitions of SEP holding firms. As the main effect of systemic patent trespass is related to the performance and timing of future standards, its impact is counterfactual and thus more difficult to measure, compared to the more obvious impact of patent holdup. Table 3.1 below provides a symmetrical contrast between patent holdup and trespass from a transactional, systematic, and systemic perspective.

	<b>Transactional</b>	<b>Systematic</b>	<b>Systemic</b>
<b>Patent holdup</b>	Circumstantial decrease in SEP implementer surplus	Royalty stack	Deadweight loss (exit of SEP implementers)

<sup>166</sup> This includes not only the amount of investment in R&D, but also in the standard-setting process. See Baron, Justus, Kirti Gupta, and Brandon Roberts. "Unpacking 3GPP standards." *Searle Center on Law, Regulation and Economic Growth Working Paper* (2015), who estimate over 3.4 million man-hours spent on 3GPP meetings between 2005-2014.

<sup>167</sup> L. Cohen, "Holdouts and Free riders", *Journal of Legal Studies*. vol. XX (June 1991)

<b>Patent trespass</b>	Circumstantial decrease in SEP holder surplus	Royalty gap	Deadweight loss (exit of SEP developers)
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Table 3.1 Patent holdup v Patent trespass

As the concepts of market power and abuse of dominant position come from a traditional industrial economic perspective associated with “*antitrust*”, it might be beneficial to forego the use of terms manifested in the traditional industrial logic of hierarchies and markets, such as “*holdup/out*” and “*patent holdup/out*”, for a more fundamental discussion on the competitive effects of an asymmetric bargaining position.<sup>168</sup> This is especially important as the institutional starting point is not a traditional vertical or horizontal relationship on a market for physical products, but instead a collaborative, open standard-setting arena based on licensing on a technology market.<sup>169</sup> In an open innovation environment, such as an SSO, the theoretical pro-competitive advantages must not only be compared to the theoretical anti-competitive disadvantages, but must be empirically investigated to determine the actual impact on the welfare of society. In turn any policy recommendation that changes the institutional norms of SSOs must be judged in light of the net economic impact on society. Figure 3.1 below provides a spectrum upon which to measure the impact of asymmetric bargaining power in the context of technology markets, in particular standards-enabled markets developed collectively through consensus-based SSOs involving SEPs and FRAND governance. The spectrum can be used to measure the current degree of asymmetric

<sup>168</sup> For example, the historical concepts of holdup and holdout, which carry specific meanings in mainstream economic theory discussed above may no longer apply in the current reality of open, collaborative innovation and thus may only serve to obfuscate the more fundamental issues at hand.

<sup>169</sup> See Heiden, Bowman and Jens Andreasson. “Reevaluating Patent Damages in the Knowledge Economy: The Intellectual Value Chain and the Royalty Base for Standard-Essential Patents”, *Criterion J. on Innovation*, 1 (2016), 229 for a deeper description of the meaning of the material and intellectual value chain in the context of SEPs and telecommunications.

bargaining power as well as provide a model to theoretically evaluate the impact of proposed policy changes.

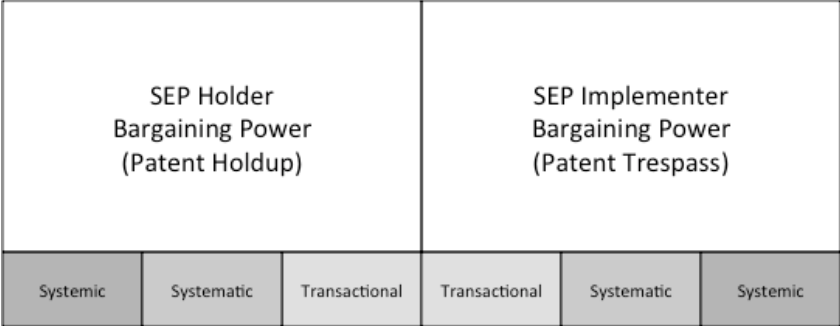


Figure 3.1 Asymmetric Bargaining Power Spectrum

**B. PLUS FACTORS FACILITATING PATENT TRESPASS**

Our interviews point to several important plus factors that can transform transactional patent trespass into systematic and systemic issues. *First*, the relative size, resources and reputation of patent owners and implementers seem to be determinant. On the one hand, the risk of systematic trespass is more acute when patent implementers are SMEs due to lower product sales that lead to unfavorable litigation costs-licensing benefits perspectives. Conversely, when patent implementers are mostly MNCs, trespass seems less systematic due to their higher sales volumes and operations in product markets with relatively well-functioning patent systems, such as in the US, Europe, and Japan. However, concentration of sales in the hands of MNCs can facilitate a systematic effect through the actions of only a small group of market leaders. For example, in smartphones, five MNCs control approximately 60% of the market.<sup>170</sup>

On the other hand, the risk of systematic trespass is aggravated when the SEP owner has a small SEP portfolio, is a non-vertically-integrated player that does not need a cross-license, or is a newcomer in a standard (no previous patent positions) or in the industry (no litigation track record) as the transaction costs of negotiation and litigation serve as effective barriers.

