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Much Ado About Holdup

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ABSTRACT

The policy debate surrounding patent hold-up in markets for standardized products is now well into its second decade with no end in sight. Fundamental questions including the definition of hold-up, whether it exists in the marketplace, and what impact it has on innovation, continue to bedevil scholars, policy makers and industry. Yet it is not clear that this debate needs to continue. Patent hold-up is a pattern of market behavior, not a legally-cognizable wrong. Whether it is commonplace or rare is largely irrelevant to liability in any given case. To the extent that hold-up behavior constitutes an abuse of market power, with resulting harms to competition, longstanding doctrines of antitrust and competition law exist to sanction it. To the extent that hold-up impedes the efficient operation of standard-setting processes, SDOs can, and have, adopted internal procedures, including disclosure and licensing requirements, to curtail that behavior. Thus, the ongoing debate over the empirical evidence for systemic patent hold-up in standardized product markets, or a lack thereof, seems a fruitless academic exercise. The presence or absence of systemic hold-up actually tells us little about individual firm behavior that can and should be sanctioned by the law, and it may thus be time to close the debate over the systemic prevalence of this form of behavior.

* Professor, University of Utah S.J. Quinney College of Law. The arguments made in this article draw on presentations made by the author, *inter alia*, at the NYU-ABA Next Generation of Antitrust Scholars Conference (New York, Jan. 2018), National Law University, Delhi's Second Annual Roundtable on Innovation, Intellectual Property and Competition (Bangalore, July 2017), Stanford University Hoover Institute's Conference on Patent Holdup Theory: Implications for the Courts, Government, and the Legislature (Washington, DC, Oct. 2016); the University of Liege, Competition and Innovation Institute Conference on Regulating Patent Hold-Up (Brussels, Mar. 2016), and the Global Competition Review (GCR) Live, IP and Antitrust Asia-Pacific Conference (Seoul, June 2015). The author thanks the participants in and organizers of each of these conferences for valuable feedback, discussion and debate and is particularly grateful to Michael Carrier, Dave Djavaherian, Andy Gavil, Jon Jacobson, Julian Nowag, Tim Simcoe and Jeralyn Trujillo for their helpful comments on this article. Partial support for the research and writing of this article was provided by the Albert and Elaine Borchard Fund for Faculty Excellence at the University of Utah.

INTRODUCTION

The technical innovations embodied in industry standards such as Wi-Fi, MP3 and LTE are covered by hundreds, if not thousands, of patents.[1] To manufacture and sell a product that complies with such a standard, a manufacturer[2] will necessarily infringe each patent that is "essential" to the standard (a standards-essential patent or SEP).[3] Therefore, the manufacturer must either obtain a license to operate under such SEPs or risk an infringement suit by the SEP holders.[4] In many cases, the relevant standards development organization (SDO) requires that this license be on terms that are "fair," "reasonable," and "non-discriminatory" (FRAND).[5]

But even with a commitment to license on FRAND terms, situations may arise in which a SEP holder seeks to charge the manufacturer a royalty that exceeds value of its technical contribution. Nevertheless, the manufacturer may have little choice but to include a broadly-adopted standard in its product in order to be viable in the marketplace. And because the manufacturer may already have made specific non-recoupable investments in the design, manufacture and sale of the standard-compliant product, it may be willing to concede to a SEP holder's demands for excessive royalties in order to avoid losing these sunk investments. This scenario has been referred to as patent "hold-up".[6]

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[1] *See* note 22, *infra*, and accompanying discussion.

[2] For convenience, I use the term "manufacturer" to refer to the entire class of entities that would theoretically require a license under a standards-essential patent, including product manufacturers, component suppliers, assemblers, OEMs, resellers, wholesalers, distributors, retailers and end users.

[3] Given the complexity of standardized technologies, the large numbers of patents involved and the significant incentives to declare patents as being "essential" to standards, there is significant debate regarding the actual essentiality of many patents to standards. *See* Jorge L. Contreras, *Essentiality and Standards-Essential Patents* in CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW: COMPETITION, ANTITRUST, AND PATENTS, Ch. 12 (Jorge L. Contreras, ed., 2017).

[4] In actuality, many holders of SEPs do not actively enforce their SEPs against manufacturers of standardized products, but rather hold these SEPs "defensively" for use if they are themselves sued. *See* Jorge L. Contreras, *Fixing FRAND: A Pseudo-Pool Approach to Standards-Based Patent Licensing*, 79 ANTITRUST L.J. 47, 62 (2013) (referring to such SEP holders as "sleeping dogs").

[5] For convenience, I also use the term FRAND to cover the alternative formulation "Reasonable and Nondiscriminatory" (RAND). These terms are largely viewed as synonymous. *See* U.S. DEPT. JUSTICE & U.S. PATENT & TRADEMARK OFFICE, POLICY STATEMENT ON REMEDIES FOR STANDARDS-ESSENTIAL PATENTS SUBJECT TO VOLUNTARY F/RAND COMMITMENTS (2013), *available at* http://www.justice.gov/atr/public/guidelines/290994.pdf.

[6] For a discussion of the different definitions of "hold-up", see Part II.A, *infra*. The legal and economic literature on hold-up in the context of patented standards has become extensive. For a detailed review of the theoretical literature, see Norman V. Siebrasse, *Holdup, Holdout and Royalty Stacking: A Review of the Literature* in PATENT REMEDIES AND COMPLEX PRODUCTS: TOWARD A GLOBAL CONSENSUS, Ch. 7 (C. Bradford Biddle et al, eds., 2019, forthcoming), and for a summary of empirical studies, see Jorge L. Contreras, *Technical Standards, Standards-Setting Organizations and Intellectual Property: A Survey of the Literature (With an Emphasis on Empirical Approaches),* in RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW, VOL. II – ANALYTICAL METHODS (Peter S. Menell & David Schwartz, eds., 2018, forthcoming). Academic articles on the topic of hold-up in standard-setting include: Thomas F. Cotter, Erik Hovenkamp, Norman Siebrasse, *Switching Costs, Path Dependence, and Patent Holdup* (working paper Feb. 21,2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3127933; Alexander Galetovic & Stephen Haber, *The Fallacies of Patent Holdup Theory*, 13 J. COMPETITION L. & ECON. 1 (2017); Norman V. Siebrasse & Thomas F. Cotter, *The Value of the Standard*, 101 MINN. L. REV. 1159

As discussed in greater detail in Part I below, hold-up can cause a variety of market inefficiencies and is generally viewed as detrimental to the smooth operation of the standardization process.

Though most commentators seem to agree that hold-up *could* occur in markets characterized by patented standards, there is significant disagreement over the extent to which hold-up actually *does* occur in such markets. On one hand, industry participants have identified patent hold-up as a significant issue. As early as 2002, the leader of the Worldwide Web Consortium (W3C), a prominent SDO, testified before the U.S. Department of Justice (DOJ) and Federal Trade Commission (FTC) that:

> patent holdup has been a real problem, introducing delay, inefficient allocation of resources intended for innovation, and the possibility for individual patent holders to exercise unjustified control over the design of fundamental technology infrastructure on which the entire marketplace depends.[7]

Other technology industry leaders have made similar claims over the years.[8] In response to the threat of hold-up, scholars including Carl Shapiro, A. Douglas Melamed, Fiona

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(2017); Alexander Galetovic, Stephen Haber & Ross Levine, *An Empirical Examination of Patent Holdup*, 11 J. COMPETITION L. & ECON. 549 (2015); Colleen V. Chien, *Holding Up and Holding Out*, 21 MICH. TELECOMM. & TECH. L. REV. 1 (2014); Dennis W. Carlton & Allan L. Shampine, *An Economic Interpretation of FRAND*, 9 J. COMPETITION L. & ECON. 531 (2013); F. Scott Kieff & Anne Layne-Farrar, *Incentive Effects from Different Approaches to Holdup Mitigation Surrounding Patent Remedies and Standard-Setting Organizations*, 9 J. COMP. L & ECON. 1091 (2013); Contreras, *Fixing FRAND, supra* note 4; Bernhard Ganglmair, Luke M. Froeb & Gregory J. Werden, *Patent Hold-Up and Antitrust: How a Well-Intentioned Rule Could Retard Innovation*, 60 J. INDUS. ECON. 249 (2012); Colleen V. Chien & Mark A. Lemley, *Patent Holdup, the ITC, and the Public Interest*, 98 CORNELL L. REV. 1 (2012); Suzanne Michel, *Bargaining for RAND Royalties in the Shadow of Patent Remedies Law*, 77 ANTITRUST L.J. 889 (2011); Carl Shapiro, *Injunctions, Hold-Up, and Patent Royalties*, AM. L. & ECON. REV. (2010); Thomas F. Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. CORP. L. 1151, 1197 (2009); Einer Elhauge, *Do Patent Holdup and Royalty Stacking Lead to Systematically Excessive Royalties*? 4 J. COMP. L & ECON. 535 (2008); J. Gregory Sidak, *Holdup, Royalty Stacking, and the Presumption of Injunctive Relief for Patent Infringement: A Reply to Lemley and Shapiro*, 92 MINN. L. REV. 714 (2008); Joseph Farrell, et al., *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L.J. 603 (2007); Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991 (2007); Damien Geradin & Miguel Rato, *Can Standard-Setting Lead to Exploitative Abuse? A Dissonant View on Patent Hold-Up, Royalty Stacking and the Meaning of FRAND*, 3 EURO. COMP. J. 101 (2007); Robert A. Skitol, *Concerted Buying Power: Its Potential For Addressing The Patent Holdup Problem In Standard Setting*, 72 ANTITRUST L. J. 727 (2005); David J. Teece & Edward F. Sherry, *Standards Setting and Antitrust*, 87 MINN. L. REV. 1913 (2003); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POLICY AND THE ECONOMY 121, 126 (Adam B. Jaffe, Josh Lerner & Scott Stern eds., 2001).

[7] Daniel J. Weitzner, Supplemental Comments, Before the United States Department of Justice and United States Federal Trade Commission Joint Roundtables on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy: Standards and Intellectual Property; Antitrust Law and Patent Landscapes (Nov. 15, 2002). The Worldwide Web Consortium (W3C) is involved in the development of standards for the Worldwide Web including HTML and XML.

