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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**

Bowman Heiden[†] & Nicolas Petit[‡]

This paper studies a problem known as “patent holdout.” Part I reviews the literature on holdout, with a specific emphasis on patents. The literature shows that the ordinary concept of holdout refers to the non-transacting conduct of a property owner, and that “patent trespass” is a better characterization for technology implementers’ attempt to evade concluding licensing agreements with patent owners. Part II proposes a definition and illustrations of patent trespass, relying on the qualitative data collected during interviews with industry stakeholders as well as on an analysis of U.S. and European case law. Part III conceptualizes the factors that determinatively make patent trespass circumstantial, systematic, and/or systemic. Part IV records the results of a quantitative study of patent trespass, based on the intuitions that arose from received theory and qualitative interviews as exposed in previous parts. The preliminary empirical results show a correlation between the nature of patent trespass and the heterogeneity of market actors and markets. In particular, multinational corporations (“MNCs”) operating in developed markets seem to primarily deploy extensive patent trespass delay tactics with the main goal of reducing their royalty payments. In comparison, large

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firms in emerging markets (“LFEs”) and small- to medium-sized enterprises (“SMEs”), especially the “long tail” of microvendors, seek to avoid payment altogether. The main conclusion of the study is that patent trespass is a significant phenomenon, which deserves as much attention from courts and policymakers as the patent holdup narrative. Our study recommends moving towards a new holistic framework in policymaking—one that grasps the asymmetric bargaining power that may exist between patent holders and technology implementers.

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INTRODUCTION

Across the world, a problem known as “patent holdup” has become a central issue of discussion in academic and policy circles. Broadly, 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.¹ 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. Hence, when technology implementers have made early sunk investments in a standardized technology, they are locked in with no other choice but to acquire a license to practice the standard. With this, patent owners are essentially able to extract *ex post* royalties in excess of what they anticipated *ex ante* had the patented technology that they declared essential not been selected for inclusion in the standard.

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.² 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 eventually on consumers.³ This, in turn, wields a *systemic* effect on investment incentives and innovation by complementary innovators.⁴

1. Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1992-93 (2007).

2. Hon. Maureen K. Ohlhausen, *The Elusive Role of Competition in the Standard-Setting Antitrust Debate*, 20 STAN. TECH. L. REV. 93, 123-24 (2017).

3. Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, 12 AM. L. ECON. REV. 280, 286 (2010).

4. Roger Brooks, *Patent “Hold-Up,” Standards-Setting Organizations And The FTC’s Campaign Against Innovators* 39 AIPLA Q. J. 435, 458-59 (2011) (discussing a FTC report that talked of a “systemic problem of patent hold-up”); Mark Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking – A Reply*, 85 TEX. L. REV. 2163, 2167 (2007) (“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

In contrast, patent holdout (also known as “reverse holdup,”⁵ “licensee holdup,”⁶ and “efficient infringement”⁷) has featured less prominently on research and policy agendas.⁸ Patent holdout is today understood as the conduct of patented-technology implementers who deliberately choose to avoid concluding a licensing agreement, in the hopes of paying either zero or reduced royalties.⁹ Admittedly, interest towards patent holdout should increase with the introduction of legal doctrines and regulatory policies that curtail the enforcement of SEPs—including, in some cases, setting aside the availability of injunctive relief as a remedy.¹⁰

Our study seeks to fill this space. Its primary 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 the possible policy impact that the choice of a concept like “holdup” had on policy makers, as opposed to holdout.

Once this is done, we turn to an empirical discussion that addresses 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

innovation.”).

5. Damien Geradin, *Reverse Hold-ups: The (Often Ignored) Risks Faced by Innovators in Standardized Area*, in PROS AND CONS OF STANDARD SETTING 101, 118 (Konkurrensverket ed., 2010).

6. F. Scott Kieff & Anne Layne-Farrar, *Incentive Effects from Different Approaches to Holdup Mitigation Surrounding Patent Remedies and Standard-Setting Organizations*, 9 J. COMPETITION L. & ECON. 1091, 1103 (2013).

7. Michael Renaud, James Wordarwski, & Sandra Badin, *Efficient Infringement and the Undervaluation of Standard-Essential Patents*, INTELL. ASSET MGMT., Sept.-Oct. 2016, at 59.

8. *Id.* at 60 (noting that the U.S. courts “seem to be much more concerned with patent hold-up than they are with patent hold-out”). More generally, as of August 2, 2017, searching for variants of the concept of “patent holdout” yielded the following results: “Reverse holdup,” 95 results; “reverse hold-up,” 152 results; “patent holdout,” 38 results; and “patent hold-out,” 27 results. This can be contrasted with the results for variants of patent holdup: “Patent holdup,” 1820 results; and “Patent hold-up,” 985 results.

9. Yann Ménière, *Fair, Reasonable and Non-Discriminatory (FRAND) Licensing Terms – Research Analysis of a Controversial Concept*, JOINT RES. CTR. 15 (2015), http://bit.do/FRAND_JRC (“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 license. 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.”).

10. Colleen Chien, *Holding Up and Holding Out*, 21 MICH. TELECOMM. & TECH. L. REV. 1, 17 (2014).

instantiations. In this largely “undertheorized” field,¹¹ we seek 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 factors transform circumstantial occurrences of patent trespass into a systematic or systemic issue.¹² Generally, 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 an SEP owner faces a “royalty gap”—i.e., 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.¹³ With this background, we try to identify the factors that determine the occurrence of circumstantial, 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 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 to elicit early quantitative measures based on our review of the applicable theory and the qualitative interviews. Considering the data collected, we then 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 refers to the non-transacting conduct of a property owner, and that “patent trespass” is a better characterization for technology implementers’ attempts to evade concluding licensing agreements. In Part II, we propose a definition

11. *Id.* at 20.

12. By circumstantial, we mean one-off, particular, or specific instances of patent trespass. This terminology is borrowed from *Eastman Kodak Co. v. Image Technical Serv., Inc.*, 504 U.S. 451, 497-98 (1992) (Scalia, J., dissenting).

13. Bernhard Ganglmair, Luke Froeb, & Gregory Werden, *Patent Hold-Up and Antitrust: How A Well-Intentioned Rule Could Retard Innovation*, 60 J. INDUS. ECON. 249, 254-55 (2012).

and provide illustrations of patent trespass. For this, we rely on the qualitative data gathered during interviews with industry stakeholders as well as on an analysis of holdout in case law. In Part III, we expose the factors that determinatively make patent trespass circumstantial, 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.”¹⁴ For instance, “B has a holdout position simply by virtue of the fact that A cannot undertake some desired action without her consent.”¹⁵ 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.¹⁶ 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.¹⁷ 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.¹⁸

Several real-life applications of holdout feature prominently in the economic literature. Consider, for example, common pool problems such as oil field unitization.¹⁹ Competition amongst oil production

14. Richard Epstein, *Holdouts, Externalities, and the Single Owner: One More Salute to Ronald Coase*, 36 J.L. & ECON. 553, 559 (1993). Some studies oversee the fact that hold-out is a well-known phenomenon in economics. See Chryssoula Pentheroudakis & Justus Baron, *Licensing Terms of Standard Essential Patents – A Comprehensive Analysis of Cases*, JOINT RES. CTR. 26 (2017), http://bit.do/LicensingTerms_JRC (“Unlike the hold-up concept, [holdout] does not originate in the economic literature, but rather from industry stakeholders and from judges and lawyers involved in FRAND litigation.”).

15. Epstein, *supra* note 14, at 559.

16. Barak Atiram, *The Wretched of Eminent Domain: Holdouts, Free-Riding and the Overshadowed Problem of Blinded-Riders*, BERKELEY J. AFR.-AM. L. & POL’Y 52, 55-56, 67 (2016).

17. *Id.* at 89. Atiram says that holdout arises in opposite situations as externalities.

18. Thomas Miceli, *Free Riders, Holdouts, and Public Use: A Tale of Two Externalities*, 148 PUB. CHOICE 105, 107 (2011).

19. Jongwook Kim & Joseph Mahoney, *Resource Based and Property Rights Perspectives on Value Creation: The Case of Oil Field Unitization*, 23 MANAGERIAL AND DECISION ECON.

firms on a reservoir leads to “extraordinary wastes” in the form of duplication of wells, inflated capital costs, decreasing extraction efficiency, environmental hazards, etc.²⁰ 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 is often incomplete because oil firms tend to holdout from the agreement due to conflicts over the sharing of benefits.²¹

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.²² A common example is an oil refining company that wants to construct an underground pipeline to transport oil from a field to a refinery, but must obtain rights of way from a variety of parcels owners.²³

The legal and economic 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.”²⁴ When those projects demand “contiguity,” the last owner may “hold out.” If negotiation is not possible and purchase is precluded, takings under the power of eminent domain may come into play,²⁵ within the limits set forth in the Fifth Amendment to the U.S. Constitution.²⁶

Corporate takeovers are another example of practical holdout.²⁷ 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,

225, 232 (2002).

20. GARY LIBECAP, *CONTRACTING FOR PROPERTY RIGHTS* 93-95 (1989).

21. Gary Libecap & Steven Wiggins, *The Influence of Private Contractual Failure on Regulation: The Case of Oil Field Unitization*, 93 J. POL. ECON. 690, 698-99 (1985).

22. Patricia Munch, *An Economic Analysis of Eminent Domain*, 84 J. POL. ECON. 473, 474 (1976).

23. Thomas Merrill, *Economics of Public Use*, 72 CORNELL L. REV. 61, 75 (1986).

24. ROBERT COOTER AND THOMAS ULEN, *LAW AND ECONOMICS* 177 (Sally Yagan et al. eds., 6th ed. 2012).

25. *Id.* See also Louis Kaplow & Steven Shavell, *Economic Analysis and the Law*, in 3 HANDBOOK OF PUBLIC ECONOMICS 1661, 1688 (Alan J. Auerbach & Martin Feldstein eds., 2002); WERNER Z. HIRSCH, *LAW AND ECONOMICS* 27-28 (3d ed. 1999).

26. U.S. CONST. amend. V (“[N]or shall private property be taken for public use, without just compensation.”).

27. Gregg Jarrell, *The Wealth Effects of Litigation by Targets: Do Interests Diverge in a Merge?* J.L. & ECON. 151, 152 (1985); Mami Kobayashi, *The Role of Large Shareholders in Hostile Takeovers* 3 (Kinki Univ., Working Paper No. E-4, 2005).

and undermine the completion of the proposed acquisition.²⁸ 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.²⁹

Wage negotiation by unions is the last area we analyze where holdouts occur.³⁰ Holdout is viewed as an alternative to union strikes when contracts are renegotiated. Instead of a work interruption, workers continue to work under the terms of the old contract after the contract has expired.³¹

Against this backdrop, it should be unsurprising that the concept of holdout is also used in relation to intellectual property rights ("IPRs") in general, and patents in particular.³² Professor Golden defines holdouts as patent owners' "demands for a better deal," and studies how applications for injunctions—"holdout threats"—can entitle them to exact high royalties which he calls "holdout premiums."³³ In the literature, concerns for "patent holdout" are observed in the field of biotechnology patents. Professors 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.³⁴ Professors Burk and Lemley, two of the main U.S. patent theorists of the early 21st century,

28. We acknowledge that, in U.S. corporate law, a remedy is brought to this holdout situation by compelling the minority shareholder to sell once the acquirer has reached a certain ownership percentage.

29. Sanford Grossman & Oliver Hart, *Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation*, 11 BELL J. ECON. 42, 44 (1980).

30. Steinar Holden, *Wage Bargaining, Holdout, and Inflation*, 49 OXFORD ECON. PAPERS 235, 237-38 (1997).

31. Peter Cramton & Joseph Tracy, *Strikes and Holdouts in Wage Bargaining: Theory and Data*, AM. ECON. REV. 100, 101, 118 (1992).