<sup>170</sup> 2016 Q4 global smartphone market share. Retrieved at <https://www.statista.com/statistics/271496/global-market-share-held-by-smartphone-vendors-since-4th-quarter-2009/>.

*Second*, our interviews suggest a systematic patent trespass effect can be deemed to occur when 30% or more of a relevant market is unlicensed. In this context, patent trespass is likely to be problematic in markets where there is a “*long tail*” of small infringing implementers who individually represent low licensing revenue but jointly account for large revenues, which has become a large and growing segment especially in emerging and developing countries.

*Third*, markets which exhibit a long tail of unlicensed implementers may be the by-product of collective action problems: why take a license if your competitors do not? SMEs that infringe SEPs will trespass for as long as possible and hope that another infringer is brought to justice by the SEP owner. When taking licenses SEP implementers will often ask for assurances that their competitors are or will also be licensed. When this assurance is not met, our interviews suggest that firms will respond to this position of license imbalance through underreporting and other means to reduce their relative license burden in relation to their competitors. When markets are competitive, additional costs in the form of SEP license fees can easily have an impact on profits and market share that can challenge the viability of the firm.

*Fourth*, the likelihood of patent trespass is influenced by the clarity, predictability and stability of the legal framework in relation to patent enforcement. For example, respondents tend to suggest that legal frameworks that mandate “*structure*” in licensing negotiations (like *Huawei v ZTE*) tend to reduce systematic trespass. However, the impact of the weakening of injunctive relief in developed countries and difficulties related to enforcement of legal remedies in developing countries is said to be key drivers incentivizing delay and non-compliance in finalizing SEP licenses, respectively.

*Fifth*, the systemic effect of patent trespass is primarily experienced through the impact on the technology market through the development and performance of consensus-based standards. As the goal of SEPs is to incentivize firms to conduct R&D and contribute to standards so as to increase innovation and dynamic efficiency in the market, a systemic effect would be characterized by a reduction in the performance trajectory and market traction of subsequent versions of standards or the breakdown of consensus-based SSOs (i.e. a breakdown of the technology market).<sup>171</sup> Indicators of a systemic effect on SEP holders and the technology market for standards could be observed from several perspectives. For

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<sup>171</sup> This is synonymous with the breakdown of SEP-based product markets predicted in patent holdup theory.

example, traditional SEP holding firms would likely reduce their contributions to consensus-based SSOs (eg, lower level of essentiality declarations, lower attendance rates at technical committee meetings) or potentially withdraw completely (eg, non-renewal of membership, increased participation to industry consortia). This may in turn lead to the development of competing de facto standards that reduces the pro-competitive benefits of consensus-based standards. Additionally SEP holders may renege on trying to have their patents recognized as essential within SSOs. Finally, SEP holders may reduce their R&D investments in technology or be forced into vertical integration through mergers, etc. as systemic patent holdup would severely reduce the formation of a division of innovative labor.<sup>172</sup>

Concomitantly, the behavior of SEP implementers that would produce a systemic effect would be witnessed, not only potentially through widespread delay or non-payment on the market, but through the active lobbying for changes in rules affecting FRAND and the pricing of SEPs. As major changes to the “*rules of the game*” are systematic by nature, actions taken by SEP implementers that could be predictive of systemic patent trespass would include the successful lobbying for changes in patent damages legislation, policy reform by competition authorities, and IPR policies in SSOs.

#### IV. EMPIRICAL EVIDENCE OF PATENT TRESPASS

This section reports the results of an empirical study of patent trespass, based on the intuitions that arise from received theory and qualitative interviews as exposed in the previous sections. Given that the information required to understand patent trespass is held within private firms, we have conducted confidential surveys with 20 licensing executives from firms with significant SEP portfolios. The common thread to all those firms is that they have actively licensed their SEP portfolios with the goal of revenue generation. Our sample thus includes SEP developers, SEP implementers (i.e. sell standard-enabled products) as well as non-implementing firms, such as patent pools.<sup>173</sup> The 12 respondents (60%) that have taken the survey total 206 years of SEP licensing experience and represent firms with an estimated

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<sup>172</sup> See Merges, Robert P. "Intellectual property rights, input markets, and the value of intangible assets." *Draft, February* (1999) for a discussion on the role of a strong patent system in creating a division of innovative labor.

<sup>173</sup> The sample of firms was chosen from the smartphone dataset used in Galetovic, Haber, and Zaretzki (2016), *supra* \_\_\_\_, and top SEP holding firms from Baron et al. (2015), *supra* 164, focused on firms with a specific business focus to generate revenue from their SEP portfolios.

amount of \$11,523M in SEP licensing revenue per year and \$124,590M in SEP-enabled product revenue per year. The respondents' experience was essentially in cellular standards, but also in Wi-Fi and video codec standards with one respondent's expertise primarily in the latter. Table 4.1 provides a statistical summary of the respondents to the survey.