[8] *See, e.g.*, Letter from Industry and Academic Writers to Assistant Attorney General Makan Delrahim, U.S. Dept. Justice Antitrust Div., dated Jan. 24, 2018, at 1 ("patent hold-up is real, well documented, and harming US industry and consumers"); Letter from Apple, Inc. to Hon. Patrick J. Leahy and Hon. Chuck Grassley dated July 18, 2012, at 2 ("The heart of the problem is that a handful of FRAND

Scott-Morton, Joseph Farrell, Michael Carrier, Mark Lemley and others (including the author) have urged positive intervention by policy makers.[9]

On the other hand, critics including Stephen Haber, Richard Epstein, Anne Layne-Farrar, David Teece, Joshua Wright, F. Scott Kieff, and J. Gregory Sidak have argued that that there is little, if any, empirical evidence that hold-up is a pervasive or even a real problem in modern technology markets.[10] Two then-sitting commissioners of the FTC, Maureen Ohlhausen and Joshua Wright, summarized this position in 2015, asserting that "there is no empirical evidence to support the theory that patent holdup is a common problem in real world markets."[11] This purported lack of evidence has led some commentators to dismiss individual firms' complaints regarding hold-up as anecdotal and to conclude that, if hold-up occurs at all in the market, it is sporadic.[12] As a result, these commentators argue, policy initiatives focused on preventing hold-up are unnecessary at best and harmful at worst.[13]

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patent holders are using their standard essential patents as leverage to extort either (i) a share of the monetary value of nonstandardized, product-differentiating technology or (ii) the right to use, themselves, proprietary nonstandardized technology owned by other companies.")

[9] *See* A. Douglas Melamed & Carl Shapiro, *How Antitrust Can Make FRAND Commitments More Effective*, 127 YALE L.J. 2110 (2018); Commissioner Terrell McSweeny, Holding the Line on Patent Holdup: Why Antitrust Enforcement Matters (Mar, 21, 2018), https://www.ftc.gov/system/files/documents/public_statements/1350033/mcsweeny_-_the_reality_of_patent_hold-up_3-21-18.pdf; Fiona Scott Morton & Carl Shapiro, "Patent Assertions: Are We Any Closer to Aligning Reward to Contribution?*" NBER Working Paper No. 21678* (2015); Farrell et al., *supra* note 6; Lemley & Shapiro, *supra* note 6; Shapiro, Navigating, *supra* note 6, at 125 ("both patent and antitrust policymakers should regard holdup as a problem of first order significance in the years ahead").

[10] *See, e.g.,* J. Gregory Sidak, *The Antitrust Division's Devaluation of Standard-Essential Patents*, 104 GEORGETOWN L.J. ONLINE 48, 61 (2015) (collecting studies at n.49) ("By early 2015, more than two dozen economists and lawyers had disapproved or disputed the numerous assumptions and predictions of the patent holdup and royalty stacking conjectures."); Galetovic, Haber & Levine, *supra* note 6, at 572 ("We cannot reject the hypothesis of no SEP holdup"); Anne Layne-Farrar, *Patent Holdup and Royalty Stacking Theory and Evidence: Where do we Stand After 15 Years of History?*, OECD Directorate for Financial and Enterprise Affairs, Note DAF/COMP/WD(2014)84 (18 Nov. 2014) (after 15 years, "empirical studies conducted thus far have not shown that holdup or royalty stacking is a common problem in practice"); Sidak, *Holdup*, *supra* note 6, at 718 (2008) ("Despite Lemley and Shapiro's insistence to the contrary, there is little evidence of the existence of the holdup and royalty stacking problems that concern them"); 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 (2008) ("we point out the lack of hard evidence that patent holdup and other licensing problems are pervasive, not sporadic").

[11] Reply Submission on the Public Interest of Federal Trade Commissioners Maureen K. Ohlhausen and Joshua A. Wright, In re. Certain 3G Mobile Handsets and Components Thereof, ITC Case No. 337-TA-613 (on remand) (Jul. 2015).

[12] Denicoló et al, *supra* note 10, at 576 ("lack of hard evidence that patent holdup and other licensing problems are pervasive, not sporadic"); Ohlhausen & Wright, *supra* note 11, at 4 (acknowledging "the possibility of anticompetitive patent holdup in a given instance").

[13] Beyond a lack of empirical evidence, Galetovic and Haber, *supra* note 6, at 9-11, criticize what they term "Patent Holdup Theory" as relying on several faulty assumptions: the exercise of market power by an upstream supplier can be a long-run equilibrium, Patent Holdup can occur many times over to the same firm, resulting in "royalty stacking," and patented technologies themselves add little or nothing to the markets that they help create. Despite the authors' assertions, it is not clear that these assumptions (other than a recognition of the risk of royalty-stacking, though not its actual manifestation) are actually necessary to, or even promoted by, commentators who warn of patent hold-up. A full discussion of these theoretical issues is, however, beyond the scope of this article.

Recently, a third view regarding hold-up in technology markets has emerged, arguing that although evidence of widespread hold-up, under some definitions of the term, is not evident in technology markets, we should not expect to find this evidence, both because prophylactic measures already taken by SDOs and enforcement agencies may have eliminated the most blatant forms of abuse, and because detecting and documenting such behavior is inherently difficult, if not impossible.[14]

These fundamental disagreements over the extent and existence of hold-up[15] were recognized by the DOJ and FTC as early as 2002, when participants in a series of hearings convened by the agencies presented widely divergent views on this question:[16]

> Some panelists said hold up was the rare exception in a system that otherwise works well. Other panelists questioned this assertion, suggesting that hold up may be more widespread.[17]

These disagreements continue today, more than a decade and a half later.[18] To be sure, existential inquiries such as these are intellectually stimulating, and the industries involved – wireless telecommunications, computer networking, consumer electronics – have huge amounts at stake. Yet, despite the vehemence with which opinions are expressed and the frequency with which such conferences, symposia and debates are convened, questions about the existence of hold-up have changed very little over the last decade and a half. As such, it is worth asking whether the debate, and the questions being asked, remain meaningful, and whether the continued search for market-wide evidence of patent hold-up, or the refutation thereof, is a useful exercise.

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[14] Carl Shapiro, Presentation made at IEEE-SIIT 9th Intl. Conf. on Standardization and Innovation in Information Technology, Oct. 6-8, 2015, Sunnyvale, CA; Nancy Rose, Deputy Asst. Atty. Gen. for Economic Analysis, Antitrust Div., U.S. Dept. Justice, Speech given at Patents in Telecoms Conference, Nov. 5, 2015, Washington, DC.

[15] For purposes of this article, references to the "existence" of hold-up relate solely to its manifestation in modern technology-driven markets that rely heavily on industry standards, such as wireless telecommunications, networking and semiconductors. The large economics literature exploring issues of hold-up and opportunism in other industries speaks for itself and is not the focus of the present debate.

[16] U.S. Dept. Justice & Fed. Trade Comm'n, Competition and Intellectual Property Law in the Knowledge-Based Economy, Feb. 6 – Nov. 6, 2002 [hereinafter DOJ-FTC, 2002 Hearings] https://www.ftc.gov/news-events/events-calendar/2002/02/competition-ip-law-policy-knowledge-based-economy-hearings.

[17] U.S. Dept. of Justice & Fed. Trade Comm'n, Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition 39-40 (2007) [hereinafter DOJ-FTC, Antitrust & IPR] (reporting on 2002 hearings).

[18] In 2016, I attended a conference (Liege Competition and Innovation Institute, *Regulating Patent "Hold-Up"? An Assessment in Light of Recent Academic, Policy and Legal Evolutions*, Brussels, 29 Feb. 2016) devoted entirely to the topic of patent hold-up in the context of technical standard-setting. An impressive line-up of international experts from government, academia and the private sector vigorously debated questions such as: Does patent hold-up exist? If it exists, what impact does it have on technology innovation? And what, if anything, can and should be done about it by regulatory and enforcement agencies?

In this article, I do not examine the theories underlying patent hold-up or the evidence for or against patent hold-up in standard setting, but rather the contours of the long-running debate surrounding hold-up and whether it matters at all. Part I offers some essential background for those who are uninitiated in the world of technical standard setting and standards-essential patents. Part II explores the interrelated questions that form the core of the current hold-up debate: how is hold-up defined, and what can empirical evidence tell us about hold-up today's technology-driven markets? And in Part III, I challenge the underlying premise that evidence of systemic market hold-up matters, either in assessing the liability of individual firms that have engaged in abusive conduct, or in formulating meaningful policy reform. I introduce key analogies to illustrate the fallacies inherent in the arguments seeking to refute the hold-up thesis based on a purported lack of empirical evidence. First, as with a public health threat such as Ebola, the absence of widespread contagion does not imply that the threat is not a real one, only that existing preventative measures are working. Likewise, as with historical markets in commodities such as steel, coal and sugar, evidence that today's markets for standardized products (computers, smart phone) are thriving does not imply that anticompetitive conduct is not occurring, nor that it should not be the subject of ongoing regulatory scrutiny and policy. I conclude by recommending continued vigilance and enforcement by governmental agencies in accordance with existing antitrust and competition laws and ending the pointless (though invigorating) academic debate over patent hold-up.

I. PATENTS, STANDARDS, AND LOCK-IN

Technical standards such as Wi-Fi, USB, html and 4G LTE enable products manufactured by different vendors to interoperate with each other without significant user intervention. A device with a USB connector will work when plugged into a USB socket anywhere in the word. The broad deployment of such standards reduces product development and manufacturing costs, expands consumer choice, fosters innovation, and produces market efficiencies known as "network effects."[19]

Most of the standards currently implemented in technology products were developed by firms, often competitors, collaborating within groups known as standards-development organizations (SDOs).[20] Because of the significant market and consumer benefits that technical standards can confer, this degree of cooperation among market participants has been viewed favorably by antitrust and competition law authorities, who might otherwise condemn such large-scale coordination efforts among competitors.[21]

[19] *See* DOJ-FTC, ANTITRUST & IPR, *supra* note 17, at 33; CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY 45–46 (1999).