32. Richard Posner, *Intellectual Property: The Law and Economics Approach*, 19 J. ECON. PERSP. 57, 61 (2005) ("[T]he longer the patent term, the more likely the invention space is to be cluttered with patents, requiring multiple negotiations and creating potential holdout problems."). Similarly, Professor Robert Merges, long seen as the U.S. authority on IPR law, has employed the concept of holdout to describe IPR holders who refuse to bargain for strategic reasons. See Robert Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 CAL. L. REV. 1293, 1298 (1996); The concept has also been used by the Department of Justice in Letter from Joel I. Klein. See Letter from Joel I. Klein, Assistant Att'y Gen., Dept. of Justice, Antitrust Division, to Gerrard R. Beeney, Esq. (Dec. 16, 1998).

33. John Golden, *Patent Trolls and Patent Remedies*, 85 TEX. L. REV. 2111, 2114, 2125, 2136 (2006).

34. Michael Heller & Rebecca Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698, 700 (1998) ("[T]he 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.").

have called “holdouts” firms that own “narrow biotechnology patents” who “refuse to license their essential sliver of the pie unless bribed.”³⁵

With all this, patent holdout seems to be 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.³⁶

B. *First-Order Properties of Holdout*

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

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.”³⁷

The upshot is twofold. *First*, it is unconventional 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 many 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

35. Dan Burk & Mark Lemley, *Is Patent Law Technology-Specific?*, BERKELEY TECH. L.J. 1155, 1173-82 (2002); Dan Burk & Mark Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1611 (2003); Rochelle Cooper Dreyfuss, *Varying the Course in Patenting Genetic Material: A Counter-Proposal to Richard Epstein's Steady Course*, 4-5 (N.Y.U. Pub. L. & Legal Theory Res. Paper Series, No. 59, 2003), <http://bit.do/VaryingtheCourse> (referring to the same term of art to discuss refusals to license patented biotechnology material).

36. Douglas Gary Lichtman, *Patent Holdouts and the Standard Setting Process*, 2-3 (Univ. of Chicago Coase-Sandor Inst. L. & Econs., Olin Working Paper No. 292, 2006), <http://bit.do/Lichtman-PatentHoldouts>.

37. Guido Calabresi & Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1105, 1127 (1972).

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.³⁸ 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.³⁹ Similarly, property rights over intangibles, as opposed to “real property,”⁴⁰ may give less holdout power simply because detection of infringements is more costly with intangibles than with tangibles.

2. Strangers, Nonmarket Exchange, and Coordination Problems

Holdout corresponds to a situation where strangers do not transact.⁴¹ 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.⁴²

These features help distinguish holdout from other fields of economics that study the governance of exchange, which focus on 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 vs. 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.⁴³ Epstein gives a stylized description of distributional holdout:

38. Mark P. Gergen, John M. Golden & Henry E. Smith, *The Supreme Court's Accidental Revolution? The Test for Permanent Injunctions*, 112 COLUM. L. REV. 203, 205-06 (2012).

39. *Id.* at 238.

40. Lloyd Cohen, *Holdouts and Free Riders*, 20 J. LEGAL STUD. 351, 357 (1991).

41. Richard Epstein, Scott Kieff, & Daniel Spulber, *The FTC, IP, and SSOs: Government Hold-Up Replacing Private Coordination*, 8 J. COMPETITION L. & ECON. 1, 17 (2012) (“In contrast, the holdout problem is one that arises between strangers who have had no course of dealing with each other.”).

42. Edward López & J. R. Clark, *The Problem With the Holdout Problem*, 9 REV. L. & ECON. 151, 151 (2013).

43. See Libecap & Wiggins, *supra* note 21, at 698.

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.⁴⁴

On the other side, several studies look at holdout through the lens of economic inefficiency.⁴⁵ In this variant, holdout is depicted as a "market failure," which prevents wealth maximizing transactions from taking place.⁴⁶ The point is that 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.⁴⁷ Another inefficiency is delay. Hirsch notes that holdouts can "retard the completion of important projects."⁴⁸ 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.⁴⁹ This happens, for example, when local institutions function as real estate companies essentially buying and selling properties, leasing to commercial and retail tenants, etc.

This diversity denotes that the welfare effects of holdout are largely an *empirical* question. The upshot of this is that it is inappropriate to talk of holdout firms as "monopolists,"⁵⁰ to assume that holdout is a "market failure,"⁵¹ or to say that holdout occurs in

44. See Epstein, *supra* note 14, at 559. See also Merrill, *supra* note 23, at 65 (drawing a similar distinction "can lead to monopoly pricing by the seller, to unacceptably high transaction costs, or to both").

45. See Calabresi & Melamed, *supra* note 37, at 1118-19.

46. See Atiram, *supra* note 16, at 56. See also Cohen, *supra* note 40, at 358-59, 362.

47. See Merrill, *supra* note 23, at 76-77.

48. See HIRSCH, *supra* note 25, at 28; See also Kaplow & Shavell, *supra* note 25, at 1688 (noting that the takings power can resolve delays encountered in purchases negotiation with a recalcitrant parcel seller, and therefore be socially advantageous).

49. See López & Clark, *supra* note 42, at 158.

50. See HIRSCH, *supra* note 25, at 32.

51. See, e.g., Cohen, *supra* note 40, at 358-59, 362.

“thin market” settings.⁵² With exceptions,⁵³ the economics literature has avoided to follow that route. It treats holdout as a circumstantial problem that may, depending on the circumstances, degenerate into an efficiency issue.⁵⁴

As a matter of logic, the answer as to whether holdout is a distributional or an efficiency issue 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.

4. Self-Interest

In mainstream economics, holdout is described as a form of self-interest. The literature envisions holdout as rational and 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.”⁵⁶ That said, it is unclear if those authors have anything other than profit maximization in mind. Even the most serious holdout scenarios, such as necessity cases (e.g., the boat owner stranded in a sudden storm who needs access to a dock), involve no more than ordinary garden-variety profit maximization.⁵⁵

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. Neither is there a suggestion that holdout implies any form of “fraud,” “deceit,” or “guile.”

52. See Merrill, *supra* note 23, at 65. See also Howard Shelanski & Peter Klein, *Empirical Research in Transaction Cost Economics: A Review and Assessment*, 11 J.L. ECON. & ORG. 335, 340 (1995).

53. See HIRSCH, *supra* note 25, at 32.

54. See Kim & Mahoney, *supra* note 19, at 230, 233 (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.”). See also Pierre Schlag, *The Problem of Transaction Costs*, 62 S. CAL. L. REV. 1661, 1673 (1989) (talking of a “classic pattern of transactions costs.”).

56. See Cohen, *supra* note 40, at 359.

55. See Epstein, *supra* note 14, at 577.

This point is better seen through three examples, all of which are taken from the market for control of corporations. Consider first a proposed takeover, where it is anticipated that the share price will increase under the new management. 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.

Lastly, 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.⁵⁶

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 determinant.

C. *The Deviation Hypothesis*

Surprisingly, in regard to patent policy, a current of economics literature has deviated from 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. We then expose how the concept of patent holdup strays from established mainstream economics. Finally, we explore the possible impact of this deviation in policy and law-making circles.

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 “holdup” to talk of a patent owners’ strategies.⁵⁷ This movement has been widely followed

56. See generally Thomas Miceli & Kathleen Segerson, *A Bargaining Model of Holdouts and Takings*, 9 AM. L. & ECON. REV. 160 (2007).

57. Until then, the concept of patent holdup was only casually used in economics, and often to denote something slightly different. For instance, the patent “holdup” problem discussed by

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 U.S. Department of Justice 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 Joseph Farrell and two economic consultants (“the antitrust paper”).⁵⁸ Interestingly, those four papers are the “standard narrative” to support remedial initiatives against patent holdup.⁵⁹ Yet, they draw on restrictive assumptions, intuitions and specifications that are often ignored in law and 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*,” 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 and patent pools, but the central theme is the “holdup problem” which is given exposition in several full sections.⁶⁰

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.⁶¹

Chang in 1995 is one whereby a follow-on inventor obtains a patent on an improvement of an initial patent. See Howard Chang, *Patent Scope, Antitrust Policy, and Cumulative Innovation*, 26 RAND J. ECON. 34, 35 (1995). See also Kaplow & Shavell, *supra* note 25, at 1698 (arguing 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”).

58. See generally Joseph Farrell, John Hayes, Carl Shapiro, & Theresa Sullivan, *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L.J. 603 (2007).

59. Jonathan Barnett, *Has the Academy Led Patent Law Astray?*, BERKELEY TECH. L.J. (forthcoming 2017).

60. See Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POL’Y & ECON. 119, 124-26 (A. Jaffe, J. Lerner, & S. Stern, eds., 2001).

61. *Id.* at 119 (“[N]ew products will inadvertently infringe on patents issued after these products were designed.”).

Because of what he later calls “hidden patents,”⁶² 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.”⁶³ 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.”⁶⁴

In this initial paper Shapiro discusses under the label “holdup,” conduct that was formerly called holdout in prior literature.⁶⁵ However, the policy paper makes no reference to holdout.⁶⁶

1.2. *The Interdisciplinary Paper*

The interdisciplinary paper is a joint effort with Mark Lemley, a well-known intellectual property (“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 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.”⁶⁷ This is a concern in “the case of private standard setting” because “it can be extremely costly or even impossible as a practical matter to ‘redesign’ a product standard to avoid infringing a patented technology.”⁶⁸ In such

62. *Id.* at 126, 141 (referring to the fact that patent applications are secret, slow to issue, and that information on such patents is not optimal and/or that patent owners may conceal their positions).

63. *Id.* at 125.

64. *Id.* at 126.

65. In particular Heller and Eisenberg, who are cited in one section of the paper. *Id.* at 148.

66. The paper does not reference to any clear school of economic thinking or legal authority in relation to holdup.

67. See Lemley & Shapiro, *supra* note 1, at 1993.

68. *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. *Id.* at 1993. Moreover, the model is primarily designed to address patent assertion entities, and the extension to standards is simply

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.⁶⁹

The “basic economic model” on which those claims are made involves an infringer who is already selling the product when it learns of the patent claim. This occurs as a result of unawareness, of lack of information on the patent, or of strategic conduct by the patent owner. Notice, however, that those specifications fare poorly with the private standard setting context, where patents receive exposure at several iterative stages: *ex-ante* disclosure requirements, ongoing technological scrutiny in patent committees and *ex-post* dissemination through the standards publication and the creation of standard essential patent databases by SSOs.

Besides this, Lemley and Shapiro add an important tweak to the previous paper. They extend their concept of patent holdup to situations where the “patent holder approaches the downstream firm before that firm has designed its product.”⁷⁰ Admittedly, in this case, the risk of holdup should be limited. The potential implementer 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, the level of the royalties that the patent holder can demand decreases. 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.⁷¹ We call this extension the “weak patent holdup theory.” It suggests that patent owners are sometimes paid negotiated royalties, which exceed what could be obtained in court.⁷²

The interdisciplinary paper again applies holdup to the conduct of a property owner, this time with more sophistication. And again, there is no reference to the economics discussed previously.⁷³

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. *Id.* at 2025-27.

69. *Id.* at 2008. Holdup occurs when the patent owner can capture value that has nothing to do with its invention.

70. *Id.* at 2004.

71. *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.” *Id.* at 2008. 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.

72. Lemley and Shapiro do not seem to contemplate that invalidity proceedings remain available to the licensee in this paper. Moreover, the paper does not acknowledge that standard essential patents are often stronger than non-essential ones. See Anne Layne-Farrar & Josh Lerner, *To Join or Not to Join: Examining Patent Pool Participation and Rent Sharing Rules*, 29 INT’L J. INDUS. ORG. 294-303 (2011).

73. This is perplexing given that Lemley had previously talked of holdout to denote the

1.3. *The Economics Paper*

In 2010, 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.⁷⁴ Essentially, the point is that “[t]he 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.”⁷⁵ 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.⁷⁶ 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.”⁷⁷ 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 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, βv , is not discounted at all to reflect any weakness of the patent.⁷⁸

1.4. *The Antitrust Paper*

The antitrust paper pays more attention to prior economic research. The authors explain that their focus is on a problem “that

conduct of patent property owners in the biotechnology industry. Note that the main “economic theory” that Lemley and Shapiro use is a standard Nash bargaining model. Lemley & Shapiro, *supra* note 1, at 1995-98.

74. The paper is the revised version of a “working paper” released four years before.

75. Shapiro, *supra* note 3, at 283. “[D]ownstream users . . . are subject to holdup because they must make sunk investments that are specific to using the patented technology.” *Id.* at 284.