<b>Respondents</b>	<b>Total</b>	<b>Mean</b>	<b>S.D.</b>
SEP Holding Firms (total)	12	–	–
SEP Licensing Revenue (n=11)	11,523 M/yr	\$1,048 M/yr	2,241 M/yr
SEP Implementers Firms	8	–	–
SEP-enabled Product Revenue	\$124,590 M/yr	\$15574 M/yr	21,771 M/yr
Non-SEP Implementing Firms	4	–	–
Cellular Standards	10	–	–
H.26x, 802.11x Standards	6	–	–
SEP Licensing Experience	206 yrs	17 yrs	8 yrs

Note: n=12

Table 4.1 Summary of Survey Respondents

In the following sections, we display and discuss the results of our survey in relation to the nature of patent trespass (A), the size and impact of patent trespass (B), the strategic business implications of patent trespass (C) and the influence of policy events and future policy developments (D).

## A. THE NATURE OF PATENT TRESPASS

### 1. *Plus Factors Facilitating Patent Trespass*

Table 4.2 shows how the survey respondents experienced the influence of three key factors – identified in received theory and qualitative interviews – as facilitating patent trespass. These findings confirm the intuitions that patent trespass is very strongly correlated with: (1) weak enforcement through alteration of patent rights and remedies, and specifically the limitation of injunctive relief, which directly mirrors the theoretical impact of injunctive relief on patent



holdup; and (2) the growing importance of emerging and developing markets in the wireless communications industry and the imperfect and uncertain enforcement regimes in these jurisdictions. Note that the respondents identified China and India as the two most problematic jurisdictions, citing domestic protectionism as a key factor impacting enforcement difficulties.

<b>General Patent Trespass Factors</b>	<b>Impact</b>	<b>Trend (2011-16)</b>
Difficulty to obtain injunctive relief	4.8	+1.6
Cost of reaching agreement	3.1	+1.1
Licensees in jurisdictions where enforcement is difficult	4.7	+0.8

Note: n=11. All values are mean values. Impact Scale: 1 (low impact) to 5 (high impact). Trend Scale: -2 (significant decrease) to +2 (significant increase).

Table 4.2 Key Factors Facilitating Patent Trespass

## 2. *Patent Trespass Strategies and the Heterogeneity of SEP Implementers*

Table 4.3 records the results of how survey respondents experienced relative delay by categories of SEP implementers and the trend over 2011-16. These observations support the general proposition that patent trespass results in significant delay across all actors with an increasing trend since 2011. But the most striking result in table 4.3 consists in showing the bimodal nature (i.e. delay v non-payment) of patent trespass across SEP implementers. On the one hand, multi-national corporations (MNCs) are associated with significant delay but not non-payment. On the other hand, large firms in emerging economies (LFEs) are almost entirely associated with non-payment. Small to medium-sized enterprises (SMEs) are equally associated with both moderate delay and non-payment, requiring further investigation to better understand the circumstances that define these different experiences.

<b>Type of SEP Implementer</b>	<b>Relative Delay</b>	<b>Trend (2011-16)</b>
Multi-National Corporations (MNCs)	3.9	+1.7

Large Firms in Emerging economies (LFEs)	4.7	+1.3
Small to Medium-sized Enterprises (SMEs)	3.7	+1.1

Note: n= 11. All values are mean values. Relative Delay scale: 1 (insignificant delay) to 5 (no payment). Trend Scale: -2 (significant decrease) to +2 (significant increase).

Table 4.3 Heterogeneity of SEP Implementers and the Impact on Delay

In addition to the general experience of delay across SEP implementers, the survey also addressed the stylized examples presented in section IIB2 above. Specifically, this included an investigation of the delaying tactics associated with patent trespass in relation to negotiation (licensing talks), litigation (before courts or antitrust agencies) and advocacy (weakening of SEP holders rights before SSOs, regulators and legislatures). Table 4.4 below summarizes the findings across eight identified patent trespass strategies.

<b>Patent Trespass Strategies</b>	<b>Frequency</b>	<b>Trend</b>	<b>Type of Implementer</b>
Ignoring correspondence	3.2	+0.8	LFE/SME
Unreasonable postponement of negotiations	3.5	+0.9	LFE/MNC
Counter-offers not in sync with industry practice	4.0	+1.6	MNC
Focusing on individual patents instead of SEP portfolios	3.8	+1.2	MNC
Focusing on specific jurisdictions instead of world-wide markets	3.4	+1.2	LFE/MNC
Refusal to engage a 3 <sup>rd</sup> -party to set the FRAND rate (e.g. through arbitration)	2.9	+0.4	MNC
Engaging antitrust/competition authorities	2.7	+1.1	LFE/MNC

Actively working to alter SSO IPR policies	3.2	+1.6	MNC
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Note: n=10. All values are mean values. Frequency scale: 1 (rarely) to 3 (often) to 5 (always). Trend Scale: -2 (significant decrease) to +2 (significant increase). Type of Implementer: MNC=Multi-National Corporation, LFE=Large Firm in Emerging market, SME=Small to Medium-sized Enterprise.

Table 4.4 Patent Trespass Strategies

One implication of Table 4.4 above is that all the patent trespass strategies mentioned are significant and increasing in frequency with each strategy experienced as occurring between often to very often on average, with the exception of the engagement of antitrust/competition authorities. In the fourth column, we document the type of actor most associated with the specific patent trespass strategy. This column confirms the intuitions that (1) SEP implementers deploy heterogeneous strategies; (2) LFEs and SMEs are more likely to pursue non-payment strategies;<sup>174</sup> and (3) MNCs and LFEs are more likely to engage in advocacy initiatives, such as engaging competition authorities and influencing SSO IPR policies based on their size and resources.