[20] SDOs include a broad range of organizations, from large, semi-governmental bodies such as the International Telecommunications Union (ITU) and the European Telecommunications Standards Institute (ETSI), to large trade associations such as the IEEE Standards Association and the Internet Engineering Task Force (IETF), to smaller groups often referred to as "consortia" that focus on one or a handful of related standards (e.g., the DVD 6C Forum, and Bluetooth Special Interest Group). *See generally* Brad Biddle, *No Standard for Standards: Understanding the ICT Standards-Development Ecosystem* in CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW: COMPETITION, ANTITRUST, AND PATENTS, Ch. 2 (Jorge L. Contreras, ed. 2017) (describing organizations involved in standard-setting).

[21] *See, e.g.*, DOJ-FTC, ANTITRUST & IPR, *supra* note 17, at x.

It is well-documented that many key interoperability standards, particularly in the wireless telecommunications and networking industries, are covered by patents, sometimes hundreds or thousands of them.[22] Ordinarily, if the manufacturer of an infringing product is unable or unwilling to obtain a license to operate under that patent, the manufacturer may either design around the patent (rendering the product non-infringing), or stop selling the infringing product.[23] With standards-compliant products, however, the manufacturer's options are more limited: designing around the patent may prevent the product from complying with the standard, thus reducing its functionality or making it unmarketable (e.g., a laptop computer without Wi-Fi or a smartphone without 4G connectivity). Thus, in order to sell a standards-compliant product, the prudent manufacturer must obtain permission from the patent holder (known as a license).

If necessary patent licenses are obtained before a new standard is approved by the SDO, then a manufacturer wishing to implement the standard in its products can do so without fear of infringement. If the royalty rates sought by the patent holder are too high for the market to bear, then the SDO participants designing the standard can work around the patented technology and choose a lower cost alternative or omit the patented technology from the standard entirely. In this way, different technologies can compete to be included in a standard, and patent holders will be constrained from demanding unreasonable terms.[24]

However, once a standard is approved by the SDO and adopted in the marketplace (and sometimes even earlier), manufacturers may invest significant amounts in product design, marketing and production based on that standard (e.g., the addition of a next-generation USB port to every laptop computer). And, given the combination of competitive pressure to place new products on the market, the length and complexity of patent licensing negotiations, inherent uncertainty regarding the meaning of the vaguely-defined term FRAND,[25] and the further uncertainty regarding which patents may actually cover a standardized technology, many manufacturers make these investments and begin to design, produce and sell standardized products before obtaining licenses from all holders of patents covering the standard.[26]

At this point, the patent holder is no longer at risk of being designed-out of the standard and the manufacturer's cost of switching from the standardized technology to an

[22] Justus Baron & Tim Pohlmann, *Mapping Standards to Patents Using Declarations of Declared Standard-Essential Patents and Systems of Technological Classification* at Table 5, Northwestern Law & Econ. Research Paper 18-10 (2018); KNUT BLIND ET AL., STUDY ON THE INTERPLAY BETWEEN STANDARDS AND INTELLECTUAL PROPERTY RIGHTS (IPRS), FINAL REPORT 62 (2011).

[23] The manufacturer may also challenge the patent's validity. However, for purposes of this article, I will assume that at least some of the patents covering most technical standards are valid and enforceable.

[24] *See, e.g.*, Farrell et al., *supra* note 6, at 616.

[25] No SDO of which I am aware actually defines the level of a FRAND royalty for its standards. And those SDOs that have taken even small steps toward defining FRAND, e.g., by offering suggested measures for the appropriate royalty base, have been met with substantial opposition. *See, e.g.*, Sidak *Antitrust*, *supra* note 10.

[26] *See* Contreras, *Fixing FRAND*, *supra* note 4, at Part I.B ("Why FRAND Licenses are not Negotiated in Advance (Even though they Should Be)").

alternative may be prohibitive (a situation often referred to as "lock-in").[27] Lock-in dramatically increases the patent holder's leverage in any ensuing licensing negotiation, as the locked-in manufacturer would, in theory, be willing to pay the patent holder any amount up to its switching costs simply to avoid losing the investment already made in adopting the patented technology and the standard, more broadly.[28]

As discussed above, a patent holder's attempt to seek rent in excess of the value of its technology is termed patent "hold-up".[29] In addition to harming potential competitors, the predicted consequences of patent hold-up include increased prices for product inputs and consumer prices, as well as reductions in innovation and product improvement, and reduced adoption of interoperability standards leading to reduced interoperability and network effects.[30]

The risk of hold-up is likely to increase as the number of parties holding patents that cover a single standard rises. Complex technological products today may implement dozens, if not hundreds of standards, each of which may be covered by hundreds or thousands of patents held by a wide range of parties.[31] As such, the aggregation of royalty demands by multiple patent holders could lead to cost-prohibitive burdens on implementing standards-compliant products. This situation is sometimes referred to as "royalty stacking". Royalty stacking can arise "when a standard implicates numerous patents, perhaps hundreds, if not thousands," each of which bears a royalty that must be paid by product manufacturers and which "may become excessive in the aggregate."[32]

SDOs have been aware of the possibility of lock-in and patent hold-up for decades[33] and have responded by adopting policies designed to lessen the threat of hold-up behavior.[34] Such policies have included an affirmative requirement that SDO participants grant product manufacturers licenses to operate under patents that cover the

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[27] *See* SHAPIRO & VARIAN, *supra* note 19, at 116–30; Farrell et al., *supra* note 6, at 616–17.

[28] *See* Cotter, Hovenkamp, Siebrasse, *supra* note 6; Shapiro, Navigating, *supra* note 6, at 125.

[29] *See* notes 5-6, *supra*, and accompanying text.

[30] *See, e.g.*, Renata Hesse, Deputy Assistant Att'y Gen., Antitrust Div., U.S. Dep't of Justice, Remarks at the ITU-T Patent Roundtable: Six "Small" Proposals for SSOs Before Lunch, at 5 (Oct. 10, 2012), http://www.justice.gov/atr/public/speeches/287855.pdf; Shapiro, Navigating, *supra* note 6, at 125-26; DOJ-FTC, ANTITRUST & IPR, *supra* note 17, at 28; Farrell et. al, *supra* note 6, at 647; Lemley & Shapiro, *supra* note 6, at 2012; Scott Morton & Shapiro *supra* note 9, at 124 (applying hold-up reasoning to innovation and adoption of Internet of Things).

[31] *See* Brad Biddle, Andrew White & Sean Woods, *How Many Standards in a Laptop? (And Other Empirical Questions),* 2010 INT'L TELECOMM. UNION SEC. TELECOMM. STANDARDIZATION, KALEIDOSCOPE ACAD. CONF. PROC. (finding 251 standards embodied in an out-of-the-box laptop computer).

[32] Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1229 (Fed. Cir. 2014).

[33] *See, e.g.,* TCL Comms. v. Telefonaktiebolaget LM Ericsson, Memorandum of Findings of Fact and Conclusions of Law, slip op. at 11-12 (C.D. Cal., Dec. 21, 2017) (noting that the European Telecommunications Standards Institute (ETSI) was "concerned" with the problem of hold-up as early as 1993, when it formulated its first intellectual property policy).

[34] For a historical account of the development of such licensing policies in the U.S. and Europe, *see* Jorge L. Contreras, *Origins of FRAND Licensing Commitments in the United States and Europe,* in CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW: COMPETITION, ANTITRUST, AND PATENTS, Ch. 9 (Jorge L. Contreras, ed., 2017).

SDO's standards (standards-essential patents or SEPs[35]), or that standards not be approved by the SDO unless SEP holders agree to make such licenses available. In order to prevent excessive pricing of these licenses, SDOs generally require that they be granted on terms that are royalty-free or, if they are royalty-bearing, at rates that are FRAND.[36] All SDOs that are accredited by the American National Standards Institute (ANSI) must impose these requirements[37] and they are widely utilized among other SDOs worldwide.[38]

But despite the prophylactic measures adopted by SDOs, not to mention a number of antitrust and competition law enforcement actions in the U.S. and Europe, it is not clear that hold-up has been eliminated from the standard-setting environment. The debate regarding hold-up, and its existence in the marketplace, thus continues, as discussed below.

II. THE HUNT FOR PATENT HOLD-UP

As noted above, there is sharp disagreement within industry, academia and government regarding the existence of pervasive, market-wide patent hold-up in technology markets. On one hand, product manufacturers claim that they have experienced hold-up and that it imposes significant costs and inefficiencies on their businesses.[39] On the other hand, some empirical studies claim that there is a lack of convincing evidence of hold-up at a systemic level.[40] One possible reason for the divergence of opinion regarding the prevalence of hold-up in the market is the large variance among definitions of hold-up. That is, if different studies actually look for *different things*, then it is not surprising that their results vary.

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[35] The question which patents are "essential" to a standard is a complex one. *See* Contreras, *Essentiality, supra* note 3.

[36] *See* Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CALIF. L. REV. 1889, x (2002). A few SDOs require that such licenses be granted on terms that are royalty-free. *See* DOJ-FTC, ANTITRUST & IPR, *supra* note 17, at x. There has been significant debate and litigation concerning the precise meaning of "FRAND" royalty rates, a discussion of which is beyond the scope of this essay. *See, e.g.*, Chryssoula Pentheroudakis & Justus A. Baron, *Licensing Terms of Standard Essential Patents: A Comprehensive Analysis of Cases*. JRC Science for Policy Report EUR 28302 (2017) (collecting cases).

[37] AM. NAT'L STANDARDS INST., ANSI ESSENTIAL REQUIREMENTS: DUE PROCESS REQUIREMENTS FOR AMERICAN NATIONAL STANDARDS § 3.1.1(b), at 10 (2016).

[38] *See* Baron & Pohlmann, *supra* note 22, at x; Rudi Bekkers & Andrew Updegrove, A Study of IPR Policies and Practices of a Representative Group of Standards Setting Organizations Worldwide 89 tbl.13 (2012), http://sites.nationalacademies.org/xpedio/groups/pgasite/documents/webpage/pga_072197.pdf (of ten major SDOs studied, eight explicitly specify FRAND licensing as an option in their IPR policies); Lemley, *supra* note 36, at 1906 (of 36 SDOs studied, 29 required, and three encouraged, FRAND licensing).