76. *Id.* at 300 (“[T]his means that the equilibrium in the early negotiations game is the same as in the hold-up game.”).

77. *Id.* at 298-99. “[T]he patent holder can still profit . . . even if the downstream firm is fully aware of the patent infringement claim against it when it initially designs its product.” *Id.* at 285.

78. *Id.* at 299.

economists call ‘opportunism’ or ‘hold-up,’”⁷⁹ which branches into a specific field of economics known as “transaction cost economics” (“TCE”).⁸⁰ 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.”⁸¹ 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 ambush 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.⁸²

2. Patent Holdup vs. Mainstream Economics

Now that we have a rounded exposition of the current of literature that some call patent holdup theory,⁸³ we can detect that it marks a deviation from the frame of reference of mainstream economics. As shown, it is 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, 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

79. See Farrell et al., *supra* note 58, at 603-04 (“[O]ppportunism 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.”).

80. But in reality, it goes as far as Ronald Coase. See Ronald Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386 (1937). See also Oliver Williamson, *Transaction Cost Economics: The Natural Progression*, 86 *J. RETAILING* 215 (2010).

81. See Farrell et al., *supra* note 58, at 612.

82. 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* note 58, 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.”).

83. They could be complemented by other papers, cited in the four reviewed. See Joseph Farrell & Carl Shapiro, *How Strong are Weak Patents?*, 98 *AM. ECON. REV.* 1347, 1347-69 (2008). See also Mark Lemley & Carl Shapiro, *Probabilistic Patents*, 19 *J. ECON. PERSP.* 75 (2005).

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 behavior.” 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 expressly 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 or no course of *transacting* with each other (even within SSOs which do not govern commercial transactions).⁸⁴ In both the “patent surprise” and the “early negotiations” scenarios, we are in an antecedent situation of “non-market exchange” characteristic of holdout.⁸⁵ This situation is distinct from the typical holdup setting,⁸⁶ which assumes prior coordination through contract (even if incomplete), and *subsequent* hazard in exchange relationships. The submission of a FRAND commitment should change nothing, and does not create a pre-contractual framework or agreement, because such declarations are unilateral in origin, abstract in content, anticipative in time and impersonal in scope.⁸⁷ In holdup, the parties know each other. To achieve a contractual effect, a symmetrical commitment should be taken *ex ante* by prospective implementers (note that they do not necessarily participate in technical standardization), 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.⁸⁸

This should have driven the writers of the four papers to use the concept of “patent holdout.” Instead, they discuss the issue under the “patent holdup” label. This terminological orientation is not in itself a

84. Epstein et al., *supra* note 41, at 17 (“In contrast, the *holdout* problem is one that arises between strangers who have had no course of dealing with each other.”) (emphasis added).

85. The argument is if one is aware of the potential opportunism of FRAND *ex ante* and believe it to be a significant problem, then why would one make investments in specific assets?

86. Shelanski & Klein, *supra* note 52, at 336.

87. All SSOs make clear that they are not commercial forums.

88. Hanns Ullrich, *FRAND Access to Open Standards and the Patent Exclusivity: Restating the Principles* 32 (Max Planck Inst. Innovation & Competition, Res. Paper No. 17-04, 2017), <http://bit.do/Ullrich-FRANDAccess> (“[I]n short, in the E.U., the contractual road to the enforcement of FRAND commitments, if available at all, is rather unsafe, [even] more so as SSOs have proved highly unwilling or unable to enforce contractual obligations (potentially) resulting from the FRAND commitments made by their participants.”).

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.⁸⁹

To be sure, the four papers tie their findings to the economics of holdup, and specifically 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.”⁹⁰ As they write, this is a significant omission, because opportunism is deemed a necessary condition of holdup by virtually all TCE scholars.⁹¹ This omission might be 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 (notably due to the fact that the standardisation process is open and that SSOs publish databases with relevant SEPs).

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.⁹² This problem can be seen at several levels. Let us recall

89. Milton Friedman, *The Methodology of Positive Economics*, in *ESSAYS IN POSITIVE ECONOMICS*, 3, 7 (Univ. of Chicago Press 1953).

90. Alexander Galetovic & Stephen Haber, *The Fallacies of Patent-Holdup Theory*, 13 *J. COMPETITION L. & ECON.* 1, 20-27 (2017).

91. Only a minor fringe of the scholarship envisions the existence of firms without opportunism. See generally James H. Love, *On the Opportunism-Independent Theory of the Firm*, 29 *CAMBRIDGE J. ECON.* 381 (2005).

92. See Williamson, *supra* note 80 at 463-64 (“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.”). See also Benjamin Klein, Robert Crawford, & Armen Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 *J.L. & ECON.* 297, 298 (1978) (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.”); Shelanski & Klein, *supra* note

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,⁹³ the printing press in our example A. But the four papers fail to make this a *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. But what lacks here is that those investments are not "transaction specific" because the infringer was not contemplating any transaction when he incurred them.⁹⁴ Moreover, 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."⁹⁵

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.⁹⁶ This should have driven the four papers to contemplate the possibility of holdup of patent owners by downstream manufacturers. By this, we mean whether technology developers, namely patent holders, who make specific investments into

52, at 337 (noting that amongst the several conditions of TCE, "asset specificity is held to be particularly important"); Aric Rindfleisch & Jan B. Heide, *Transaction Cost Analysis: Past, Present, and Future Applications*, 61 J. MARKETING 30, 32-39 (1997) (defining asset specificity as one "independent variable" of transaction costs analysis).

93. See Klein et al., *supra* note 92, at 299 (The definition of asset specific investment is: an 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 to that user would not be reduced.").

94. See OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM* (1985) (discussing the concept of "transaction specific" investments).

95. See Lemley & Shapiro, *supra* note 1, at 2005.

96. Holdup can be bidirectional.

R&D that possibly leads to patents, can be *ex post* held up by technology implementers who want to bring licensing terms down.⁹⁷ Yet, not a trace of that hypothesis can be found in the literature supporting patent holdup. 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.⁹⁸

Finally, there is one last discrepancy between the four papers' subject of inquiry and TCE theory. Holdup in TCE requires a contracting framework, which is what triggers firms' commitment of resources into specific assets.⁹⁹ The presence of an initial contract, be it complete or incomplete, between patent owners and implementers when they enter into licensing discussions is, however, a contentious issue, and it is not entirely clear that the FRAND commitment submitted to a SSO is a substitute to a contract.¹⁰⁰ In the U.S., the Ninth Circuit has found in *Microsoft v. Motorola* that a RAND commitment created "contractual obligations." However, at the same time, many other cases seem to refuse to consider that a FRAND commitment categorically creates such a contract.¹⁰¹ An even more *ad hoc* situation exists in the European Union, where the Court of Justice held in *Huawei v. ZTE* that FRAND commitments create "legitimate

97. See Shelanski & Klein, *supra* note 52, at 337-38. The authors identify R&D as a possible asset-specific investment. They then quantify "R&D expenditure, as a proxy for physical asset specificity." *Id.* at 338. We admit here that all patent holders (or at least inventors) almost always incur sunk costs before they negotiate patent licenses, and that not all of them are exposed to holdup because those costs are sunk. Yet, in the standardization arena, R&D investments are planned *ex ante* in light of a structured process of technology development with the future expectation of licensing transactions. This is very different from the situation of the lone, creative inventor who tinkers in his garage.

98. See Kathryn Harrigan, *Deterrents to Divestiture*, 24 ACAD. MGMT. J. 306 (1981). See also Paul Geroski, Richard J. Gilbert, & Alexis Jacquemin, *Barriers to Entry and Strategic Competition*, in 41 FUNDAMENTALS OF PURE AND APPLIED ECONOMICS 97 (Jacques Lesourne & Hugo Sonnenschien eds., 1990).

99. Shelanski & Klein, *supra* note 52, at 341.

100. See Garrard Beeney, *FRAND and SEPs in the U.S.*, INTELL. ASSET MGMT., July-Aug. 2016, <http://bit.do/Beeney-FRANDandSEPs> ("FRAND commitments are generally considered to be contracts between the SSO and patent owner (with parties that practice the standard being third-party beneficiaries of those contract..."). See also Roger Brooks & Damien Geradin, *Interpreting and Enforcing the Voluntary FRAND Commitment*, 9 INT'L J. IT STANDARDS & STANDARDIZATION RES. 1 (2011). *But see* Nicolas Petit, *EU Competition Law Analysis of FRAND Disputes*, in CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW (Jorge L. Contreras ed., 2017).

101. See *Genband U.S. LLC v. Metaswitch Networks Corp.*, 211 F. Supp. 3d 858, 898-99 (E.D. Tex. 2016) (Decision on Equitable Defenses), *vacated*, 861 F.3d 1378 (Fed. Cir. 2017). See also *Certain Network Devices Related Software and Components Thereof (I)*, Inv. No. 337-TA-944 (Feb. 2, 2016) (Initial Determination), (Jul. 26, 2016) (Commission Opinion).

expectations” on third parties,¹⁰² yet fell short of affirming that implementers can legitimately expect to be offered specific royalty levels.¹⁰³ Upon further reading of the judgment, one gets the impression that the “legitimate expectations” generated by a FRAND commitment are not linear, and must be assessed on a case-by-case basis “in accordance with the undertaking given to the standardisation body.”¹⁰⁴ This dovetails with the reading of the German patent infringement courts, which have denied contractual enforceability to FRAND commitments.¹⁰⁵ To add further confusion to the issue, in *Unwired Planet International Ltd. and others*, the U.K. Judge Birss noted that a FRAND commitment created a contractual framework between parties to the negotiation, yet went on to say that “there is no need for contract law to go as far as creating a power to compel parties to enter into FRAND licences against their will because patent law already has the tools available to give legal effect to the FRAND undertaking.”¹⁰⁶

Admittedly TCE did not require a contract in the legal sense to give rise to holdup, merely a type of potentially legally enforceable commitment. In this sense, Williamson talked of “contract as framework,” in opposition to the “iron-rule” arrangements usually defined as contracts in law and economics.¹⁰⁷ Whilst we admit that incomplete and imperfectly enforceable contracts do not rule out holdup according to TCE, we note that the abovementioned judicial events call into question whether FRAND generates the type of complete or incomplete contractual paradigm that constitutes the basis of TCE.¹⁰⁸ To put the point controversially, the intransigence of

102. Case C-170/13, *Huawei v. ZTE*, 2015 EUR-Lex CELEX LEXIS 477 at ¶ 53 (Jul. 16, 2015).

103. See *id.* at ¶ 54 (noting that there may be disagreement between the parties on the actual FRAND terms).

104. *Id.* at ¶ 63.

105. See Haris Tsilikas, *Huawei v. ZTE in Context—EU Competition Policy and Collaborative Standardization in Wireless Telecommunications*, 48 IIC-INT’L REV. INTELL. PROP. & COMPETITION L. 151, 165 (2017) (“German patent infringement courts have interpreted FRAND commitments as mere declarations of an obligation to conclude a contract that already exists under German competition law. Denying the contractual enforceability of the FRAND commitment has the important implication that defendants in SEP infringement disputes cannot rely on contractual remedies when faced with unreasonable licensing demands.”).

106. See *Unwired Planet Int’l Ltd. v. Huawei Tech. Co. Ltd.* [2017] EWHC (Pat) 711 [163] (Eng.) (Judge Birss explained the nature of those obligations as follows: “[t]he patentee is obliged by contract to take a FRAND approach to the negotiation and to grant a licence on FRAND terms. The implementer must take a FRAND approach to the negotiation and accept a licence on FRAND terms if it wishes to take advantage of the constraint on the patentee’s rights imposed by the FRAND undertaking.”).

107. See WILLIAMSON, *supra* note 94, at 4.

108. See Ullrich, *supra* note 88. See also Paul Joskow, *The Role of Transaction Cost Economics in Antitrust and Public Utility Regulatory Policies*, 7 J.L. ECON. & ORG. 53 (1991)

recognizing any value to FRAND in certain jurisdictions hints that such pledges may have no more worth than cheap talk. Table 1 below provides a summary of the theoretical deviations discussed above.