The survey respondents identified several additional patent trespass strategies related to emerging/developing markets that would require further investigation to validate, including:

- Cartelization amongst SEP implementers reinforcing the collective action problem;
- Corruption at the private-public interface;
- Splitting-up of SEP implementers into multiple subsidiaries in different countries that require separate legal action.

## B. THE SIZE AND IMPACT OF PATENT TRESPASS ON SEP HOLDERS

The goal of this section is to better understand the transactional v systematic impact of patent trespass. Our survey asked SEP holders to (1) quantify their SEP licensing coverage worldwide over time and provide explanations for the possible evolution; and (2) quantify

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<sup>174</sup> One example of an LFE benefiting from a patent trespass position in this context is the case of HTC, who grew quickly in emerging markets but struggled to enter Western markets based on a lack of preparedness to manage patent obligations. See Li, Lanhua, Huang, Can, Zheng, Suli, 2016. HTC Case Study, presentation in the board meeting of Institute for Intellectual Property Management, School of Management, Zhejiang University, Hangzhou, China, April 29, 2016.

several key costs, time, and revenue parameters that impact the patent trespass decision-making process for SEP implementers.

1. *SEP Licensing Coverage*

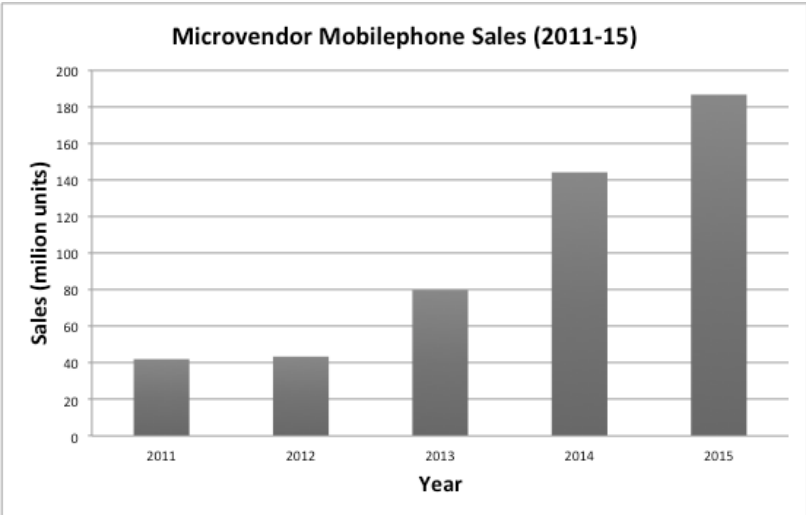
Table 4.5 shows longitudinal data of licensing coverage as a percentage of implementing firms that are potential licensees. While global wireless communications markets are growing, the data suggest that license coverage has fallen steadily over the past ten years.<sup>175</sup>

Licensing Coverage	2016	2011	2006
% of Implementing Firms	39%	59%	73%

Note: n=7. All values are mean values.

Table 4.5 SEP Licensing Coverage

Using the example of the mobile phone market, one key reason stated by respondents is the fragmentation of the market into many smaller vendors, especially in emerging countries, due to the proliferation of the Android operating system for mobile and of standardized hardware. Figure 4.1 below shows the 340% growth in unit sales of microvendors from 2011-15.



<sup>175</sup> The current impact is attenuated by the fact that the majority of handsets are sold by a minority of MNCs and the overall market has been growing significantly. Thus it is possible for overall SEP licensing revenues to increase while coverage is decreasing in the short run.

Figure 4.1 Microvender Mobilephone Sales 2011-15 (Strategy Analytics 2016)

Figure 4.2 represents the worldwide market share of approximately 150 smartphone vendors in 2015. While the top five multi-national vendors still cover 56% of the market, there is a growing segment of large firms operating in emerging markets (LFEs) such as Oppo, Vivo, Micromax, Intex, etc. competing for market share. Moreover, there is a growing “long tail” of over 100 microvendors that now accounts for 13% of global sales. If LFEs and SMEs are more likely to follow a non-payment strategy as indicated in section IVA2 above, it stands to reason that as the volume of sales grows in emerging and developing countries, so will the royalty gap as licensing coverage decreases.