[39] *See* note 8, *supra*, and accompanying discussion.

[40] *See* note 10, *supra*, and accompanying discussion.

A. Hold-Up Defined

At first blush, it might seem that a generally-accepted definition of patent hold-up should not be difficult to achieve. After all, the law is replete with vague terms like "due process", "good faith" and "market power" that, despite continued wrangling, have been defined with sufficient clarity to enable market actors to order their affairs. And if subtle definitional variations might make a difference at the margins, these do not materially alter the general parameters of the conduct in question. But with "hold-up", this is not the case. As it turns out, what might appear to be minor definitional gradations have had severe consequences both in terms of empirical studies of hold-up behavior and policy responses to potential hold-up. If nothing else, this diversity of definitions has given rise to a cottage industry of academic studies and articles discussing the theory and practice of patent hold-up.[41]

The notion of economic hold-up did not originate with technical standard-setting, nor with patent law at all. Though earlier treatments exist, economists considering hold-up in standard-setting often look to Oliver Williamson's leading work on transaction costs and information asymmetry in the 1980s.[42] Williamson defines opportunism (an analog of hold-up) as "self-interest seeking with guile," which includes "calculated efforts to mislead, deceive, obfuscate, and otherwise confuse."[43] He identifies resources, such as banana, sugar cane and other volatile crops, that cannot easily be re-deployed to alternative uses (the notion of asset specificity).[44] The owners of specific assets are vulnerable to opportunistic behavior by potential transaction partners who act dishonestly (e.g., by using deceptive means to argue for a lower price). As explained by Kieff and Layne-Farrar, Williamson predicts that the confluence of "asset specificity on the one hand and opportunism on the other … is what causes the serious problem of holdup."[45]

Despite the rich intellectual heritage that economics owes to Williamson and subsequent researchers,[46] the term "hold-up" has taken on a different and more straightforward meaning in the context of standard-setting. Shapiro is generally credited with introducing the notion of hold-up to the lexicon of standard-setting in 2001.[47] Courts adjudicating disputes between patent holders and manufacturers have subsequently adopted streamlined definitions of hold-up such as: "[t]he ability of a holder of [a] SEP to demand more than the value of its patented technology,"[48] and "when the

[41] *See* note 6, *supra*.

[42] Kieff & Layne-Farrar, *supra* note 6, at 1094-97; Galetovic & Haber, *supra* note 6, at 17-23.

[43] OLIVER E. WILLIAMSON, THE MECHANISMS OF GOVERNANCE 378 (1996). *See also* OLIVER E. WILLIAMSON, THE ECONOMIC INSTITUTIONS OF CAPITALISM 47 (1985).

[44] *Id*. at 52-56.

[45] Kieff & Layne-Farrar, *supra* note 6, at 1095.

[46] It is worth noting that Williamson himself used the term "opportunism" to describe the particular set of behaviors under discussion. The term "hold-up" was introduced by later scholars to describe the same conduct. *See, e.g.,* Farrell, et al., *supra* note 6, at 603 (equating "opportunism" and "hold-up").

[47] *See* Shapiro, Navigating, *supra* note 6, at 125. *See also* Galetovic & Haber, *supra* note 6, at 4 (tracing current hold-up theories in standard-setting to Shapiro).

[48] Microsoft Corp. v. Motorola, Inc., Findings of Fact and Conclusions of Law, No. C10-1823JLR, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013).

holder of a SEP demands excessive royalties after companies are locked into using a standard."[49]

Many of these definitions emphasize the manufacturer's sunk costs and lock-in to a particular technical solution. Thus, according to the U.S. Federal Trade Commission (FTC), hold-up is based on "a patentee's ability to extract a higher licensing fee after an accused infringer has sunk costs into implementing the patented technology than the patentee could have obtained at the time of design decisions, when the patented technology competed with alternatives."[50]

From an economic standpoint, Layne-Farrar, Llobet and Padilla define hold-up as occurring "when two parties contract on the provision of a good and one of the parties (typically the buyer) needs to make a specific investment ex ante before negotiating the price. After the party makes the specific investment … the other party may have increased bargaining power and it may, therefore, choose a price that does not reward the sunken investment."[51] This type of hold up, they argue, "destroys the incentives to invest in the first place".[52]

A related focus of these hold-up formulations is the inappropriate leverage that SEP holders could obtain by threatening to obtain judicial injunctions to prevent manufacturers from producing standardized products, usually after lock-in has occurred.[53] The threat of an injunction, it is argued, may persuade a manufacturer to pay the SEP holder a higher rate than is otherwise warranted by the value of its patented technology. As such, the SEP holder engages in hold-up.

Williamson's element of guile, which implies deception or duplicity on the part of the resource holder, is not generally a part of these more recent or standards-specific definitions of hold-up. While this definitional divergence can initially cause confusion, it is clear from an examination of the literature that Williamson and transaction cost economists, on one hand, and courts, agencies and commentators who are considering conduct relating to standardization, on the other hand, are using the term hold-up to refer

[49] Ericsson Inc. v. D-Link Sys., 773 F.3d 1201, 1209 (Fed. Cir. 2014).

[50] Fed. Trade Comm'n, The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition n.62 (2011) [hereinafter FTC, Evolving IP Marketplace]. *See also* Farrell et al, *supra* note 6, at 604 (associating hold-up with lock-in "when one party makes investments specific to a relationship before all the terms and conditions of the relationship are agreed"); Carlton & Shampine, *supra* note 6, at x ("By making a sunk investment, the party worsens its bargaining position and later can be held up by its negotiating partner, which can drive a harder bargain than would have been possible before the investment was made.").

[51] Anne Layne-Farrar, Gerard Llobet & A. Jorge Padilla, *Preventing Patent Hold Up: An Economic Assessment of Ex Ante Licensing Negotiations in Standard Setting*, 37 AIPLA Q.J. 445, 455 (2009).

[52] *Id*.

[53] *See* Michel, *supra* note 6, at x; Lemley & Shapiro, *supra* note 6, at 2008 ("The potential for an injunction against a whole product can and does permit so-called patent trolls to hold up defendants by threatening to enjoin products that are predominantly noninfringing"); Shapiro, Navigating, *supra* note 6, at 125 ("if the manufacturer has already designed its product and placed it into large scale production before the patent issues. … [t]he patentee can credibly seek far greater royalties, very likely backed up with the threat of shutting down the manufacturer if the Court indeed finds the patent valid and infringed and grants injunctive relief").

to *different* types of market behavior. While early theorists of patent hold-up may have made an unfortunate terminological choice when describing the phenomenon that they observed in the market, the term used to describe the phenomenon is not fatal to its existence. Attempts to discount theories about patent hold-up solely on the basis that they are inconsistent with similarly-named transaction cost economics theories of hold-up have little purchase and only serve to muddy the debate.[54] For purposes of the remainder of this article, I will assume that a SEP holder can engage in hold-up, as the term is described above and generally understood, without attempting to deceive or otherwise exhibit guile.[55]

B. Hold-Up and Royalty Stacking

As discussed in the preceding Part, patent hold-up is a potentially abusive behavior that may be exhibited by individual SEP holders. Royalty stacking, on the other hand, is a phenomenon that may arise when multiple SEP holders[56] each charge royalties on different features of a single product, thereby yielding an aggregate royalty rate that can be excessive in terms of the overall product's value.[57] As the U.S. Court of Appeals for the Federal Circuit has explained,

> [r]oyalty stacking can arise when a standard implicates numerous patents, perhaps hundreds, if not thousands. If companies are forced to pay royalties to all [patent] holders, the royalties will 'stack' on top of each other and may become excessive in the aggregate."[58]

As has been discussed extensively in the literature, royalty stacking is a variant of the classical Cournot complements problem in which different firms each control

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[54] *See, e.g.*, Galetovic & Haber, *supra* note 6, at 10 and 12-29 (lengthy analysis arguing that patent hold-up theory "contradicts the established theory of holdup" as established by transaction cost economics).

[55] It is worth noting, however, that deception in standard-setting can itself subject a SEP holder to significant antitrust liability, both as exclusionary conduct under Section 2 of the Sherman Act and as an unfair method of competition under Section 5 of the Federal Trade Commission Act. *See* Gil Ohana, Marc Hansen & Omar Shah, *Disclosure and Negotiation of Licensing Terms Prior to Adoption of Industry Standards: Preventing Another Patent Ambush*? 12 EURO. COMPETITION L. REV. 644 (2003) (describing deceptive conduct and the willful concealment of patents, sometimes referred to as "patent ambush"). These forms of conduct, however, go beyond what is typically considered to constitute hold-up.

[56] The threat of royalty stacking is not unique to SEPs or standardized products and stacking issues have been discussed in industries ranging from biotechnology to semiconductors. *See, e.g.,* Lemley & Shapiro, *supra* note 6, at 2010.

[57] *See* Shapiro, Navigating, *supra* note 6; Lemley & Shapiro, *supra* note 6.

[58] Ericsson, Inc. v. D-Link Sys., 773 F.3d 1201, 1209 (Fed. Cir. 2015). *See also* In re. Innovatio IP Ventures, LLC Patent Litig., U.S. Dist. LEXIS 144061 at *62 (N.D. Ill. 2013) ("quote"); Farrell et al., *supra* note 6, at 642 ("This is because the sum of the incremental values of [multiple] patents exceeds their value in combination"); William F. Lee & A. Douglas Melamed, *Breaking the Vicious Cycle of Patent Damages*, 101 CORNELL L. REV. 385, 427 (2014) ("When thousands of patents or other inputs are involved in the same device, judges and juries consistently and systematically overemphasize the value of the single patent (or patents) at issue as compared to all the other inputs").

necessary inputs to production and act in an uncoordinated manner when charging a manufacturer for the use of those inputs.[59]

Hold-up and royalty stacking are related phenomena, inasmuch as they can each result in elevated royalties for standardized products. Yet they are different, both in their manifestation and in the behavior that may produce them. For example, royalty stacking can exist entirely independently of hold-up, simply because a product embodies multiple patented technologies and each patent holder seeks to maximize its individual return. Likewise, hold-up can occur with respect to products that are covered by only one patent, so long as that patent is essential to the exploitation of that product. Needless to say, when both hold-up and royalty stacking occur in tandem, the result can be even higher aggregate royalty rates for the relevant products. But, for analytical purposes, it is important to remember that hold-up and royalty stacking need not occur in tandem.