Table 1: Theoretical deviation from holdout to holdup

	Holdout			Holdup (TCE)	
	Property owner	Self interest	Non-contractual	Opportunism (guile)	Transaction specific assets
“Patent Holdup”	✓	✓	✓	X	X
Hidden patent/surprise	✓	✓	✓	X ✓	X ✓
Early negotiation	✓	✓	✓	X	X

3. Impact

Instead of using the established term of art of holdout, the four papers discuss the concept of holdup. 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, John Golden observed 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.”¹⁰⁹ In this section we carry this intuition further, and explore the possible side effects of this deviation.

3.1 Anchoring

Behavioral sciences can help explain why permuting holdout with holdup may not have been innocuous.¹¹⁰ 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.¹¹¹ As said before, holdup is a loaded concept. It embeds a host of strict

(discussing the need of a contractual framework in TCE).

109. See Golden, *supra* note 33, at 2114 n.16.

110. See Lichtman, *supra* note 36. That said, patent holdout has remained in use to denote the conduct of patent owners by a number of patent scholars and practitioners. See also Gavin George, *What Is Hiding in the Bushes – eBay’s Effect on Holdout Behavior in Patent Thickets*, 13 MICH. TELECOMM. & TECH. L. REV. 557 (2007).

111. Adrian Furnham & Hua Chu Boo, *A Literature Review of the Anchoring Effect*, 40 J. SOCIO-ECON. 35, 35 (2011) (“[A]nchoring bias is caused by insufficient adjustment because final judgements are assimilated toward the starting point of a judge’s deliberations.”).

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.¹¹² In a standards context, a commonly heard story is that of “quid pro quo”:¹¹³ a patent has eventually been deemed essential by SSO participants—included in a standard’s 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 is seen as bad, unethical behavior by the patent owner.¹¹⁴ This helps to obfuscate the conventional economic wisdom whereby property rules and injunctions are generally appropriate when there are no transaction costs (even though this may need some contextualization).¹¹⁵

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

112 See Farrell et al., *supra* note 58, 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).”).

113. Nicholas Banasevic, *The Implications of the Court of Justice’s Huawei/ZTE Judgment*, 6 J. EUR. COMPETITION L. & PRAC. 463, 463 (2015).

114. See, e.g., Farrell et al., *supra* note 58, at 604 (“‘Bad’ behavior (such as deception) is not logically necessary for such inefficiency, but hold-up can powerfully reward deception and concealment.”). They add that “[t]he pure economics are largely unaffected by whether or not guile is involved, but of course policy and legal treatment may be strongly affected.” *Id.* And further, they say “[w]hile 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.” *Id.* at 605 (emphasis added). Later, again, the authors 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.” *Id.* at 609.

115. See Calabresi & Melamed, *supra* note 37, at 1127 (“[T]hat 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 efficiency reasons for allowing intentional takings, and property rules, supported by injunctions or criminal sanctions, are appropriate.”).

investments (e.g., 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 U.S. Supreme Court judgment in *eBay Inc. v. MercExchange, LLC* of 2006, injunctions are a subsidiary remedy that only becomes available when patent damages are proven inappropriate.¹¹⁶ And in *Huawei v. ZTE*, the Court of Justice of the E.U. has accepted that antitrust law can bring limitations to the free and unfettered exercise of patent remedies by FRAND-pledged SEP owners.

The deviation from holdout to 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.

Fourth, 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 rather unilaterally by the State.¹¹⁷ 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.

At this stage, we want to stress that it is not speculative to believe that semantic deviations generate anchoring effects. All scholars, including ourselves, understand the power of issue framing and problem definition on decision makers. Dozens of political scientists have written on this issue.¹¹⁸ Philosophers have devoted numerous

116. Note that even before *eBay*, no permanent injunction had ever been granted on the basis of an infringed SEP in the United States. After *eBay*, only one has been granted, and the U.S. Trade Representative has mandated its recall.

117. See Kaplow & Shavell, *supra* note 25, at 1688.

118. See William G. Jacoby, *Issue Framing and Public Opinion on Government Spending*, 44 AM. J. POL. SCI. 750 (2000). See also Janet A. Weiss, *The Powers of Problem Definition: The Case of Government Paperwork*, 22 POL'Y SCI. 97 (1989); David A. Rochefort & Roger W. Cobb, *Problem Definition: An Emerging Perspective*, in 1 THE POLITICS OF PROBLEM DEFINITION: SHAPING THE POLICY AGENDA (1994); WILLIAM RIKER, THE ART OF POLITICAL MANIPULATION

studies to how Greek sophists used rhetoric to advance political platforms. Heterodox economists like Hayek have riled the use of "weasel words" to disguise intrusive market interference.¹¹⁹ Environmentalists have also criticized the substitution of "climate change" to "global warming" in the 2000s, when the debate was closing in against the skeptics.¹²⁰

Yet, one issue remains unresolved: why has there been so little objection to the substitution of holdout by holdup in the patent literature?

3.2 Terminology and the State of IP Economics

Except for the works of Golden (and of Haber and Galetovic in relation to holdup), the semantic deviation 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.¹²¹ Ian Ayres and Gideon Parchomovsky provide a good illustration, discussing the work of Shapiro in terms of holdout.¹²²

The problem, of course, is that economists are not only read by economists. This terminological accuracy matters when economic theories make their way towards law and policy. 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

(1986).

119. Friedrich August Hayek, *The Fatal Conceit: The Errors of Socialism*, in THE COLLECTED WORKS OF FRIEDRICH A. HAYEK 1, 116-17 (William W. Bartley III & Stephen Kresge eds., 2011).

120. See Terry Anderson & Kurt R. Leube, *The Climate Of Word Change*, HOOVER INST. (Mar. 8, 2017), <http://bit.do/climate-of-word-change>.

121. Another reason is that economists do not read law articles, much less read footnotes.

122. See Ian Ayres & Gideon Parchomovsky, *Tradable Patent Rights*, 60 STAN. L. REV. 863 (2007).

property scholarship.¹²³ 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. This generates a proliferation of concepts. Ron Katznelson and John Howells remark for instance that “[t]here is rich metaphorical vocabulary in the patent literature, describing patent litigation and “prohibitive” demands for royalties for licensing under key basic patents, which conveys essentially the same meaning as patent ‘hold-up’ such as patent logjam, thicket, deadlock, gridlock and impasse.”¹²⁴ In the same vein, it may be worthwhile noting that a similar phenomenon has occurred with the term “*patent troll*,” often used as a synonym by IP writers to less loaded concepts like “patent dealers,” “patent-holding entity,” “non-practicing entity,” or “patent-assertion entity.”¹²⁵

Moreover, IP scholarship is generally not driven by descriptive ambition, and its current approach is generally normative.¹²⁶

3.3. Normative vs. Positive Economics

In his Nobel Prize lecture, George Stigler explored why new ideas are accepted or rejected by a science.¹²⁷ He suggested that “the attractiveness of the public policy positions associated with a theory has an effect upon the acceptability of the theory.”¹²⁸ In the market for new ideas, those with substantial policy implications end up dominating epistemic communities. Thomas Piketty’s work on wealth inequality, with its clear implications for optimal taxation, is a stark example.¹²⁹

123. See Dan Burk, *Intellectual Property and the Firm*, 71 U. CHI. L. REV. 3 (2004) (noting this in relation to the theory of the firm).

124. See Ron Katznelson & John Howells, *The Myth of the Early Aviation Patent Hold-Up – How a U.S. Government Monopsony Commandeered Pioneer Airplane Patents*, 24 INDUS. & CORP. CHANGE 1 (2015). Similarly, Professor Robert Merges, an economics-savvy lawyer, discusses blocking conduct of a patent owner as holdup in 1994 and as holdout in 1996. Robert 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). See also Merges, *supra* note 32.

125. James F. McDonough III, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189 (2006) (defining trolls as “[a] person or entity who acquires ownership of a patent without the intention of actually using it to produce a product”).

126. Jonathan Barnett, *Property as Process: How Innovation Markets Select Innovation Regimes*, 119 YALE L.J. 384, 387 (2009) (discussing “the normative mode of most intellectual property scholarship”).

127. George Stigler, *Nobel Lecture: The Process and Progress of Economics*, 91 J. POL. ECON. 529, 529 (1983).

128. *Id.* at 543.

129. THOMAS PIKETTY, CAPITAL IN THE TWENTY-FIRST CENTURY (Arthur Goldhammer

A possible implication of Stigler’s intuition is that normative economic theories—those that explain how the world ought to be—are subject to less challenge (they are more acceptable in Stigler’s words) by law, policy makers and academics, than positive economic theories—those that describe how the world is. In turn, this could explain the greater influence of the normative patent holdup theory on decision makers, as compared to the descriptive theory of patent holdout. The patent holdup theory indeed comes with a battery of reform proposals. 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 injunctions by courts.¹³⁰ 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.”¹³¹ In contrast, no such policy agenda comes with patent holdout. Even if patent holdout was brought to bear in policy reform, it would have less appeal: the idea of strengthening the “patent monopoly” or of encouraging patent litigation is likely a tough sell to law and policy makers, especially to antitrust agencies.

3.4. *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.”¹³²

Those impressed by patent holdup theory should be wary of not succumbing to the same reinforcement bias. In the literature supporting patent holdup, the 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 what Coase may have called a rather “casual attitude toward checking the facts.”¹³³ As we have already stressed, the literature supporting patent holdup dispenses

trans., Harv. Univ. Press 2014).

130. See Shapiro, *supra* note 3, at 308 (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.”).

131. See Farrell et al., *supra* note 58, at 660.

132. Ronald Coase, *The Conduct of Economics: The Example of Fisher Body and General Motors*, 15 J. ECON. & MGMT. STRATEGY 255, 275 (2006).

133. *Id.*

with explaining how the proposed theory can stand alive absent the basic conditions of opportunism and asset specificity.

Moreover, the theory's "early negotiations" scenario or "weak patent holdup theory" may not give enough credit 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 event that the patent would be proven invalid."¹³⁴ 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. Similarly, the statement that "[t]he 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-hypothesis complex. Moreover, the idea that there is overcompensation (holdup) is strange, because here the patent can be deemed strong.¹³⁵

Besides, the literature supporting patent holdup fails to contemplate that all patents are not homogeneously probabilistic. In this regard, the four papers pay no heed to 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 E.U. than in the U.S. Similarly, the fact that SSOs share their documentation with patent offices, such as the USPTO or the EPO or publish databases of SEPs (like ETSI or the IEEE), give rise to fewer patents being issued and in turn increases patent quality.

A third aspect that lacks in factual backing is seen in the bold claim that patent holdup results in a loss of efficiency.¹³⁶ The papers pretend that patent owners exact a tax on new products, which impedes

134. See Lemley & Shapiro, *supra* note 1, at 2004-05.

135. *Id.* at 2005.

136. Klein et al., *supra* note 92, at 301.

rather than promotes innovation.¹³⁷ 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 early conjectures.¹³⁸ Instead, both Shapiro and Lemley have sought to double down by criticizing this emerging empirical literature as being “faith-based” or “myth.”¹³⁹

We do not pretend that patent holdup theory is disingenuous. It is a plausible problem at the theoretical level. We neither affirm that there is no empirical evidence of patent holdup. Some cases confirm its existence. Instead, our bottom line is that patent holdup is a thin theory. It abstracts away certain facts of the standard setting process, to describe two strict hypotheses which do not correspond to the specifications present in the real economic context of FRAND-pledged SEPs. In our opinion, the founders of patent holdup theory today face an important responsibility: recalling the limitations of their progeny. As Tirole himself wrote in his famous IO textbook: “At first sight, even a theorist should regret the very high ratio of theory to evidence in a field in which theoretical models are often lacking in generality and in which practical implications are so crucial.”¹⁴⁰

II. PATENT “TRESPASS”: DEFINITIONAL ISSUES

Now that we have argued that holdout is not a suitable term to denote the conduct of an unlicensed implementer, we must come up with a distinct, better term. We face here a pragmatic problem: scientific fields are path dependent. It would thus be practically impossible to re-permute the terminologies. Moreover, this would leave wide open the question of how to call what we call now holdout, or reverse holdup.