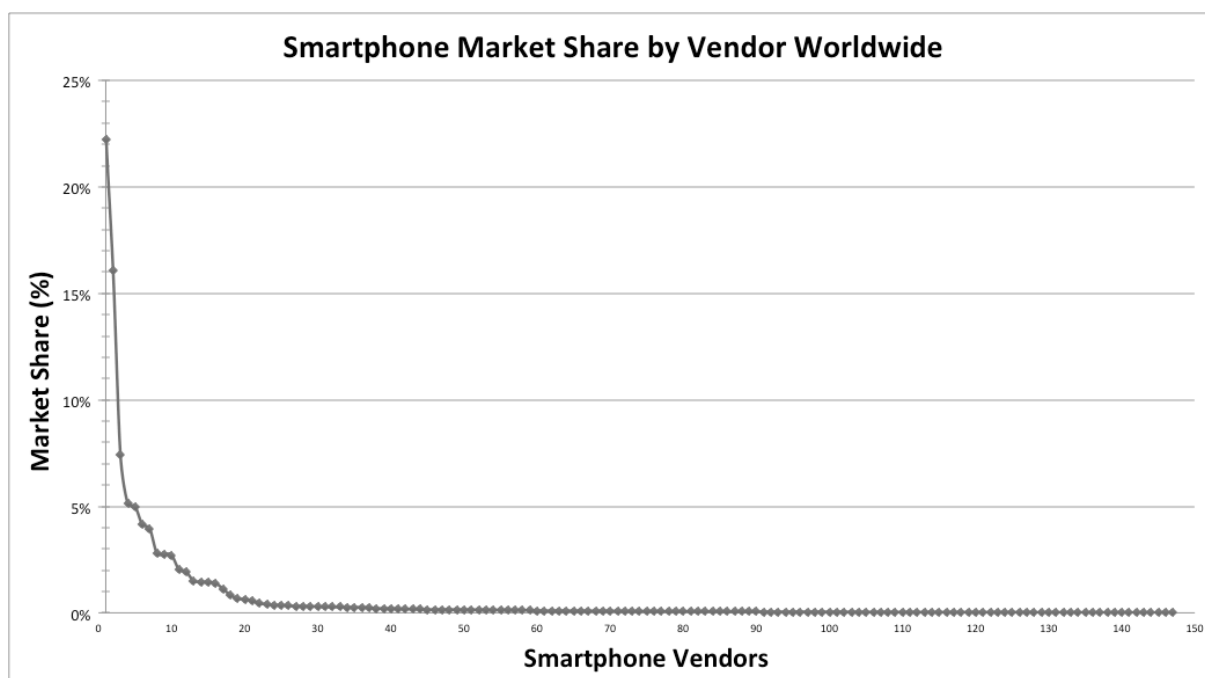


Figure 4.2 Smartphone Market Share by Vendor Worldwide 2015 (Strategy Analytics 2016)

## 2. Patent Trespass Decision Model Parameters

Several of the plus factors that affect the patent trespass decision model presented in figure 4.2 above were analyzed in more detail through industry surveys and follow-up interviews, including the reasonable length of the due diligence phase (period 0-1), the experienced time delay or time to license (period 1-2), the cost of reaching an SEP license including litigation, and the impact of delay and non-payment on cumulative FRAND royalties (i.e. the royalty gap).

<b>Decision Model Parameters</b>	<b>Mean</b>	<b>Range</b>
Due Diligence Phase	12 months	3 – 24 months
Time to License	32 months	18 - 60+ months
Cost of SEP Licensing: (n=4)		
USA (Negotiation/Litigation)	0.3/17.5 \$M	0.1-0.5/5.0-50 \$M
EU (Negotiation/Litigation)	0.15/6.0 \$M	0.05-0.25/2.0-10 \$M
China (Negotiation/Litigation)	0.15/3.0 \$M	0.1-0.2/1.0-5.0 \$M
Impact of Delay (Reduction in SEP licensing rates due to delay)	44%	0-80%
Impact of Non-payment (Amount of licensing revenue unable to collect)	39%	0-80%

Note: n=10.

Table 4.6 Parameters Impacting the Patent Trespass Decision Model

Table 4.6 shows that SEP licensors agree that a reasonable time (see period 0-1) in figure 2.1) for due diligence is necessary to evaluate the SEP portfolio to be licensed. However, the experienced time to license is much greater than a reasonable due diligence period for technology implementers who have indicated a willingness to license. For those who have not shown willingness, the time to license can be even greater (sometimes more than half of the lifetime of the standard in the market), especially in emerging jurisdictions. Thus our survey results tend to confirm the intuition in section IIB that, absent injunctive relief, SEP implementers benefit from delaying the finalization of SEP licensing agreements. As SEP implementers would seem to be rationally incentivized to delay (i.e. there is no benefit to accept an early offer). In turn, this could create the potential for a systematic impact on FRAND royalties for SEP licensors as indicated by the respondents through their experienced reduction in licensing revenue from delay (44%) and non-payment (39%) as shown in table 4.6.<sup>176</sup>

### C. STRATEGIC IMPLICATIONS OF PATENT TRESPASS

<sup>176</sup> The focus of the survey was on the impact of licensing revenue, but the impact of lower royalties on market share can be very substantial when SEP holders compete with non-licensed SEP implementers.

This section reports the data collected on the systemic impact of patent trespass (reduction in economic efficiency). In our survey, SEP holders were asked to provide information on strategic trends at firm level, including quantitative data such as the change in R&D spending and technical contributions toward SSOs. The survey also sought to collect information on industry level strategic trends, such as the change in standardization behavior and market structure in the telecommunication value chain.

<b>Strategic Trends</b>	<b>Mean</b>	<b>S.D.</b>
R&D spending on technology standards	-0.5	1.5
Number of technical contributions to standards	-0.4	1.6
Migration of consensus standards to proprietary de facto standards	+0.8	0.9
Vertical integration of SEP holders	-0.2	1.3

Note: n=11.