Given their seeming relatedness, hold-up and royalty stacking are frequently discussed together, if not conflated, in the literature.[60] In this essay, however, my focus is on hold-up. Accordingly, I do not address in detail the arguments raised either by proponents or opponents of theories addressing royalty stacking.[61]

C. Examples of Hold-Up from FRAND Litigation

As discussed in the previous section, hold-up is defined in the context of standard-setting as a SEP holder's attempt to extract excessive compensation from a manufacturer after the manufacturer has become locked-in to a standard. Using this definition, examples of hold-up can be found throughout the case law dealing with disputes over the licensing of standards-essential patents.

As noted in Part I, many SDOs require SEP holders to license their SEPs to manufacturers on terms that are fair, reasonable and non-discriminatory (FRAND). In some cases, a SEP holder and a manufacturer may disagree whether the royalty rate demanded by the SEP holder for such a license is FRAND, and the manufacturer may sue the SEP holder for breaching its FRAND commitment.[62] In other cases, a SEP holder may sue a manufacturer for infringing its SEPs, and the manufacturer may raise as an

[59] *See* Shapiro, Navigating, *supra* note 6, Lemley & Shapiro, *supra* note 6 at 2013–15 (describing the well-known problems of Cournot complements and double marginalization and their potential to lead to hold-up in SEP markets),

[60] *See, e.g.*, Shapiro, Navigating, *supra* note 6; Lemley & Shapiro, *supra* note 6; Galetovic & Haber, *supra* note 6.

[61] I view royalty stacking as a greater threat than patent hold-up to innovation and efficient technology markets. *See* Jason R. Bartlett & Jorge L. Contreras, *Rationalizing FRAND Royalties: Can Interpleader Save the Internet of Things*, 36 REV. LITIG. 285 (2017); Jorge L. Contreras, *Standards, Royalty Stacking and Collective Action*, 3 CPI ANTITRUST CHRON. (2015).

[62] Because FRAND commitments are typically made by a SEP holder directly to an SDO, such suits are often brought by a manufacturer under a third party beneficiary theory whereby the manufacturer (which may or may not be a member of the SDO) argues that it is an intended beneficiary of the SEP holder's promise to the SDO. *See* J. Gregory Sidak, *A FRAND Contract's Intended Third-Party Beneficiary*, 1 CRITERION J. INNOVATION 1001 (2016); Jorge L. Contreras, *A Market Reliance Theory for FRAND Commitments and Other Patent Pledges*, 2015 UTAH L. REV. 479, 508-14 (2015).

affirmative defense the SEP holder's obligation to grant the manufacturer a license on FRAND terms. In both of these scenarios, one of the central questions is whether the royalty rate that the SEP holder sought to charge the manufacturer for the required SEP license was FRAND.[63]

In several such cases, courts have determined that the initial royalty demands of SEP holders have been far in excess of FRAND rates. For example, in *Microsoft v. Motorola*, with respect to its SEPs covering the H.264 audio-video encoding standard, Motorola initially demanded a royalty of 2.25% of the end price of Microsoft products embodying the standard.[64] Thus, for a low-end $500 computer, the per-unit royalty would have been $11.25.[65] The court, in assessing the value of Motorola's patents to the H.264 standard and the value of the standard to the overall products in which it was embodied, determined a FRAND royalty rate of $0.00555 per unit.[66] Based on these results, Motorola's initial royalty demand to Microsoft was more than 2,000 times higher than the "reasonable" royalty rate determined by the court.

Likewise, in *In re. Innovatio IP Ventures LLC*, Innovatio, the holder of twenty-three SEPs covering the 802.11 Wi-Fi wireless networking standard, sent demand letters to hundreds of coffee shops, motels, supermarkets and other retail establishments that offered public Wi-Fi access, in each case seeking a monetary settlement.[67] The case was consolidated and the court considered Innovatio's proposed royalty of 6% of the end price of products such as wireless access points, laptops, tablets and bar code scanners, resulting in potential royalties ranging from $3.39 to $36.90 per unit.[68] But after assessing the value of Innovatio's SEPs, the court held that the appropriate FRAND royalty was only $0.0956 per unit, making Innovatio's initial royalty proposals between 35 and 386 times higher than the adjudicated FRAND royalty rate.

Though these cases present extreme examples in which SEP holder royalty demands exceeded judicially determined FRAND rates by orders of magnitude, there are additional examples, both in the U.S. and elsewhere, in which the alleged behavior of SEP holders is consistent with a model in which a SEP holder attempts to extract excessive compensation from a manufacturer after the manufacturer has become locked-in to a standard.[69]

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[63] Other questions include whether the asserted patents are, indeed, essential to the relevant standard and thus subject to the FRAND commitment in the first place.

[64] Microsoft Corp. v. Motorola, Inc., Microsoft's Motion for Partial Summary Judgment of Breach of Contract at 22, Case 2:10-cv-01823-JLR filed Mar. 30, 2012 (W.D. Wash.). The effective per-unit royalty would have been $4.48 for an X-Box retailing for $199. *Id.*

[65] *Id*.

[66] Microsoft Corp. v. Motorola, Inc., No. C10-1823JLR, 2013 U.S. Dist. LEXIS 60233, at *20.

[67] 2013 U.S. Dist. LEXIS 144061 at *38 (N.D. Ill. 2013).

[68] *Id*. at *74-75.

[69] *See, e.g.*, TCL v. Ericsson (C.D. Cal. 2018) (SEP holder proposed effective 4G U.S. royalty rates of 1.074% and 1.988%, compared to court's determination of 0.450% FRAND rate); Unwired Planet v. Huawei (2017 EWHC 711 (Pat) at Para. 5, 7, 807(13)) (SEP holder proposed effective 4G major market royalty rates of 0.2% compared to court's determination of 0.052% FRAND rate); Lemley & Shapiro (2007) (discussing earlier cases including Rambus and RIM-Blackberry). *But see* Denicoló et al, *supra* note 10, at 597-99 (contesting Lemley-Shapiro characterization of these cases).

On the other hand, there have been cases in which adjudicatory bodies have found that SEP holders did *not* engage in hold-up. As explained by the Federal Circuit in *Ericsson v. D-Link*, an accused infringer seeking to raise the issue of hold-up to a jury must introduce actual evidence of the SEP holder's hold-up behavior.[70] Because this evidence was not introduced by the alleged infringer, the court did not instruct the jury on the question of hold-up.[71] Thus, while hold-up may not be found in every case, its potential existence is clearly acknowledged by courts that have considered the issue.

D. The Search for Systemic Patent Hold-Up

1. Why Seek Systemic Hold-up?

In addition to data provided by litigated cases, researchers have sought evidence demonstrating (or refuting) the existence of patent hold-up at a systemic level. In other words, whether or not hold-up is a pervasive phenomenon affecting the market as a whole. While individual case data may exist, Ohlhausen and Wright observe that "the outcome of a handful of litigated cases says nothing about whether holdup is a widespread problem for competition and consumers".[72] Layne-Farrar is yet more explicit, arguing that litigation results, such as those in *Innovatio* (discussed above) are "highly fact specific and should not be used as a benchmark for ecosystem reform."[73] And Kieff and Layne-Farrar go so far as to argue that virtually *any* intervention by governmental agencies in the operation of markets should be viewed with suspicion and even as a form of "government hold-up".[74]

Accordingly, in response to commentators such as Shapiro, Farrell and Lemley, these commentators argue that only empirical evidence of pervasive, systemic hold-up in relevant markets should justify policy interventions intended to reduce the threat of hold-up. That is, in order to form a rational basis for policy making, systemic data is needed in addition to litigation data.

2. Evidence of a Lack Evidence

Researchers seeking evidence of systemic hold-up have focused largely on the market for wireless communications devices, which is heavily dependent on standards

[70] Ericsson, Inc. v. D-Link Sys., 773 F.3d 1201, ___ (Fed. Cir. 2015).

[71] *Id*.

[72] Ohlhausen & Wright, *supra* note 11, at 3. Ohlhausen and Wright argue that evidence of pervasive systemic hold-up is needed to "shift the burden" of proof at the ITC to the SEP holder to prove that its potential licensee is unwilling to accept a license on FRAND terms (*id.* at 7-8). But this is not necessarily so. While Ohlhausen and Wright present the case for a lack of evidence of pervasive hold-up, it is not clear that in order for the ITC to adapt its public interest inquiry to SEPs there must be evidence of pervasive hold-up.

[73] Layne-Farrar, *supra* note 10, at 5.

[74] Kieff & Layne-Farrar, *supra* note 6, at 1098-1100 ("This sort of industrial policy, where courts and government agencies intervene in commercial disputes to pick the winners and losers, would distort competition in the marketplace and would alter firm's *ex ante* incentives to negotiate reasonable solutions in good faith. These would be harmful unintended consequences worth trying to avoid.")

covered by large numbers of SEPs. These studies fall into two general categories. The first draw conclusions based on positive characteristics of the market. For example, Ohlhausen and Wright observe that "wireless prices have dropped relative to the overall consumer price index (CPI) since 2005, output has grown exponentially, features and innovation continue at a rapid pace, and competition between mobile device manufacturers has been highly robust with meaningful entry over time."[75] Galetovic and Haber expand on these observations with a wealth of data relating to innovation and pricing in technology product markets, all of which, they argue, suggest that hold-up cannot be producing a meaningful drag on innovation, consumer choice or economic welfare:

> [F]rom 1997 to 2013 rates of innovation in phone equipment (which includes such low tech items as fax machines and landline phones, as well as wireless phones) was 10 percent per annum faster than the economy-wide average. The data show that the rate of innovation in portable and laptop computers was faster still, 31 percent per annum faster than the economy-wide average. Similar rates of innovation are observed in other SEP-intensive IT products such as video equipment, audio equipment, desktop computers, and televisions. In addition, rates of innovation in SEP-intensive IT products have not slowed over time relative to the rates of innovation in similar, non-SEP- intensive IT products. For example, the rate of innovation in SEP-intensive laptop computers compared to non-SEP-intensive mainframe computers shows that SEP-intensity was associated with faster innovation…
>
> Between 1994 and 2013 the number of SEP holders [in the wireless telecom sector] increased from 2 to 128. Patent Holdup Theory would predict that this increase should have dramatically slowed the rate of innovation. That prediction did not obtain in reality, however: prices of mobile devices dropped like stones, while output grew 62-fold. During this same period there was rapid entry of new firms into the manufacture of phones and tablets—so much so that the level of industrial concentration actually fell in this industry over time.[76]

In addition to the general health of these product markets, commentators have pointed to the known royalty burdens borne by product manufacturers to assess whether predictions regarding hold-up (and royalty stacking) have led to excessive royalty burdens.[77] Gupta observes that the profit margins of leading mobile phone manufacturers such as Apple, Samsung and Nokia, are significant (in the range of 40%, 37% and 23%,

[75] Ohlhausen & Wright, *supra* note 11.