As hinted above, we believe that an appropriate characterization may be patent “trespass.”¹⁴¹ As soon as we say this, however, we must concede the weaknesses of this choice. *First*, the concept of “trespass” has vernacular meaning in property law. It is a legal doctrine, subject to specific principles which may not fit with what we call patent “trespass.”¹⁴² *Second*, the concept of “trespass” is used as a “conceptual

137. Lemley & Shapiro, *supra* note 1, at 1993.

138. See Galetovic & Haber, *supra* note 90.

139. See Mark Lemley, *Faith-Based Intellectual Property*, 62 UCLA L. REV. 1328 (2015).

140. JEAN TIROLE, *THE THEORY OF INDUSTRIAL ORGANIZATION* 3 (John Bonin & Hélène Bonin trans., MIT Press 1988).

141. We are grateful to Steve Haber for pointing to this concept as a good substitute for “holdout.”

142. Trespass does not require a showing of harm, and one need not know that he is trespassing to commit a wrong.

analog” in relation to other policy issues in patent law, and it may thus be confusing to use it yet again here for other purposes.¹⁴³ *Third*, scholars interested in the topic of patent holdup have proposed many semantical labels for holdout, and we have received several equally interesting suggestions from commenters including: “willful patent infringement,” “efficient infringement,” “adverse patent implementation,” “opportunistic infringement,” “patent-holder opportunism,” “implementer opportunism,” “deliberate patent trespass,” etc.

While we concede that the choice of patent “trespass” in this paper has some downsides, we want to iron out some ambiguities. We use “trespass” to capture the casual idea that the product of a technology implementer involves a “relatively gross invasion” over a technology developer’s patent claims.¹⁴⁴ Put differently, we no longer talk of patent “trespass” to describe the crossing of a legal “boundary.” We do not employ trespass as a doctrinal analogy, and the reader should therefore not attempt to draw parallels between what we call here trespass, and other areas, principles and rules of black letter law. This is in line with the law in context approach followed in the previous section, which tends to avoid being too legalistic.¹⁴⁵ To further reduce confusion, we systematically refer to trespass in quotations (patent “trespass”).

The reason which justifies our choice of “trespass,” as opposed to the other concepts proposed in the literature, is essentially one of balance. Given that both holdup and holdout are empirical issues, they ought not to be approached with any prior bias or prejudice. However, having followed the use of “patent holdup” as a reference term, the literature has created an imbalance. The only way to level the playing field is thus to use a metaphorically loaded term for the conduct of patent implementers, which neutralizes the bias against the conduct of patent owners.

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

143. Adam Mossoff, *The Trespass Fallacy in Patent Law*, 65 FLA. L. REV. 1687, 1687-88 (2013).

144. Thomas Merrill, *Trespass, Nuisance, and the Costs of Determining Property Rights*, 14 J. LEGAL STUD. 13, 14 (1985).

145. See WILLIAMSON, *supra* note 94, at 4.

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. Professor Golden refers to this as a “catch me if you can problem.”¹⁴⁶

Beyond this general definition, the literature documents many variants of patent trespass. A common form of trespass arises when willful SEP infringement remains undetected, and implementers wait to get sued.¹⁴⁷ A related version of patent trespass occurs when detected infringers refuse or delay negotiation and/or payment.¹⁴⁸ Patent trespass can also arise before courts, when infringing defendants resort to “diversionary tactics” in litigation.¹⁴⁹ Technology implementers may attempt to challenge the validity and/or essentiality of the SEP as counterclaims before the same court,¹⁵⁰ or as independent demands before other judicial forums. In this discussion, the limit between trespass and legitimate patent defenses—laches, estoppel¹⁵¹, equity and antitrust¹⁵²—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.” Lastly, some include in patent trespass the advocacy efforts deployed by technology implementers to weaken the enforceability of SEPs with

146. See Golden, *supra* note 33, at 2135.

147. Edward Egan & David Teece, *Untangling the Patent Thicket Literature* 13 (Tusher Ctr. for Mgmt. of Intell. Capital, Working Paper No. 7, 2015).

148. Marie Barani, *From Patent Hold-Up to Patent Hold-Out?*, 14 INT’L J. STANDARDIZATION RES. 1, 7-9 (2016). For instance, they may insist on specific licensing terms, to put the SEP owner in breach of its duty of nondiscrimination under a FRAND commitment. See Letter from Sharon Israel, President, AIPLA, to the Japan Trade Comm’n (Aug. 6, 2015), <http://bit.do/Israel-AIPLA-Letter>.

149. Egan & Teece, *supra* note 147, at 12.

150. Ménière, *supra* note 9.

151. An estoppel defense exists when the patent owner has failed to declare patents that could be essential. Remaining silent when there is a duty to speak can constitute an actionable defense against a patentee suing for injunctive relief.

152. See *Microsoft Mobile, Inc. v. Interdigital, Inc.*, No. 15-CV-723-RGA, 2016 WL 146545, at *1-*5 (D. Del. Apr. 13, 2016) (discussing an illustration of an antitrust defense); Lichtman, *supra* note 36, at 5-6 (discussing an exposition of ordinary patent defenses).

SSOs, regulatory agencies and policy makers.¹⁵³ 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.”¹⁵⁴ Again, however, the threshold level between the fundamental right to petition government and patent trespass is unclear.¹⁵⁵

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.¹⁵⁶ In particular, the litigation time reduces the litigation payoff of the patent owner, as injunctions are less powerful.¹⁵⁷ At the same time, it is entirely unclear why SEP owners would systematically face transaction costs disadvantages over technology implementers.¹⁵⁸

SEP owners may also be undercompensated—a by-product of patent trespass—when there is “uncertain detection.”¹⁵⁹ 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.¹⁶⁰ For instance, small firms,

153. See Gregory Sidak, *Patent Holdup and Oligopsonistic Collusion in Standard-setting Organizations*, 5 J. COMPETITION L. & ECON. 123 (2009); Kieff & Layne-Farrar, *supra* note 6, at 1098-1100.

154. Kieff & Layne-Farrar, *supra* note 6, at 1114.

155. As an example, there is disagreement as to whether courts can fairly adjudicate damages in the SEP context and the impact on private negotiations in the shadow of the court. See William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385, 411-32 (2015) (describing why current reasonable royalty law overcompensates patent holders by contaminating the hypothetical negotiation with ex post considerations). *But see* Gregory J. Sidak, *The Meaning of F/RAND, Part I: Royalties*, 9 J. COMPETITION L. & ECON. 931, 983 (2013) (criticizing that the ex-ante evaluation of SEPs is “not ex ante enough” and should be placed at the time of the R&D investment decision not the decision by the SSO); David J. Teece & Edward F. Sherry, *The IEEE’s New IPR Policy: Did the IEEE Shoot Itself in the Foot and Harm Innovation?* 6 (Tusher Ctr. for Mgmt. of Intell. Capital, Working Paper No. 13, 2016) (stating the recent inclusion of ex ante valuation of SEPs in the new IEEE IPR policy “essentially amounts to the proposition that *all* of the gains from standardization should flow to implementers and/or consumers, and none (except via the volume effect) to patent holders whose technology is incorporated into the standard” (emphasis original)).

156. Epstein et al., *supra* note 41, at 27 (“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 . . .”).

157. Gregor Langus, Vilen Lipatov, & Damien Neven, *Standard-Essential Patents: Who Is Really Holding Up (and When)?*, 9 J. COMPETITION L. & ECON. 253, 268 (2013).

158. There exists an incentive to delay borne out by the preliminary empirical evidence, but we would need greater access to the strategic logic of implementing firms to formulate a complete, explanatory factual theory.

159. Vincenzo Denicolò, Damien Geradin, Anne Layne-Farrar, & Jorge Padilla, *Revisiting Injunctive Relief: Interpreting eBay in High-Tech Industries with Non-Practicing Patent Holders*, 4 J. COMPETITION L. & ECON. 571, 591-92 (2008).

160. Chien, *supra* note 10, at 24, 31.

new entrants or pure innovators who cannot leverage a reputation effect may be at risk.¹⁶¹ Similarly, some claim that the “relative size of the infringer as compared to the patentee” may play a role, entitling big implementers to resist claims of legitimate compensation vindicated by small developers.¹⁶² 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.

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.).¹⁶³ 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.

Beyond all those factors, one area of relative consensus is that limitations to the availability of injunctive relief—categorically or discretely¹⁶⁴—contribute to the formation of patent trespass.¹⁶⁵ 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 license agreement.¹⁶⁶ At best, their infringement will go unnoticed, or it 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]

161. *Patents and Standards: A Modern Framework for IPR-based Standardization*, at 124 (Mar. 25, 2014), <http://bit.do/patandstandards> (“Small, financially constrained innovators or new entrants that cannot leverage a “reputation effect” are thus particularly at risk among SEP owners.”).

162. Chien, *supra* note 10, at 24.

163. *Id.* at 24-25.

164. See Fiona Scott Morton & Carl Shapiro, *Patent Assertions: Are We Any Closer to Aligning Reward to Contribution?* (Nat’l Bureau of Econ. Research, Working Paper No. 21678, 2015) (for an example of a proposal to categorically restrict injunctions).

165. Certain 3G Mobile Handsets and Certain Wireless Devices with 3G and/or 4G Capabilities, Inv. No. 337-TA-868 (June 13, 2014) (Initial Determination) (noting that elimination of injunctive relief would only incentivize patent holdout).

166. Kieff & Layne-Farrar, *supra* note 6, at 1113 (arguing against a categorical rule limiting injunctions when a FRAND commitment has been given: “[f]or 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. 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.”).

their chance” in court.¹⁶⁷ Risk aversion, litigation fatigue or some factors previously outlined may cause an SEP owner to enter into a favorable settlement. In the worst-case scenario, the technology implementer will fully pay for compensatory damages, and this will be akin to a deferred payment (possibly inflated by the plaintiffs’ lawyers fees outside of the U.S.).¹⁶⁸ Camesasca, Langus, Neven, and Treacy note that denying injunctions gives prospective licensees “enhanced ability and incentives to free ride on SEPs.”¹⁶⁹

Virtually all authors agree that injunctions seek to promote the conclusion of licensing contracts when technology is relevant.¹⁷⁰ Restricting their availability may be particularly conducive to trespass in relation to technologies subject to rapid life cycles, such as wireless communications.

More generally, this idea ties the concept of “efficient infringement” mentioned previously.¹⁷¹ Yet, the concept of efficient infringement is potentially misleading for the following reason: the fact that an infringement is efficient from the individual perspective of an SEP implementer does not imply that the infringement is efficient from a social perspective. To take an analogous example, a cartel is an efficient infringement from each cartelist’s individual perspective, yet this does not make the cartel efficient at the social level. An infringement may be efficient, and at the same time give rise to a market failure that warrants remediation through private or public ordering.¹⁷²

Anecdotal examples of trespassing exist. An illustrative case is provided by the LTE standard. In 2012, Via Licensing and Sisvel created two patent pools covering nearly 1000 SEPs. Yet, in 2016 none

167. Geradin, *supra* note 5, at 125.

168. Joe Kattan & Chris Wood, Standard-Essential Patents and the Problem of Hold-Up 15 (Dec. 19, 2013) (unpublished manuscript), available at <http://bit.do/Kattan-Std-Essential>.

169. Peter Camesasca, Gregor Langus, Damien Neven, & Pat Treacy, *Injunctions for Standard-Essential Patents: Justice Is Not Blind*, 9 J. COMPETITION L. & ECON. 285, 287 (2013).

170. Epstein et al., *supra* note 41, at 4 (discussing injunctions as a common remedy in patent law: “[t]he combined effect of this approach to patent remedies is that parties in the patent marketplace are encouraged to contract with each other before or during the time frame in which the patented technology was put to significant use”).