Table 4.7 Strategic Trends in the Telecommunication Industry at the Firm and Industry Level

Table 4.7 indicates a general movement in the direction associated with a potential impact on economic efficiency, in particular, a potential reduction in innovative output linked to dynamic efficiency. Measures of standard deviations (SD) were included to stress the rather broad distribution among the respondents, suggesting that other mitigating factors exist. Certainly, further detailed longitudinal research regarding R&D spending, frequency of technical contributions to SSOs, M&A activity, and the development of de facto v consensus standards would provide greater insight into the systemic impact of patent trespass in the wireless communications market.<sup>177</sup>

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<sup>177</sup> Currently, only one specific case regarding the change in IEEE IPR policy offers a glimpse into firm level strategic implications. While several large SEP holders have refused to agree to the new policy terms, it still remains to be seen whether this will have a systemic impact on firm behavior and market structure.

## D. POLICY-LEVEL EVENTS AND RECOMMENDATIONS

This section discusses the impact of specific SEP decisions by courts, competition authorities, and standard setting organizations (SSOs), which we group together as policy-level events, on patent trespass. Our survey asked SEP holders to quantify the general impact of specific policy level events on the SEP royalty rate and time-to-license.

SEP Policy Events	Royalty Level	Time to License
eBay v. MercExchange (2006)	-0.7	+1.0
Orange Book Standard (2009)	+0.2	+0.0
FTC/Google Settlement (2013)	0.0	+0.1
Microsoft v. Motorola (2013)	-1.3	+0.9
IEEE IPR Policy (2015)	-1.1	+1.0
Huawei v. ZTE (2015)	+0.3	-0.2
Average Relative Impact	-0.4	+0.5

Note: n=10. All values are mean values.

Table 4.8 Impact of SEP Policy-Level Events

Table 4.8 shows that the six policy-level events are as a whole perceived as creating a negative aggregate impact on SEP royalty rates and time-to-license (i.e. a decrease in royalties and increase in delay). These results are not unexpected both given the profile of the respondents and the general consensus on the expected outcome of these events.

What is more interesting in table 4.8 is, however, to show the relative impact perceived by the respondents across the different events. The key findings in this regard are (1) the ranking of the *Microsoft* decision, the IEEE IPR Policy, and the *eBay* decision as creating the greatest negative impact on patent trespass; and (2) the agreement that the *Orange Book Standard* and *Huawei v ZTE* judgments generated a positive impact on reducing patent trespass though not through the reduction of time-to-license. While these results do not provide conclusive evidence on the impact of policy-level events on overall royalties and delay in the market, they do indicate that such events in the context of standards-enabled markets can produce a systematic impact on bargaining positions (in both directions) between SEP holders and



implementers. Therefore, the systematic impact of patent trespass must be viewed across multiple arenas (i.e. court, competition authorities, legislatures, and market contexts) and jurisdictions to gain a full understanding. This is challenging given the global nature of competition and the local nature of IP and competition law. At any rate, we can derive from our survey that events that occurred in the EU are perceived as curtailing patent trespass, while events that took place in the US are perceived as facilitating patent trespass.

The respondents suggested the need for the following policy improvements to reduce patent trespass:

- Reduced time to adjudication in legal proceedings for non-licensed actors to combat the collective action problem, especially in emerging and developing countries, where actors that take an early, fair license are at a competitive disadvantage in relation to those who delay;
- Improved framework for the determination of an unwilling licensee and subsequent access to injunctive relief to facilitate market transactions;
- Implement mandatory arbitration for SEP negotiations that extend beyond a reasonable point of time;
- Implement “loser pays” rule in SEP court cases;
- Allow increased damages beyond FRAND for situations where the prospective licensee unreasonably delayed negotiations or litigation, or applied extrajudicial pressure on license fees;<sup>178</sup>
- Allow the court system to manage SEP disputes in well-functioning markets instead of involving competition authorities and standard-setting organizations;
- Greater education of policy makers in the complexity of SEPs and the telecommunication industry;
- A mechanism for R&D spenders to express a lack of balance in the return on R&D investment in business-model-neutral standards;
- Facilitate global portfolio licensing between SEP licensors and multi-national implementing firms;
- Recognize FRAND determinations across jurisdictions.

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<sup>178</sup> See Sidak (2016). See Core Wireless Licensing S.a.r.l. v. LG Electronics, Inc. et al, No. 2:2014cv00911 - Document 560 (E.D. Tex. 2016)

## CONCLUSIONS

This paper has investigated the concept of “*patent trespass*” from a theoretical and empirical perspective. Generally, our analysis calls for balance to the “*standard narrative*” of patent holdup and royalty stacking. Specifically, our study has made the following findings:

1. The improper concept of “*patent holdout*” should be replaced with another concept that conforms with mainstream economic theory. We have proposed “*patent trespass*”, but we concede that other concepts may be more appropriate;
2. The concept of patent holdup used in the early patent economics literature is misleading, and creates a “*semantic trap*”;
3. The theoretical analysis of “*patent holdup*” proposed in the early patent economics literature is incompatible with the conventional understanding of holdup theory in transaction cost economics;
4. The patent holdup narrative is incomplete, and needs to be supplemented by a “*patent trespass*” concept. In this paper, we advance some basic features of patent trespass in the hope of building a fuller, more comprehensive theory. We stress the importance of “*patent trespass*” plus factors and strategies based on expert interviews and received theory, including a Patent Trespass Decision Model and an Asymmetric Bargaining Power Spectrum.
5. Our industry survey provides tolerably strong empirical backing to the theoretical proposition of “*patent trespass*”. Admittedly, our industry survey is based on a restricted population of respondents who are mostly based on the SEP holder’s side. Yet, we submit that this does not affect the *existence* of patent trespass at any level of magnitude. An analogy helps here: students of discrimination conduct surveys with minorities. Yet no one ever claims that their results are defective due to the restriction of their population to the primary targets of discrimination. We note moreover that the survey was anonymous and that the data submitted by the respondents was uncoordinated.

The main conclusion of the study is that patent trespass is a significant phenomenon, which deserves as much attention from courts and policy-makers as the patent holdup narrative. Our study recommends moving towards a new holistic framework in policy making, one that grasps the asymmetric bargaining power that may exist between SEP holders and implementers.

The preliminary empirical results show a correlational relationship between the nature of patent trespass and the heterogeneity of market actors and markets. In particular, multinational corporations (MNCs) operating in developed markets were said to primarily deploy extensive *delaying tactics* with the main goal of reducing their royalty payments, while large firms in emerging markets (LFE) and small to medium-sized enterprises (SMEs), especially the “*long tail*” of microvenders, seek to *avoid payment* altogether. The latter issue is reinforced by an apparent collective action problem among competitors in combination with the growth of emerging markets. To illustrate this point, a patent trespass decision model is developed to explain why it is rational for SEP implementers to delay or avoid payment given the lack of access to injunctive relief and the transaction costs and uncertainty of enforcement across different jurisdictions.

While the patent holdup narrative has been the driver of several competition policy initiatives in the past decade, it is less obvious whether patent trespass has received consideration from competition authorities. If our preliminary finding is right that patent trespass can generate adverse effects on economic efficiency, this calls into question whether competition policy resources are deployed towards the right market failure. To be more concrete, should competition policy remedies also be deployed towards anti-competitive behavior by SEP implementers that could have a systemic impact on economic efficiency, in particular, dynamic efficiency? This could manifest itself through collusion to change IPR policies in SSOs to reduce SEP payments or through cartelization of actors in emerging markets to avoid SEP payments.

Of course, our study identifies several firm and industry level factors that suggest that patent trespass yields adverse effects on economic efficiency. Yet, our preliminary evidence does not produce entirely conclusive results, which lead us to the following final point.

As patent holdup and trespass theory predict opposite results and implications, empirical evidence is required to assess the impact of actual bargaining positions on the standards-enabled market so as to effectively advise policy. Several empirical studies have attempted to calculate the aggregate royalties in standards-enabled products (i.e. the royalty stack).<sup>179</sup> This study adds to the discourse but more importantly urges academics and policy-

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<sup>179</sup> Galetovic, A., S. Haber, and L. Zaretski. *A New Dataset on Mobile Phone Patent License Royalties: September 2016 Update*. Hoover IP2 Working Paper 16011, 2016; J. Gregory Sidak, “What Aggregate Royalty Do Manufacturers of Mobile Phones Pay to License Standard-Essential Patents?” *Criterion Journal on Innovation* 1 (701), 2015; Keith Mallinson, “Cumulative Mobile-SEP Royalty Payments No More than Around 5

makers to engage in further empirical studies to support better theory development and evidence-based decision-making.

## APPENDIX A

### Industry Survey

**1. Respondent (if retired or have worked in multiple firms, please choose the firm that best represents your experience with SEP licensing) – F1b**

- a. Is your firm an SEP holder?
  - Yes (Approximately how big is your licensing revenue?)
  - No
  
- b. Is your firm an SEP implementer?
  - Yes (Approximately how big is your product revenue?)
  - No
  
- c. Which standard represents the majority of your SEP license revenue?

**2. The Nature of Patent Holdout – what, who, why? – D1-5, F1a,**

- a. How would you define patent holdout? (Open answer) D1-5
  
- b. To what extent do you experience patent holdout with the following implementers?: (F1a)
  - MNCs operating in both developed and developing/emerging economies (e.g. Samsung, Apple, Lenovo/Motorola, etc.)
    - Relative Delay in Payment (1-5) 1=insignificant, 5=no payment
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Large firms operating primarily in developing/emerging economies (e.g. MicroMax, Oppo, Vivo, etc.)
    - Relative Delay in Payment (1-5) 1=insignificant, 5=no payment
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - SMEs operating primarily in developing/emerging economies (e.g. microvendors with less than 10M units/year)
    - Relative Delay in Payment (1-5) 1=insignificant, 5=no payment
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Other

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percent of Mobile Handset Revenues,” IP Finance, August 19, 2015; Keith Mallinson, “Patent holdout” allegations encourage SEP free-riders, mimeo, available at

<http://www.wisearbor.com/pdfs/Mallinson%20on%20Holdup%20and%20Holdout%20for%20IP%20Finance%2016%20Aug%202016.pdf>