[76] Galetovic & Haber, *supra* note 6, at 6-7 (summarizing prior studies and data, internal citations omitted). *See also* Kirti Gupta, *The Patent Policy Debate in the High-Tech World*, 9 J. COMP. L. & ECON. 827 (2013), Keith Mallinson, *Patent Licensing Fees Modest in Total Cost of Ownership for Cellular*, IP FINANCE (June 12, 2011), http://ipfinance.blogspot.co.uk/2011/06/patent-licensing-fees-modest-in-total.html.

[77] While these studies appear to be directed principally at the question of royalty stacking (which is not the primary focus of this essay), they are described briefly here for the sake of completeness.

respectively), implying that neither hold-up nor the stacking of SEP royalties are having a meaningful effect on such manufacturers' financial returns.[78] Galetovic, Haber and Zaretzki, extending earlier methodologies developed by Mallinson, adopt a revenue-based approach. They divide the aggregate global patent licensing revenue reported by the twenty largest publicly-traded firms with significant licensing arms by the total sales prices of all mobile phones sold globally. They conclude that the resulting ratio (approximately 3.3%) represents the aggregate patent royalty burden borne by mobile phone manufacturers.[79] Mallinson[80] and Sidak[81], using similar methodologies, arrive at aggregate royalty burdens in the range of 4-5%.

In sum, the studies described above all reach the conclusion that there is no empirical evidence of systemic patent hold-up in wireless telecom or other markets characterized by SEPs and standards. In most cases, the authors use this finding to discourage governmental agencies from intervening in the market by enacting regulations or taking other action intended to prevent hold-up from occurring. While the methodologies and theoretical underpinnings of these studies have been challenged,[82] the force and frequency with which they have recently been presented is sure to be influential.

E. And what about Holdout?

In the debate over patent hold-up, a common refrain by those who challenge the existence of hold-up has become "but what about holdout?" Holdout, also called 'reverse hold-up' in this context, refers to "the practice of companies routinely ignoring patents and resisting patent demands because the odds of getting caught are small."[83] As described by Kieff and Layne-Farrar, holdout by potential SEP licensees presents a

[78] Gupta, *supra* note 76, at 845.

[79] Alexander Galetovic, Stephen H. Haber, Lew Zaretzki, *An Estimate of the Average Cumulative Royalty Yield in the World Mobile Phone Industry: Theory, Measurement and Results,* 42 TELECOMMUNICATIONS POLICY 263 (2018).

[80] Keith Mallinson, *Don't Fix What Isn't Broken: The Extraordinary Record of Innovations and Success in the Cellular Industry Under Existing Licensing Practices*, 23 GEO. MASON L. REV. 967 (2016).

[81] J. Gregory Sidak, *What Aggregate Royalty Do Manufacturers of Mobile Phones Pay to License Standard-Essential Patents*? CRITERION J. INNOVATION 701 (2016).

[82] *See, e.g.*, Shapiro, SIIT, *supra* note 14, and Rose, *supra* note 14. I too have some concerns, for example, with the characterization of technology markets without accounting for the value of cross-licensed technology in overall royalty burdens. In some industries, such as semiconductor devices, many large players are cross-licensed, with no-fee, reciprocal cross-licenses representing significant transfers of value that are seldom reflected in a firm's income statement. *Cf.* Layne-Farrar, *supra* note 10, at 9 ("cross licensing cannot be ignored"). A full methodological critique is, however, beyond the scope of this article.

[83] Chien, *supra* note 6, at 5. This use of the term 'holdout' in the standards context is different than the well known holdout problem in real property, in which the assembly of multiple fragmented property rights (e.g., in a parcel of land) is difficult because each individual owner can "hold out" for an amount approaching the total value. *See* Abraham Bell & Gideon Parchomovsky, *The Evolution of Private and Open Access Property*, 10 THEORETICAL INQUIRIES L. 77, 83 (2009); Robert P Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations,* 84 CAL. L. REV. 1293, 1298 n.9 (1996). *See also* Bowman Heiden & Nicolas Petit, *Patent 'Trespass' and the Royalty Gap: Exploring the Nature and Impact of Patent Holdout*, 34 SANTA CLARA HIGH TECH L.J. 179, 185 (2017) (suggesting the term 'patent trespass' in lieu of 'patent holdout').

mirror-image problem to alleged hold-up by SEP holders: "By holding out for unreasonable deal terms, these potential infringers can cause a holdup problem in the opposite direction: against the patentees and all those who have invested in the patentee".[84] Numerous other commentators have likewise insisted that any investigation into the prevalence of hold-up is incomplete without a similar investigation into holdout and its perpetrators.[85] Even the current head of the DOJ Antitrust Division has taken up this call, stating that "collective hold-out" behavior in standard-setting may be even more pernicious than unilateral hold-out by SEP holders.[86]

Holdout undoubtedly exists in the marketplace, as product manufacturers are capable of acting just as opportunistically as patent holders.[87] But hold-up and holdout are different species of behavior. As discussed above, hold-up arises from a SEP holder's potential violation of its commitment to license its SEPs on FRAND terms so as to extract from manufacturers more value than can be attributed to the SEP holder's technical contribution. As such, hold-up is integrally tied to the standardization process and the commitments made therein. Holdout, on the other hand, is simply willful patent infringement. A manufacturer, whether or not it is a member of the SDO that developed a standard, has no obligation to accept a FRAND license or to manufacture a standardized product.[88] The manufacturer that elects not to accept a SEP license on FRAND terms but nevertheless sells standardized products, assuming that the SEPs are valid and actually cover the relevant standard, infringes those SEPs and runs the risk that the SEP owner will sue and avail itself of available remedies for such infringement – the same risk that every manufacturer that fails to obtain a necessary patent licenses faces.[89] Thus, as explained by Melamed and Shapiro, in the case of holdout, "The issue … is not whether

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[84] Kieff & Layne-Farrar, *supra* note 6, at 1097, n.18.

[85] *See, e.g.*, Richard Epstein & Kayvan Noroozi, *Why Incentives for 'Patent Holdout' Threaten to Dismantle FRAND, and Why It Matters*, 32 BERKELEY TECH. L.J. (2018).

[86] Assistant Attorney General Makan Delrahim, Remarks at the USC Gould School of Law's Center for Transnational Law and Business, Nov. 10, 2017, https://www.justice.gov/opa/speech/assistant-attorneygeneral-makan-delrahim-delivers-remarks-usc-gould-school-laws-center. *But see* McSweeny, *supra* note 9, rejecting this position.

[87] Though holdout likely exists it is, like hold-up, difficult to detect. *See* Melamed & Shapiro, *supra* note 9, at 8. Likewise, there is a lack of empirical evidence demonstrating market-wide prevalence of holdout behavior in the standards context.

[88] It is important to note that, in most cases, the use of technical interoperability standards is voluntary. There are very few mandatory standards of this nature (with a few exceptions, for example, in broadcast high definition television (HDTV), and standards implicating public health or safety (see Unocal)). In Europe, under the European Court of Justice's ruling in *Huawei v. ZTE*, Eur. Court of Justice, Case C-170/13 (2015), certain conduct parameters for potential SEP licensees are established. However, it is important to remember that these parameters are not affirmative conduct obligations on potential licensees, but merely procedures that must be followed if potential licensees wish to avoid being subject to an injunction sought by the SEP holder. *See, e.g.*, Pierre Larouche & Nicolo Zingales, *Injunctive Relief in the EU – Intellectual Property and Competition Law at the Remedies Stage* in CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW: COMPETITION, ANTITRUST, AND PATENTS, Ch. 25 (Jorge L. Contreras, ed., 2017).

[89] These remedies include reasonable royalty damages, as well as the potential for costs, attorneys' fees, interest and enhanced (up to treble) damages if the infringement is willful (see Jorge L. Contreras et al., *The Effect of FRAND Commitments on Patent Remedies* in PATENT REMEDIES AND COMPLEX PRODUCTS: TOWARD A GLOBAL CONSENSUS, Ch. 5 (C. Bradford Biddle et al, eds., 2019, forthcoming). Moreover, if a manufacturer refuses to accept a genuine FRAND license offered by a SEP holder, the SEP holder may be able to seek and obtain injunctive relief against the unwilling licensee.

the implementer would prefer not to pay for a license, but whether there is a need for special rules in patent infringement cases, not available in other settings, to deal with alleged debtors that would rather litigate than settle on the terms offered to them."[90] Accordingly, this article focuses on the debate regarding the existence of hold-up and leaves the question of holdout to discussions of patent infringement and remedies more broadly.[91]

III. CAN WE PLEASE STOP SEARCHING FOR SYSTEMIC HOLD-UP?

It is not the purpose of this article to critique the data or methodologies used by researchers who claim that there is no evidence of systemic hold-up. Though questions remain, the data presented in the cited studies finding no empirical evidence of systemic hold-up present plausible descriptions of current markets for products such as smart phones and other connected technology devices. Instead, this critique is directed at the core assumption that runs through each of these studies: that a lack of evidence of systemic hold-up means that hold-up does not represent a threat that justifies policy intervention. In this Part, I argue that, notwithstanding the findings of these studies, patent hold-up in standardized product markets may indeed be a threat that merits preventative policy measures, but that those measures should be directed toward the prevention of well-understood and actionable forms of anticompetitive conduct rather than the economic phenomenon of hold-up.