171. In brief, without injunctive relief, there is no downside to infringement.

172. This distinction between a socially versus individually efficient infringement is what fuels the scholarly discussion on the availability of enhanced damages for willful infringement. Aware of that problem, Judge Gilstrap noted that “it would be inappropriate to create a bright line rule forbidding enhanced damages merely because the asserted patents are standard essential.” *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, Nos. 2:14-cv-00911, 2:14-cv-00912, 2016 WL 4596118 at *2 (E.D. Tex. Sept. 3, 2016) (order denying motion for summary judgment of no willful infringement).

of those companies had signed a single license.¹⁷³ Other examples of trespassing conduct were reported in several jurisdictions: U.S.,¹⁷⁴ E.U.,¹⁷⁵ India, and Brazil.¹⁷⁶ 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 both contribute to SSOs and make long term innovation investments.¹⁷⁷ 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 are systematically granted, but they do not associate any welfare estimate to that effect.¹⁷⁸ Ganglmair, Froeb, and Werden explain that when licensing negotiations occur after the innovator’s investment in R&D is sunk but before the implementer sinks its investment in the standard, any reduction in the availability of injunctive relief “reduce[s] the payoff from R&D and makes some projects no longer worth pursuing.”¹⁷⁹

B. Patent Trespass Strategies

1. General Properties of Patent Trespass Strategies

At a 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

173. Arvin Patel, *Time to Save Standards*, INTELL. ASSET MGMT., Nov.-Dec. 2016, at 56.

174. Daryl Lim, *Patent Holdups*, in THE CAMBRIDGE HANDBOOK OF ANTITRUST, INTELLECTUAL PROPERTY, AND HIGH TECH (Roger D. Blair & D. Daniel Sokol eds., 2017).

175. See Peter Picht, *The ECJ Rules on Standard-Essential Patents: Thoughts and Issues Post-Huawei*, 37 EUR. COMPETITION L. REV. 365 (2016) (reporting on German cases illustrative of holdout conduct).

176. Barani, *supra* note 148, at 9.

177. Denicolò et al., *supra* note 159, at 603-04 (“The main point here is how the granting of an injunction would affect incentives for innovation. Although 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.”).

178. Langus et al., *supra* note 157, at 258.

179. In other words, fewer socially-beneficial R&D projects are undertaken. See Ganglmair et al., *supra* note 13, at 265-66.

results in terms of trespass). *First*, patent trespass is *intentional*. As mentioned by one respondent, patent trespass is a situation that develops after an SEP holder writes to a company to say there are actual or future infringements. A firm that trespasses must knowingly practice a patented technology. Patent trespass can therefore be distinguished from inadvertent patent infringement and the customary vetting process required to ascertain essentiality and validity in patent disputes is undertaken without the specific purpose to delay, as discussed below.

Second, while patent trespass consists in a refusal to take a proposed license, or in attempts to avert an invitation to license, it often manifests itself through less explicit strategies. Some scholars talk of a “constructive” refusal to take a license. In line with this, 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 are diverse. One is that interest rates are lost on the pre-negotiation period. Another reason is that interest rates are generally much lower than internal rates of return.¹⁸⁰ Lastly, an important consideration is that, depending on the legal fees rules, the patent owner may bear some (or all) of the costs of litigation.¹⁸¹ At the extreme, if delaying tactics work to their full extent,

180. 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. A report by consulting economists Pierre Régibeau, Raphaël De Coninck, and Hans Zenger seems to deny, however, the general validity of the argument:

The first concern is that SEP-holders are prevented by hold-out strategies from obtaining a market return from their investment in innovation . . . Economically this argument is not generally valid . . . Delayed payment can only matter for the innovator when there are financial market imperfections that increase the costs of financing investment when the royalty income stream is reduced. For financially constrained entities, the failure to collect royalties promptly may have the effect of preventing further research because the costs of financing increase with lower cash flows.

See Pierre Régibeau, Raphaël De Coninck & Hans Zenger, *Transparency, Predictability, and Efficiency of SSO-based Standardization and SEP Licensing*, at 20-21 (Dec. 12, 2016), <http://bit.do/Regibeau-Transparency>.

181. In Europe, most jurisdictions apply a form of the “loser pays” principle which may disincentivize litigation by the SEP owner. In the United States, a regime more favorable to

even the prospect of getting compensatory damages from a court may become uncertain, for instance when the patent approaches its expiration or when the standard has been phased out and replaced by a new generation.¹⁸²

Fourth, most respondents agree there is some symmetry between patent holdup and trespass. A patent holdup requires the availability of injunctive, 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. Most respondents explain that patent trespass can occur even where injunctive relief is available (whereas patent holdup cannot occur when injunctive relief is not available). This may be due to the fact that the transaction costs of litigating for an injunction can be prohibitively high as compared to the value of the case.¹⁸³ In particular, when implementing firms are small and medium-sized enterprises ("SMEs"), they may represent too little revenue for an 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 that know this can deliberately holdout from licensing negotiations.¹⁸⁴

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 royalties. This allows trespassing firms to capture greater profits or market share. It also disincentivizes any firm from taking a license unless the whole market is licensed, which creates a collective action problem. In concrete terms, trespassing firms compete to be last to pay.

litigation exists.

182. Respondents give this as a reason why many smaller SEP holders often do not attempt to collect royalties or employ patent assertion entities ("PAEs") to handle the collection.

183. See Chien, *supra* note 10, at 5, 20 (noting "[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").

184. This is analogous to patent holdup when a PAE makes a license offer at a level below initial costs of due diligence in litigation.

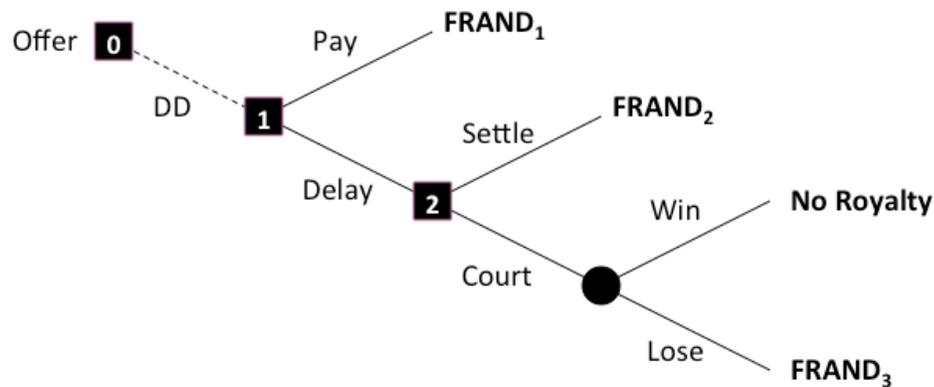


Figure 1: Patent Trespas Decision Model

Figure 1 illustrates the decision process for delay from the perspective of the SEP implementer based on the proposed elements of patent trespass defined above.¹⁸⁵ The model depicts an initial offer (FRAND₁) at (point 0) after which a reasonable due diligence phase is initiated followed by the decision to accept or delay (point 1).¹⁸⁶ If delay is chosen, this strategy continues until a settlement is agreed upon (FRAND₂) or a final court decision is adjudicated (FRAND₃).¹⁸⁷ When $FRAND_3 \leq FRAND_2 \leq FRAND_1$ is perceived as true, delay and litigation will be preferred over payment until the point when the certainty of the outcome (e.g., in relation to court decision) makes settlement a better financial choice than delay.¹⁸⁸ Under this model of behavior, the SEP holder will automatically face a reduction in their

185. The model is based on the general theory that negotiations are done in the shadow of the current perceived norms of the court (and other relevant regulators and policy actors). Thus, implementers will delay to avoid payment not because the technology they are using is not valuable, but because the current legal/regulatory/policy environment incentivizes this behavior from a financial perspective (i.e., when it is economically rational).

186. 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.

187. At the time of the initial decision (point 1 in Figure 1), a rational SEP implementer will evaluate the potential time value of delay, the potential value of a favorable court decision, the potential value of the SEP holder giving up, and the potential costs associated with the delay and litigation.

188. For example, patent damages under U.S. law are typically determined using a reasonable royalty standard. See 35 U.S.C. § 284 (2012); *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970). 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 U.S. FRAND cases. See Bowman Heiden, *Valuing Standard Essential Patents in the Knowledge Economy: A Comparison of F/RAND Royalty Methodologies in U.S. Courts*, 13 INT'L J. STANDARDIZATION RES. 19 (2015).

initial offer (FRAND₁) by the costs associated with delay and litigation, as well as the time value of money and the probability of success in court. In essence, a potential SEP implementer 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.¹⁸⁹

In conclusion, 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 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,¹⁹⁰ which could result in the finding of very low or no royalties depending on the jurisdiction. Moreover, the erosion of patent value, possibly due to novel valuation theories deployed by courts around the world, may incentivize implementers to remain silent in the face of licensing demands.¹⁹¹ Finally, in relation to licensed actors on the market, SEP implementers benefit from delay through improved competitive positioning. Without the availability of injunctive relief, all of these factors benefit the potential licensee and incentivize delay indefinitely, which effectively provides the SEP implementer with a low-cost option to wait.¹⁹² 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). This maximizes their competitive advantage relative to their competing implementing firms. The “race to trespass” effect becomes 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 garnered during our qualitative interviews. At this stage of our research, we can

189. 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.

190. See Mark Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75 (2005).

191. Renaud et al., *supra* note 7, at 62.

192. The strategy of delay in patent holdout can 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.

document four interesting types of delaying tactics. *First*, the trespassing firm may offer negotiation terms that are not industry practice, whereby:

- 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 Multi-National Corporation (“MNC”); and/or
- the SEP implementer constantly postpones negotiation meetings or sends a corporate envoy with no authority to conclude a licensing agreement.¹⁹³

Similarly, a *second* trespass strategy can occur 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 specifications can include the choice of the place of arbitration, the appointment or arbitrators, the number of arbitrators, etc.

A *third* possible, and more controversial, example of trespass occurs when infringers take affirmative steps to weaken the SEP holder’s position. This can occur 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).¹⁹⁴ Whilst the literature is not always clear on the circumstances in which the mere exercise of the right to litigation and petition is akin to trespass, we believe that certain extreme tactics constitute obvious examples. For instance, there is trespass when the implementer divides a case relating to one portfolio license in a myriad of invalidity cases before distinct jurisdictions.

Lastly, within their corporate organization, some trespassing firms have set up “licensing-in” departments. Their job 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 involving issues fundamental to

193. Multiple versions of delay in negotiations are put forward by interviewees and survey respondents including, for example, corporate restructuring, changing contact 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.

194. See *Intex Techs. (India) Ltd. v. Telefonaktiebolaget LM Ericsson*, Case No. 76/2013, Competition Commission of India (Jan. 16, 2014) (illustrating these tactics); INST. OF ELEC. & ELECS. ENG’RS, IEEE STANDARDS BOARD BYLAWS, at § 6 (Dec. 2016), <http://bit.do/IEEE-StdsBdBylaws> (demonstrating the recent IEEE IPR patent policy change).

patent law. 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 primary intention to reduce or avoid completely its FRAND royalty obligation? A framework to answer this question and determine the economic impact is discussed below.

3. Case Law

A review of recent court cases provides dispositive or suggestive evidence of what may constitute holdout conduct.¹⁹⁵ Hereafter, we discuss cases that expressly found that an infringer was “unwilling” to conclude a license on FRAND terms. Our sample of cases also includes cases where the examiner of facts did not reach a finding of unwillingness to license, but whose facts provide anecdotal illustration of trespass.

A first strand of cases features licensees who either stay entirely silent to invitations from SEP holders to enter into licensing discussions or who delay the progression of negotiations. In *Saint Lawrence Communications v. Deutsche Telekom and HTC*, for instance, an infringer had not replied for 5 months to an invitation to license by a SEP owner. In line with other courts, this time period was sufficient for the German court to deem the infringer “undisputedly not willing” to license and to grant the injunction.¹⁹⁶ Besides this relatively standard threshold duration,¹⁹⁷ more extreme delays are also reported in the case-law. For instance, in *NTT DoCoMo v. HTC*, an implementer had only submitted a counter offer a year and a half after having received the licensing invitation, and a half year after the initiation of infringement proceedings.¹⁹⁸ Similarly, in *Sisvel v. Haier*, the infringer

195. To conduct this overview of case law, we have made extensive use of Peter Georg Picht, *Case Law Search: A Summary of Post-Huawei Court Decisions*, 4IP COUNCIL (June 6, 2017), <http://bit.do/post-Huawei>.