- Relative Delay in Payment (1-5) 1=insignificant, 5=no payment
  - Trend (-2,+2) -2=large decrease, +2=large increase
- c. What are the key factors facilitating patent holdout?
- Difficulty to obtain injunctive relief? (D4, F4)
    - Impact (1-5) 5=highest impact
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Transaction cost of reaching agreement with licensees? (D2)
    - Impact (1-5) 5=highest impact
    - Trend (-2,+2) -2=large decrease, +2=large increase
    - What are the average costs associated with finalizing an SEP licensing deal:
      - US/Europe
      - India/China
  - Licensees in jurisdictions where enforcement is difficult and legal remedies regarding patent damages is uncertain? (F4b)
    - Impact (1-5) 5=highest impact
    - Trend (-2,+2) -2=large decrease, +2=large increase
    - Which are the top three most problematic jurisdictions from a patent holdout perspective?
  - Licensees require that competitors are licensed before willing to take license (F3d)
    - Impact (1-5) 5=highest impact
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Other?
    - Impact (1-5) 5=highest impact
    - Trend (-2,+2) -2=large decrease, +2=large increase
- d. How often do you experience the following implementer holdout conduct? (SE1-4)
- Ignoring correspondence
    - Frequency (1-5) 5=always
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Unreasonable postponement of negotiations
    - Frequency (1-5) 5=always
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Counter offers not in sync with industry practice
    - Frequency (1-5) 5=always
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Focusing on individual patents instead of SEP portfolio
    - Frequency (1-5) 5=always
    - Trend (-2,+2) -2=large decrease, +2=large increase
  - Focusing on specific jurisdictions instead of worldwide license
    - Frequency (1-5) 5=always
    - Trend (-2,+2) -2=large decrease, +2=large increase

- Antitrust complaint threat
  - Frequency (1-5) 5=always
  - Trend (-2,+2) -2=large decrease, +2=large increase
- SSO complaint threat
  - Frequency (1-5) 5=always
  - Trend (-2,+2) -2=large decrease, +2=large increase
- Other (open answer)
  - Frequency (1-5) 5=always
  - Trend (-2,+2) -2=large decrease, +2=large increase

### 3. Size and Impact of Patent Holdout

- a. What percentage of the product market do you contact/attempt to license?
  - % of firms contacted
  - If not 100%, why?
- b. What percentage of the product market is licensed? (F2a)
  - % of implementing firms (now, -5y, -10y)
  - % of units sold (now, -5y, -10y)
  - % of sales revenue (now, -5y, -10y)
- c. What percentage of SEP holders receive licenses?
  - % of firms claiming to hold SEPs that receive licenses
  - Why don't all SEP holders receive licenses?
- d. What is the impact of the unwillingness to license
  - % reduction in final royalty amount
  - % license revenue impossible to collect
  - number of years to finalize license from time of first contact,
- e. In your opinion, what is considered a reasonable amount of time to complete due diligence and negotiations of an SEP portfolio licensing agreement?
- f. What is a realistically successful licensing program in terms of percentage of licensed market sales (relative scale %)
- g. Hypothetically, what is the minimum coverage (in terms of percentage of licensed market sales) to maintain a viable licensing operation?

### 4. Impact of Policy Events

- a. What has been the impact of the following events on the ability to finalize an SEP license agreement – royalty magnitude and time-to-license? (relative scale)
  - *eBay v. MercExchange* (2006)
    - Royalty level (-2,+2) -2=large decrease, +2=large increase
    - Time-to-License (-2,+2) -2=large decrease, +2=large increase
  - *Orange Book Standard* (2009)
    - Royalty level (-2,+2) -2=large decrease, +2=large increase
    - Time-to-License (-2,+2) -2=large decrease, +2=large increase

- FTC/Google Settlement (2013)
  - Royalty level (-2,+2) -2=large decrease, +2=large increase
  - Time-to-License (-2,+2) -2=large decrease, +2=large increase
- *Microsoft v. Motorola* (2013)
  - Royalty level (-2,+2) -2=large decrease, +2=large increase
  - Time-to-License (-2,+2) -2=large decrease, +2=large increase
- IEEE IPR Policy (2015)
  - Royalty level (-2,+2) -2=large decrease, +2=large increase
  - Time-to-License (-2,+2) -2=large decrease, +2=large increase
- *Huawei v. ZTE* (2015)
  - Royalty level (-2,+2) -2=large decrease, +2=large increase
  - Time-to-License (-2,+2) -2=large decrease, +2=large increase

## 5. Strategic Implications (F5)

- a. In the past 5 years please describe the trend in the following:
  - Firm level
    - R&D spending on technology standards (-2,+2) -2=large decrease, +2=large increase
    - Number of technical contributions to standards (-2,+2) -2=large decrease, +2=large increase
  - Industry Level
    - Migration from consensus standards towards proprietary de facto standards (-2,+2) -2=large decrease, +2=large increase
    - Vertical integration of SEP holders in the industry (-2,+2) -2=large decrease, +2=large increase

## 6. Policy Recommendations

- a. What policy changes would you recommend to combat patent holdout?