A. The Absence of Systemic Hold-Up Does Not Mean that Hold-Up Does Not Occur

In a 2017 article, Galetovic and Haber utilize an extended analogy drawn from the field of Mayan archeology to make the point that scholars sometimes ignore the facts in front of them in order to cling to pre-formed (and empirically unsupported) beliefs.[92] In this analogical tradition, I will use a hypothetical from public health epidemiology to illustrate a related point. Let us consider the often fatal and highly contagious viral infection Ebola. U.S. public health officials, aware of the dangerous effects of Ebola, might propose the implementation of prophylactic measures to prevent the spread of Ebola in the United States. Such measures might include early detection systems at U.S. hospitals, a network of Ebola experts ready to investigate suspected cases, and potential vaccines for particularly vulnerable populations. All of these measures, of course, would come at a cost. Those opposing the incurrence of this cost might argue that such measures are unjustified because there is no empirical evidence that Ebola is a problem in the U.S. After all, there are no documented outbreaks of the disease, and the only reported cases have been sporadic and linked to other factors (such as health workers returning from abroad). In fact, both lifespan and overall health in the United States have been improving steadily over the past several decades. Most declines in population health can

[90] Melamed & Shapiro, *supra* note 9, at 8.

[91] Raising the issue of holdout in response to concerns over hold-up is an example of the fallacious argumentation technique *ignoratio elenchi* (irrelevant conclusion) first identified by Aristotle in *On Sophistical Refutations*. *See* STANFORD ENCYCLOPEDIA OF PHILOSOPHY, "Fallacies" (May 29, 2015).

[92] Galetovic & Haber, *supra* note 6.

be traced to causes such as tobacco use, poor dietary choices, lack of exercise and the like, but not to Ebola. Thus, because there is no evidence that Ebola outbreaks have occurred in the United States nor any linkage between decreased health and Ebola, and because the overall health of the United States population continues to improve, there is no justification for preventative measures to stop Ebola outbreaks in the United States.

This reasoning is, of course, fallacious[93] and, in the case of a disease like Ebola, dangerously so. In the field of public health, prophylactic measures are often taken *before* a health risk affects a significant portion of the population. This is the reason for prophylactic measures in the first place. In the field of public health, it is widely recognized that risks arising from any number of environmental and pathogenic sources can be assessed based on laboratory analysis and test cases, without population-level epidemiological data. In fact, once population level data for such outbreaks is available, it is often too late: an epidemic has broken out and millions are at risk. Luckily, it is doubtful that public health officials would apply the fallacious reasoning outlined above to important public health decisions.

Curiously, however, this "Ebola fallacy" has taken root in the debate over patent hold-up. As discussed above, the purported lack of empirical evidence of system-wide patent hold-up is used as a justification for abandoning or forestalling policy interventions aimed at reducing the risk of hold-up. Because hold-up has not been detected at a systemic level, so the argument goes, it must not be a problem. Therefore, measures designed to prevent hold-up from occurring must be the result of gratuitous or over-zealous policy making. The logical fallacies in this argument should be apparent.

In fact, there are numerous examples of anticompetitive conduct by individual firms in markets that are not otherwise overrun by anticompetitive behavior. For example, in 2009, the Federal Trade Commission brought an action against pharmaceutical manufacturer Solvay and a group of generic drug manufacturers for violating Section 5 of the FTC Act by entering into an arrangement whereby the generic manufacturers agreed not to challenge Solvay's patent on its AndroGel product and not to market their generic versions of AndroGel, in exchange for a significant payment by Solvay to each of the generic manufacturers (a so-called "pay for delay" scheme).[94] The Supreme Court held in 2013 that such conduct was actionable and reversed the Eleventh Circuit's dismissal of the FTC's claim.[95] Yet even in 2009, the year in which the FTC brought its action, of the 68 agreements settling patent disputes filed by pharmaceutical manufacturers with the FTC,[96] the FTC estimated that only 19 of these (28%) were potential pay for delay agreements; and by 2014, the year after the *Actavis* decision, only 21 out of 160 such agreements (13%) were deemed by the FTC likely to represent illegal

[93] In terms of formal logic, this is a form of fallacy of consequent: Ebola is a problem because it causes widespread death. We do not have widespread death. Therefore, Ebola is not a problem. *See, generally*, Stanford Encyclopedia of Philosophy, *supra* note 91.

[94] F.T.C. v. Actavis, 133 S. Ct. 2223 (2013), slip op. at 6.

[95] *Id*.

[96] Patent settlements within the pharmaceutical industry must be filed with the FTC pursuant to the Medicare Prescription Drug, Improvement, and Modernization Act of 2003.

pay for delay schemes.[97] Thus, while pharmaceutical industry patent settlements have attracted significant attention as potentially anticompetitive arrangements, most such settlements do not merit investigation by the FTC.[98]

An even more telling example is found in the area of mergers and acquisitions. During fiscal year 2016, a total of 1,832 merger and acquisition transactions were reported to the FTC and DOJ under the Hart-Scott-Rodino Antitrust Improvements Act.[99] Of these, the FTC challenged only twenty-two (1.2%).[100] Thus, while some anticompetitive mergers may exist, the vast majority are not anticompetitive.[101] But the absence of market-wide anticompetitive conduct in the area of mergers and acquisitions hardly excuses the handful of transactions that do present antitrust risks, nor does it suggest that mergers should not be subject to governmental monitoring and, when merited, enforcement.

B. Protective Measures May Already Be Working to Reduce Hold-Up

Another important factor that should be considered regarding the purported lack of empirical evidence of systemic hold-up is the effect that existing policy measures have already had in reducing hold-up. As noted above, the threat of patent hold-up was a primary motivating factor for many SDOs to adopt policies requiring the disclosure and licensing of SEPs. These policies have been in place for decades. In the United States, the first such policy was adopted in 1959 by the American Standards Association (the predecessor to today's American National Standards Institute (ANSI).[102] Today, every one of the more than 200 ANSI-accredited developers of American National Standards must adhere to ANSI's essential requirements, including the adoption of such a licensing policy for SEPs. Similar policies have existed in European and international standards organizations since at least the 1980s.[103] These policies, which were developed by SDOs in large part to reduce the likelihood of hold-up within standard-setting systems, have had several decades to work, and it is likely that the lack of observed hold-up in some studies can be attributed to the successful operation of these policies.

Similarly, antitrust and competition enforcement agencies in the U.S. and Europe have been aware of the potential for hold-up connected with standardization for many years. Accordingly, they have brought enforcement actions when it has been alleged that

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[97] Fed. Trade Comm'n, Agreements Filled with the Federal Trade Commission Under the Medicare Prescription Drug, Improvement, and Modernization Act of 2003: Overview of Agreements Filed in Fiscal Year 2014: A Report by the Bureau of Competition, Ex. 1 (2016). *See also* Michael A. Carrier, *Five Arguments Laid to Rest After* Actavis, ANTITRUST SOURCE, Oct. 2013.

[98] The author is grateful to Prof. Michael Carrier for this insight.

[99] Federal Trade Commission (Bureau of Competition) and Department of Justice (Antitrust Division): Hart-Scott-Rodino Annual Report: Fiscal Year 2016: Section 7A of the Clayton Act (The Hart-Scott-Rodino Antitrust Improvements Act of 1976) at 1 (2017).

[100] *Id*. at 2.

[101] The author is grateful to Prof. Andy Gavil for this insight.

[102] Am. Standards. Assn., Procedures of American Standards Association (1959). *See, generally*, Contreras, *Origins*, *supra* note 34 at x (describing historical development of policy).

[103] *See* Contreras, *Origins*, *supra* note 34, at 163 (discussing early FRAND requirements at ISO/IEC and CEN/CENELEC).

hold-up behavior has resulted in a violation of the antitrust laws. High-profile enforcement actions against patent holders such as Rambus,[104] Google[105] and Qualcomm[106] send powerful deterrent signals to the market and warn others not to engage in similar behavior lest they, too, become the subject of agency enforcement. Like SDO policies, it is likely that the general market awareness of agency interest in standard-setting and hold-up has, to a degree, limited the amount of hold-up that is actually attempted in the marketplace, thereby limiting the direct evidence of hold-up as a systemic problem.

But do the deterrent effects of SDO and agency efforts to reduce hold-up signify that hold-up is not a problem? Certainly not. To reach such a conclusion would be perverse: akin to claiming that burglary is not a problem in a neighborhood that experiences reduced burglary rates after it has implemented an active neighborhood watch program and enhanced policing.

C. Indicia of Healthy Markets do not Prove the Absence of Anticompetitive Conduct

As noted above, one of the principal arguments advanced by commentators seeking to refute the "hold-up theory" is that markets for telecommunications products, namely smart phones, are robust – evidenced by increasing product functionality, decreasing consumer prices and rapid innovation -- and that this degree of robustness indicates that hold-up cannot be a problem in these markets.[107] If hold-up were a problem in these markets, they reason, we would see product stagnation, stable (but high) prices, and a lack of competition – features associated with classic examples of hold-up in markets for products such as natural resources and agricultural goods.[108]

But this argument relies on a false syllogism: hold-up results in market dysfunction; if a market functions well, then it cannot be subject to hold-up. The weaknesses in this argument are multifold. First, hold-up may exist in individual instances without sufficient weight to affect overall market characteristics, particularly in a large global market such as mobile telecommunications. Thus hold-up may exist, even in a market that outwardly appears to be functioning well. Second, there is no valid counterfactual to use to compare the health and robustness of the market for mobile telecommunications products.[109] Other consumer electronics devices, such as televisions and DVD players, do not compare well with mobile telecommunications devices, which have taken on a unique character in the modern networked economy. Thus, observing the strength of the market fails to answer the critical questions "compared to what?" and how much stronger the market might be (through more product diversity, functionality, price reduction) without hold-up?

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[104] *Rambus, Inc. v. FTC*, 522 F.3d 456 (D.C. Cir. 2008).