196. Landesgericht Mannheim [LG] [Regional Court Mannheim], Mar. 10, 2015, Case No. 2 O 103/14 (Ger.), <http://bit.do/LGMannheim-caseno20103-14>. See Bucharest Court of Appeal 4th Civil Division, Oct. 28, 2015, Case No. 29437/3/2015 (“After informing Defendant, on 25 September 2012, about its SEP portfolio and inviting it to indicate its interest in obtaining a global license, Claimant submitted, on 28 March 2013, a licensing offer (inter alia) for the patent-in-suit. Defendant did not respond to Claimant’s communications.”). See also Picht, *supra* note 195, for details made available in a survey.

197. Landesgericht Düsseldorf [LG] [Regional Court Düsseldorf], Mar. 31, 2016, Case No. 4a O 73/14 (Ger.), summarized in Picht, *supra* note 195 (“Defendant did not comply with Huawei because it took more than five months to react and then only asked for proof of the alleged infringement.”).

198. Landesgericht Mannheim [LG] [Regional Court Mannheim], Jan. 29, 2016, Case No. 7 O 66/15 (Ger.), summarized in Picht, *supra* note 195 (“In casu the standard implementer’s

took seven months to reject the offers presented by the SEP owner, and subsequently waited almost a year to submit a counter offer.¹⁹⁹ These cases suggest that the length of reply taken by the infringer is the dispositive fact that permits an inference of an intention to evade a license. Yet, some cases are more explicit. In *TCT v Ericsson*, the antitrust agency of Brazil noted that the infringer appeared engaged in intentionally delaying such an agreement.²⁰⁰

A second group of cases displays an infringer entering into licensing discussions, yet on the basis of extreme negotiation terms. *Archos S.A. v. Koninklijke Philips N.V.*, a case over the entire Philips patent portfolio relating to the UMTS (3G) and LTE (4G) standards, provides a telling example. Here the alleged infringer had started negotiation indicating that if the SEP owner “wanted more than a few thousands of euros it would have to take legal action.”²⁰¹ Other cases feature an insistence to discuss contractual terms that deviate from established industry practice. For example, in *Pioneer v Acer*, the defendant counter offer was “evidently non-FRAND” because the license would have been limited to Germany whilst it was “recognized commercial practice” in the field to discuss worldwide licenses.²⁰²

A third instantiation of trespass consists in an infringer’s denial of infringement, despite clear evidence to the contrary. In *Core Wireless v. LG Electronics*, LG had sought to challenge Core Wireless’s lawsuit by raising an invalidity defense.²⁰³ However, LG’s corporate representative later testified before the Court that the patents were novel and non-obvious. Judge Gilstrap held that LG’s “invalidity defense, which was asserted at trial but rejected by the jury, is belied by the admission of LG’s corporate representative . . . who testified at his deposition that after thorough review of the patents-in-suit he

reaction was insufficient (1) because a counter-offer was made only 1.5 years after receiving the licensing offer and 0.5 years after the bringing of the proprietor’s action, (2) because security was merely promised, not provided, and (3) because the amount of security offered fell short of the court’s suggestions.”)

199. Landesgericht Düsseldorf [LG] [Regional Court Düsseldorf], Nov. 3, 2015, Case No. 4a O 93/14 (Ger.), summarized in Picht, *supra* note 195, (“Defendants did not comply with this prerequisite because they rejected, on 1 September 2014, the offers presented by Claimant on 17 February and 29 August 2014 without formulating any counter-offer, submitting such a counter-offer only belatedly, on 12 August 2015.”).

200. See *TCT Mobile Telefonos v. Telefonaktiebolaget LM Ericsson*, Decision on Preparatory Proceeding No. 08700.008409/2014-00, 08.06.2015 (Braz.).

201. RBDHA, 10 februari 2017, ECLI:NL:RBDHA:2017:1025 (*Archos S.A./Koninklijke Philips N.V.*), summarized in Picht, *supra* note 195.

202. Landesgericht Mannheim [LG] [Regional Court Mannheim], Jan. 8, 2016, Case No. 7 O 96/14 (Ger.), summarized in Picht, *supra* note 195.

203. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, No. 2:14-cv-00912 slip op. at 2 (E.D. Tex. Nov. 1, 2016) (final judgment).

concluded that the patents are novel and non-obvious.” He further stated that “a factfinder could credit this evidence and conclude that LG willfully or wrongfully took steps to conceal infringement.”²⁰⁴

Similarly, in *Telefonaktiebolaget LM Ericsson v. Intex Techs.*, the facts featured a defendant infringer who argued that it was not aware of “any significant portfolio of [Ericsson’s] patents in India that are essential for compliance.”²⁰⁵ Yet, Ericsson countered that the defendant had filed several complaints before the Competition Commission of India and the Intellectual Property Appellate Board, thereby implicitly acquiescing that Ericsson’s patents were essential to the 2G and 3G standards.

Lastly, other varieties of implementer practices may be deemed circumstantially constitutive of holdout. In *IWNComm v. Sony*, the Beijing Intellectual Property Court (BIPC) granted a permanent injunction against Sony in relation to the WAPI standard.²⁰⁶ The court found that the SEP owner had explained the patented technology relevant to WAPI and provided a list of its patent and a draft license agreement. In turn, the court considered that the defendant’s request for the plaintiff to provide a “claim chart” was unreasonable.²⁰⁷

Core Wireless v. LG provides a tell-tale example of obstructive conduct constitutive of holdout.²⁰⁸ The court explained that extant negotiations had taken place, including seven meetings in Seoul. When LG invited Core Wireless to South Korea for a last meeting with a view to making a licensing offer, Core Wireless could reasonably expect to leave with expectations of a forthcoming license. Instead LG issued at that meeting a one-page document indicating that it preferred litigation, and that it would wait until another “major cell phone manufacturer licensed the portfolio” to be a “follower” in the pre-established royalty scheme. Finding LG unwilling to conclude a license, the court somewhat ironically noted that “this should have been done by email.”

204. See *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, Nos. 2:14-cv-00911, 2:14-cv-00912, 2016 WL 4596118 at *2 (E.D. Tex. Sept. 3, 2016) (order denying motion for summary judgment of no willful infringement).

205. *Telefonaktiebolaget LM Ericsson v. Intex Techs. Ltd.*, I.A. No. 6735/2014 In Cs(Os) No. 1045/2014, Mar. 13, 2015 (India), available at <http://bit.do/Ericsson-v-Intex>.

206. Xin’t think caJie Tong Radio Network Co. v. Sony Mobile Communication (China) Co., Ltd. (西安西电捷通无线网络通信股份有限公司 v. 索尼移动通信产品(中国)有限公司) [*IWNComm. v. Sony*], Jing Zhi Min Chu Zi No. 1194 (Beijing Intellectual Property Court 2017) (China). For further information, see Dazheng David Huang, *Beijing Intellectual Property Court Grants First Injunction in a SEP Infringement Suit*, LINKEDIN (Mar. 22, 2017), <http://bit.do/Beijing-IP-Ct-Grants-Injunction>.

207. And that the plaintiff’s insistence on the signature of a non-disclosure agreement was not disproportionate, given the confidential information that appears in claim charts.

208. See *Core Wireless*, slip op. at 2 (E.D. Tex. Nov. 1, 2016) (final judgment).

The facts of *Microsoft v. Motorola* are also suggestive of patent trespass. True that in this case, the Court of Appeals for the Ninth Circuit denied the injunction, and concluded that the SEP owner had breached a contractual duty.²⁰⁹ However, the facts of the case display features of a possible holdout strategy: during the proceedings, Microsoft had relocated its distribution center for all Windows and Xbox products for Germany to the Netherlands to protect itself against the economic loss if the German court were to find an infringement.²¹⁰

Lastly, in *Wiko v. Sisvel*, a SEP owner had addressed licensing invitations to retailers of telephones produced by unlicensed manufacturers. In response, one of the unlicensed implementers initiated unfair competition proceedings against the SEP owner. The undergirding allegation was that the letters sent to the resellers constituted illicit denigration because it claimed the products had been unlawfully manufactured. The Commercial Court dismissed the application.²¹¹

III. DETERMINANTS OF CIRCUMSTANTIAL, SYSTEMATIC, AND SYSTEMIC PATENT TRESPASS

In economic theory, holdup (holdout in mainstream economics) and trespass are traditionally perceived as circumstantial 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 circumstantial patent trespass into a systematic and systemic issue. We first define what we mean by circumstantial, systematic and systemic patent trespass in Section A and then discuss a few “plus factors” that can influence such outcomes in Section B.

A. Framework

At a quantum level, patent trespass is a circumstantial problem. In classic economic terms, patent trespass is a situation in which two firms are trying “to divide up the pie” through “tough negotiations.”²¹² Egan and Teece refer to this in the patent world as a simple case of “transfer payments,”²¹³ meaning that SEP owners and implementers attempt to

209. See *Microsoft Corp. v. Motorola, Inc.*, 795 F.3d 1024 (9th Cir. 2015).

210. *Id.*

211. See Tribunal de Commerce [Trib. com.] [Commercial Court] Marseille, Sept. 20, 2016, [2016F01637] (Fr.).

212. Cohen, *supra* note 40, at 358-59.

213. Egan & Teece, *supra* note 147, at 12.

share economic surplus. When these negotiations and transfer payments become structured into market norms, one group of actors may hold a consistent, predominant and recurrent 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, circumstantial and systematic bargaining power can have an impact on the performance of market actors. However, the economic significance of a circumstantial and systematic problem is primarily distributional. It is inapt 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 of rent distribution between private actors.²¹⁴ 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, circumstantial, systematic, and systemic market impact is at different degrees on the bargaining power spectrum, as shown below in Figure 2.

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.

Professors 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.”²¹⁵ 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.”²¹⁶ 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 royalty gap, as opposed to a royalty stack.

214. In a famous dissent, Justice Scalia enumerated a long list of examples of circumstantial “leverage” due to specific investments unworthy of antitrust policy consideration:

[T]he 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 Tech. Servs., Inc., 504 U.S. 451, 497-98 (1992) (Scalia, J., dissenting).

215. Lemley & Shapiro, *supra* note 1, at 1993.

216. *Id.*

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.”²¹⁷ Systemic patent holdup primarily implies a decrease in static efficiency through reductions in consumer surplus and a disincentive for 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.²¹⁸ 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.²¹⁹ 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, vertical integration or acquisitions of SEP holding firms. Other possible effects include impact on business models. Startups developing innovative ideas may shift from patent licensing as a means to appropriate their innovation, towards more capital-intensive methods like firmware development and processors manufacturing. Firms that once acquired portfolios of patents, including SEPs, may leave the buying market. And companies with large SEP patent and SEP positions may be incentivized to delegate their licensing activities to privateers.²²⁰ 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

217. *Id.*

218. This includes not only the amount of investment in R&D, but also in the standard-setting process. See Justus Baron, Kirti Gupta, & Brandon Roberts, Unpacking 3GPP Standards 20 (2015) (unpublished manuscript), available at <http://bit.do/Baron-Unpacking3GPP> (estimating over 3.4 million man-hours had been spent on 3GPP meetings between 2005–2014).

219. Cohen, *supra* note 40, at 359.

220. Pentheroudakis & Baron, *supra* note 14, at 103.

measure compared to the more obvious impact of patent holdup. Table 2 below provides a symmetrical contrast between patent holdup and trespass from a circumstantial, systematic, and systemic perspective.

Table 2: Patent Holdup vs. Patent Trespass

	Circumstantial	Systematic	Systemic
Patent Holdup	Circumstantial decrease in SEP implementer surplus	Royalty stack	Deadweight loss (exit of SEP implementers)
Patent Trespass	Circumstantial decrease in SEP holder surplus	Royalty gap	Deadweight loss (exit of SEP developers)

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.²²¹ 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.²²² 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 considering the net economic impact on society. Figure 2 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 bargaining

221. 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.

222. For a deeper description of the meaning of the material and intellectual value chain in the context of SEPs and telecommunications, see Bowman Heiden & Jens Andreasson, *Reevaluating Patent Damages in the Knowledge Economy: The Intellectual Value Chain and the Royalty Base for Standard-Essential Patents*, 1 CRITERION J. INNOVATION 229 (2016).

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

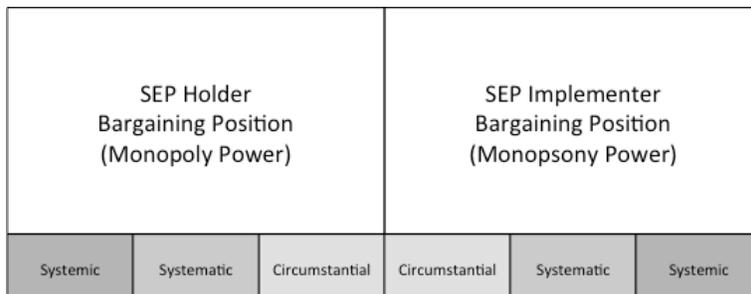


Figure 2: Asymmetric Bargaining Power Spectrum

B. Plus Factors Facilitating Patent Trespass

Our interviews point to several important plus factors that can transform circumstantial 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 U.S., 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.²²³

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.

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

223. IDC, *Global Market Share Held by Leading Smartphone Vendors from 4th Quarter 2009 to 4th Quarter 2016*, STATISTA (2017), <http://bit.do/Statista-GlobalMarketShare>.

for large revenues, which has become a large and growing segment especially in emerging and developing countries.²²⁴

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 a key driver 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.²²⁵ 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

224. Licensing at the component where there are fewer global actors could reduce the long tail problem in theory, however, there are several challenges including: (1) SEPs are often claimed on the system/product level not the component level, and (2) patent exposure to downstream firms due to upstream exhaustion of rights. See Heiden & Andreasson, *supra* note 222, at 261. And (3) norms for pricing of licenses at the component level that may lay down a hidden revenue-cap on standardized technologies. See Axel Gautier & Nicolas Petit, Smallest Salable Patent Practicing Unit and Component Licensing: Why 1\$ is Not 1\$ 1 (Apr. 18, 2017) (unpublished manuscript), available at <http://bit.do/Gautier-SmallestSalablePatent>.

225. Technology markets in the context of open, consensus-based standards could be characterized as having two distinct phases—(1) the competitive development of the technical standard in the SSO and (2) the pricing and negotiation of licenses for the use of the technology. The fact that these occur separated in time creates the illusion that standardization is based only on ex post licensing instead of ex ante technology transfer process. This separation of phases can have socially-desirable outcomes through facilitating market development and reducing antitrust concerns within the SSO environment.

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).²²⁶ Indicators of a systemic effect on SEP holders and the technology market for standards could be observed from several perspectives. For example, traditional SEP holding firms would likely reduce their contributions to consensus-based SSOs (e.g., lower level of essentiality declarations, lower attendance rates at technical committee meetings) or potentially withdraw completely (e.g., 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.²²⁷

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-

226. This is synonymous with the breakdown of SEP-based product markets predicted in patent holdup theory.

227. See Robert Merges, *Intellectual Property Rights, Input Markets, and the Value of Intangible Assets* (Feb. 9, 1999) (unpublished manuscript), available at <http://bit.do/Merges-IPRights> (discussing the role of a strong patent system in creating a division of innovative labor).

enabled products) as well as non-implementing firms, such as patent pools.²²⁸ The 12 respondents (60%) that have taken the survey total 206 years of SEP licensing experience and represent firms with an estimated 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 3 provides a statistical summary of the respondents to the survey.

Table 3: Summary of Survey Respondents

Respondents	Total	Mean	S.D.
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.

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).

228. The sample of firms was chosen from the smartphone dataset used in Alexander Galetovic, Stephen Haber, & Lew Zaretzki, *A New Dataset on Mobile Phone Patent License Royalties* (Stan. Univ. Hoover Inst. Working Grp. on Intell. Prop., Innovation, & Prosperity, Working Paper No. 16011, 2016), and top SEP holding firms from Baron et al., *supra* note 218, at 27 (focusing on firms with a specific business focus to generate revenue from their SEP portfolios).

A. *The Nature of Patent Trespass*

1. Plus Factors Facilitating Patent Trespass

Table 4 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.

Table 4: Key Factors Facilitating Patent Trespass

General Patent Trespass Factors	Impact	Trend (2011-16)
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).

2. Patent Trespass Strategies and the Heterogeneity of SEP Implementers

Table 5 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 5 consists in showing the bimodal nature (i.e., delay vs. non-payment) of patent trespass across SEP implementers. On the one hand, 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.

Table 5: Heterogeneity of SEP Implementers and the Impact of Delay

Type of SEP Implementer	Relative Delay	Trend (2011-16)
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).

In addition to the general experience of delay across SEP implementers, the survey also addressed the stylized examples presented in Section II.B.2, 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 6 below summarizes the findings across eight identified patent trespass strategies.

Table 6: Patent Trespass Strategies

Patent Trespass Strategies	Frequency	Trend	Type of Implementer
Ignoring correspondence	3.2	+0.8	LFE/SME
Unreasonable postponement of negotiations	3.5	+0.9	LFE/MNC
Counteroffers 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 worldwide markets	3.4	+1.2	LFE/MNC
Refusal to engage a 3rd-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

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.

One implication of Table 6 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;²²⁹ and (3) MNCs and LFEs are more likely to engage in advocacy initiatives, such as engaging competition

229. One example of an LFE benefiting from a patent trespass position in this context is the case of HTC, which grew quickly in emerging markets but struggled to enter Western markets based on a lack of preparedness to manage patent obligations. See Lanhua Li, Can Huang, & Suli Zheng, HTC Case Study, Presentation at the Board Meeting of Institute for Intellectual Property Management at School of Management, Zhejiang University (Apr. 29, 2016) (on file with authors).

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

1. SEP Licensing Coverage

Table 7 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.²³⁰

Table 7: SEP Licensing Coverage

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

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

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

230. 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.

standardized hardware. Figure 3 below shows the 340% growth in unit sales of microvendors from 2011-15.

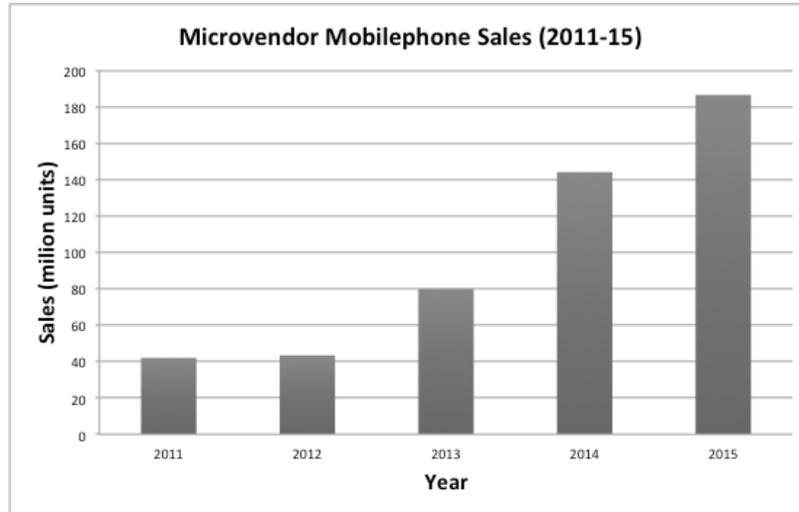


Figure 3: Microvendor Mobile Phone Sales 2011-15 (courtesy of Strategy Analytics 2016)

Figure 4 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 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 IV.A.2, 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.

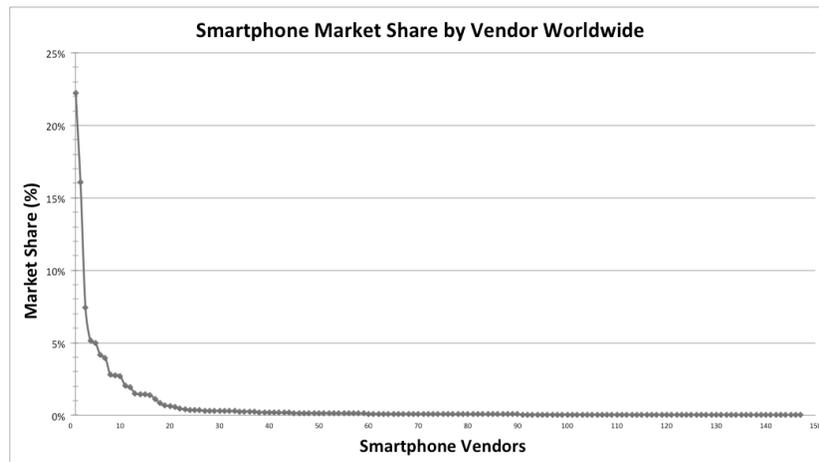


Figure 4: Smartphone Market Share by Vendor, Worldwide in 2015 (courtesy of Strategy Analytics 2016)

2. Patent Trespass Decision Model Parameters

Several of the plus factors that affect the patent trespass decision model presented in Figure 4 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).

Table 8: Parameters Impacting the Patent Trespass Decision Model

Decision Model Parameters	Mean		Range	
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	\$17.5M	0.1–0.5	\$5–50M
EU (Negotiation/Litigation)	0.15	\$6M	0.05–0.25	\$2–10M
China (Negotiation/Litigation)	0.15	\$3M	0.1–0.2	\$1–5M
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 8 shows that SEP licensors agree that a reasonable time (see period 0-1) in Figure 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 8.²³¹

3. Strategic Implications of Patent Trespass

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

231. 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.

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.

Table 9: Strategic Trends in the Telecommunication Industry at the Firm and Industry Level

Strategic Trends	Mean	S.D.
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 9 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 versus consensus standards would provide greater insight into the systemic impact of patent trespass in the wireless communications market.²³²

4. 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.

232. 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.

Table 10: Impact of SEP Policy-Level Events

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

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

Table 10 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 10 is, however, 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 aggravating 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 E.U. are perceived as curtailing patent trespass, while events that took place in the U.S. 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;²³³
- 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; and
- Recognize FRAND determinations across jurisdictions.

CONCLUSION

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:

- The improper concept of “patent holdout” should be replaced with another concept that conforms with

233. See Gregory Sidak, *Enhanced Damages for Infringement of Standard-Essential Patents*, 1 CRITERION J. ON INNOVATION 1101 (2016). See also *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, Nos. 2:14-cv-00911, 2:14-cv-00912, 2016 WL 4596118 (E.D. Tex. Sept. 2, 2016).

mainstream economic theory. We have proposed “patent trespass,” but we concede that other concepts may be more appropriate;

- The concept of patent holdup used in the early patent economics literature is misleading, and creates a semantic trap;
- 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;
- 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.
- 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 holders’ 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, 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 microvendors, 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).²³⁴ This study adds to the discourse but more importantly urges academics and policy-makers to engage in further empirical studies to support better theory development and evidence-based decision-making.²³⁵

234. Galetovic et al., *supra* note 228, at 2; Gregory Sidak, *What Aggregate Royalty Do Manufacturers of Mobile Phones Pay to License Standard-Essential Patents?*, 1 CRITERION J. ON INNOVATION 701, 701-02 (2015); Keith Mallinson, *Cumulative Mobile-SEP Royalty Payments No More than Around 5 percent of Mobile Handset Revenues*, IP FINANCE (Aug. 19, 2015), <http://bit.do/Mallinson-Cumulative-Mobile>; Keith Mallinson, *“Patent Holdup” Allegations Encourage SEP Free-Riders*, IP FINANCE (Aug. 16, 2016), <http://bit.do/Mallinson-on-Patent-Holdup>.

235. For example, further research would be needed to better understand the nature and problem of different classes of trespasses, especially in relation to the context of patents, should the use of patent trespass move from merely an explanatory analogy to a normative concept.

APPENDIX A

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,
 1. How would you define patent holdout? (Open answer) D1-5
 2. 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

Additionally, further exploration of the traditional law of equitable remedies for tested approaches to double-sided-opportunism problems arising from simple structures of rights could provide further insights into potential solutions that more effectively balance the interests of SEP holders and implementers in standards-enabled markets.

- 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
 - Relative Delay in Payment (1-5)
1=insignificant, 5=no payment
 - Trend (-2,+2) -2=large decrease, +2=large increase
3. 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
4. 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

What policy changes would you recommend to combat patent holdout?