[105] In re. Motorola Mobility LLC & Google Inc., FTC Docket No. C-4410 (Jul. 23, 2013) (decision and order).

[106] Fed. Trade Comm'n v. Qualcomm, Inc., Case 5:17-cv-00220 (N.D. Cal. Filed Jan. 17, 2017).

[107] *See, e.g.,* Galetovic & Haber, *supra* note 6; Mallinson, *supra* note 80.

[108] *See* Galetovic & Haber, *supra* note 6.

[109] *See* Melamed & Shapiro, *supra* note 9.

A simple historical illustration is useful in this context. During the decade leading up to the enactment of the Sherman Antitrust Act of 1890, several major U.S. commodity markets (e.g., steel, salt, petroleum, coal, sugar, lead, and others) came under intense scrutiny for a variety of allegedly anticompetitive industrial arrangements. One might have argued that these markets, had they been subject to the sorts of anticompetitive collusion that the Sherman Act sought to address, should have seen reductions of output and increases in price. Yet, between 1880 and 1890, U.S. output of salt, petroleum, steel, and coal all increased significantly, and prices of steel, sugar and lead all dropped significantly.[110] Do these positive market indicia demonstrate that the subject markets were not subject to anticompetitive collusion, and that the Sherman Act was not necessary? Certainly, investigations of these industries revealed significant cartel behavior. I would suggest that few commentators today would argue that the coal, steel, sugar and other major industrial producers of the late nineteenth century were innocent of collusive and anticompetitive conduct, or that the Sherman Act was not a necessary and beneficial measure for the U.S. economy.[111] Yet, had we relied solely on the positive characteristics exhibited by these markets as proof that anticompetitive conduct did not exist, then perhaps the Sherman Act never would have been enacted.

By the same token, the fact that global markets for standardized products such as computers and smart phones appear to be thriving does not itself refute the possibility of hold-up nor the existence of anticompetitive conduct in these markets. Nor does it allow regulators and policy makers to drop their guard or cease to monitor these important industries.

D. The Occurrence of Individual Instances of Hold-Up is Sufficient to Justify Policy Intervention

As discussed in Part II.C, the litigation record demonstrates the repeated occurrence of patent hold-up, both with and without deception, in standardized product markets.[112] Critics refer to this evidence as "anecdotal" and "sporadic",[113] and so it may be. However, the law is not made through generalizable economic models. It is a fundamental characteristic of modern legal systems that both private litigation and public enforcement are directed toward individual actors with respect to specific and provable violations of law.

This being said, it is also well-established that aggregations of litigation data can reflect market trends and behaviors that are more pervasive. Moreover, litigation data and trends have often served as legitimate bases for policy review and reform. Examples abound and have ranged from the imposition of stricter mortgage lending requirements

[110] Thomas J. DiLorenzo, *The Origins of Antitrust: An Interest Group Perspective*, 5 INTL. REV. L. ECON. 73, 80 (1985) (citing US Bureau of the Census, Statistical Abstract of the U.S., various years).

[111] Interestingly, DiLorenzo, who compiled the above figures in a 1985 article, did question the need for the Sherman Act.

[112] *See* Part x, *supra*.

[113] Ohlhausen & Wright, *supra* note 11; Denicoló et al, *supra* note 10.

following evidence of egregious predatory lending practices during the 2000s[114] to a host of proposed legislative and regulatory reforms in the field of patent law that have been informed by litigation data regarding, among other things, strategic venue selection and suits by non-practicing entities.[115]

Accordingly, given the expanding litigation record showing that patent hold-up exists, at least in cases that the parties value sufficiently to litigate to a final decision, there is no reason to reject that data as a basis for policy reform. On the contrary, the appearance of hold-up behavior in cases litigated in the United States and elsewhere is a strong indicator that hold-up is not a sporadic occurrence, but a systemic problem that deserves the attention of policy makers.

E. Hold-Up Itself is not a Cognizable Legal Offense

Another area in which the debate over hold-up has become muddled is the attempt to prosecute hold-up in individual legal cases. As discussed above, hold-up behavior has arguably been identified in cases such as *Microsoft v. Motorola* and *Innovatio*. In *Ericsson v. D-Link*, the court pointed to insufficient evidence of hold-up. Yet in each of these cases, both courts and litigants seem to have lost sight of the fact that hold-up itself *is not a cognizable legal offense*. That is, even if patent hold-up is undesirable for the efficient operation of markets, or hinders the broad adoption of technical interoperability standards, or effects wealth transfers from some market participants to others or impedes market entry and innovation, these effects alone do not demonstrate that illegal conduct has occurred.

Antitrust and competition laws exist to sanction anticompetitive behavior in standard setting and otherwise. For example, Section 2 of the Sherman Act prohibits exclusionary conduct by actors having monopoly power,[116] Section 5 of the Federal Trade Commission Act prohibits unfair methods of competition,[117] and Article 102 of the Treaty on the Functioning of the European Union (TFEU) prohibits abuse of a dominant position.[118] Each of these legal regimes has played a prominent role in policing conduct in standard-setting.[119] In many cases, these offenses may overlap with the exercise of patent hold-up, but in other cases they may not. In order for a violation of law to occur, a defendant must be shown to have engaged in legally prohibited conduct using established standards of conduct, not the ill-defined economic concept of hold-up.

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[114] *See, e.g.*, Commonwealth of Mass. v. Fremont Inv. & Loan (Mass. 2008).

[115] *See, e.g.*, Jorge L. Contreras & Ryan Schneer, *Current Proposals to Amend U.S. Patent Law*, (Working Paper, Nov. 6, 2013), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2350240 (summary of legislative initiatives).

[116] Sherman Antitrust Act of 1890, Sec. 2.

[117] Fed. Trade Comm'n Act, Sec. 5.

[118] Treaty on the Functioning of the European Union, Art. 102.

[119] *See, e.g.*, Renata B. Hesse & Frances Marshall, *U.S. Antitrust Aspects of FRAND Disputes* in CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW: ANTITRUST, COMPETITION AND PATENTS, Ch. 16 (Jorge L. Contreras, ed., 2017); Nicolas Petit, *EU Competition Law Analysis of FRAND Disputes* in CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW: ANTITRUST, COMPETITION AND PATENTS, Ch. 17 (Jorge L. Contreras, ed., 2017).

Thus, the Federal Circuit in *Ericsson v. D-Link*, in holding that a jury should not be instructed about patent hold-up absent the presentation of sufficient evidence regarding actual hold-up conduct by the patent holder, may have missed the mark. The principal matter being adjudicated in that case was whether or not the SEP holder complied with its contractual duty to grant a license on FRAND terms and what that FRAND royalty should be. The existence of hold-up behavior as an independent matter is not dispositive of these claims, and antitrust claims were not being adjudicated in the proceedings that formed the basis for the Federal Circuit's opinion. If they had been, then evidence relating to the SEP holder's violation of, or compliance with, the antitrust laws would have been probative. Thus, whether or not evidence of hold-up existed, it would not have been relevant to the dispute absent some underlying legal claim that it could have helped to prove or refute.

This is not to say, of course, that there is general agreement regarding the extent to which antitrust and competition law can and should be used to police conduct in standard setting. On the contrary, this question is hotly debated, with some calling for greater antitrust scrutiny in this area[120] and others calling for less.[121] Nonetheless, antitrust and competition law exist as positive and legally-recognized boundaries on private behavior. To the extent that the broader concept of hold-up is not coterminous with these existing causes of action, it should not factor heavily in the analysis of party conduct.

CONCLUSIONS

The policy debate surrounding patent hold-up in markets for standardized products is now well into its second decade with no end in sight. Fundamental questions including the definition of hold-up, whether it exists in the marketplace, and what impact it has on innovation, continue to bedevil scholars, policy makers and industry. Yet it is not clear that this debate needs to continue. Patent hold-up is a pattern of market behavior, but not necessarily a legally-cognizable wrong. Whether it is commonplace or

[120] *See, e.g.*, Melamed & Shapiro, *supra* note 9; Scott Morton & Shapiro, *supra* note 9; George S. Cary et al., *The Case for Antitrust Law to Police the Patent Holdup Problem in Standard Setting*, 77 ANTITRUST L.J. 913, 921 (2011) ("[I]t is unsurprising that antitrust has long been applied to the conduct of standard-setting organizations … Indeed, because the opportunistic conduct resulting in patent holdup specifically 'concerns the inefficient acquisition of market power,' many commentators have 'generally assumed that [such] opportunism in the standard-setting process is an antitrust problem"); Michel, *supra* note 6.

[121] *See, e.g.,* Delrahim, *supra* note 86; Maureen K. Ohlhausen, *The Elusive Role of Competition in the Standard-Setting Antitrust Debate*, 20 STANFORD TECH. L. REV. 93 (2017); Herbert Hovenkamp, *Antitrust and the Patent System: A Reexamination*, 76 OHIO ST. L.J. 467, 555 (2015) ("Fundamentally, these are problems best addressed through the patent system rather than by antitrust law"); Douglas H. Ginsburg, Taylor M. Owings & Joshua D. Wright, *Enjoining Injunctions: The Case Against Antitrust Liability for Standard Essential Patent Holders Who Seek Injunctions*, ANTITRUST SOURCE, Oct. 2014; Bruce H. Kobayashi & Joshua D. Wright, *Federalism, Substantive Preemption, and Limits on Antitrust: An Application to Patent Holdup*, 5 J. COMPETITION L. & ECON. 469, 506–16 (2009) (discussing the comparative advantage of tort and contract law over antitrust law in regulating breaches of FRAND commitments).

rare is largely irrelevant to liability in any given case. To the extent that hold-up behavior constitutes an abuse of market power, with resulting harms to competition, longstanding doctrines of antitrust and competition law exist to sanction it. To the extent that hold-up impedes the efficient operation of standard-setting processes, SDOs can, and have, adopted internal procedures, including disclosure and licensing requirements, to curtail that behavior. Thus, the ongoing hunt for empirical evidence of systemic patent hold-up in standardized product markets, or a lack thereof, seems a fruitless academic exercise. The absence of systemic hold-up actually tells us little about individual firm behavior that can and should be sanctioned by the law, and it may thus be time to close the debate over the systemic prevalence of this form of behavior.