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THE ROLE OF ANTITRUST IN PREVENTING PATENT HOLDUP[1]

Carl Shapiro[2]

Mark A. Lemley[3]

ABSTRACT

Patent holdup has proven one of the most controversial topics in innovation policy, in part because companies with a vested interest in denying its existence have spent tens of millions of dollars trying to debunk it. Notwithstanding a barrage of political and academic attacks, both the general theory of holdup and its practical application in patent law remain valid and pose significant concerns for patent policy. Patent and antitrust law have made significant strides in the past fifteen years in limiting the problem of patent holdup. But those advances are currently under threat from the Antitrust Division of the Department of Justice, which has reversed prior policies and broken

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[2] Carl Shapiro is the Transamerica Professor of Business Strategy Emeritus at the Haas School of Business, University of California at Berkeley. Shapiro served as an expert witness in the FTC v. Qualcomm case discussed below.

[3] Lemley is the William H. Neukom Professor at Stanford Law School and a partner at Durie Tangri LLP. We thank Jorge Contreras, Tom Cotter, Joe Farrell, Doug Melamed, Steve Salop, and participants at a workshop at the University of Pennsylvania Carey Law School for comments on a prior draft. Our opinions are our own; no one has funded this Article. California, United States. *e-mail*: mlemley@law.stanford.edu or mlemley@durietangri.com.

with the Federal Trade Commission to downplay the significance of patent holdup while undermining private efforts to prevent it. Ironically, the effect of the Antitrust Division's actions is to create a greater role for antitrust law in stopping patent holdup. We offer some suggestions for moving in the right direction.

INTRODUCTION

Patent holdup occurs when a patent holder is able to obtain unreasonably high royalties by asserting its patent against another company's products because that company's most efficient way to develop, make, and sell those target products involves investments that cannot easily be redeployed to non-infringing products (See FEDERAL 2011, p. 191).[4] The owner of a valid patent that is essential to making devices that comply with a popular telecommunications standard would wield enormous monopoly power if it could block device manufacturers from selling products that comply with that standard. The elevated royalty rates that would result from such unconstrained monopoly power would be passed through to device prices, causing substantial consumer harm. These problems would be magnified because there are thousands of Standard-Essential Patents ("SEPs") reading on modern telecommunications standards,

[4] "The ability of patentees to demand and obtain royalty payments based on the switching costs faced by accused infringers, rather than the ex ante value of the patented technology compared to alternatives, is commonly called 'hold--up.'."). In the context of standard-setting, the Department of Justice and the Federal Trade Commission have defined holdup as "the ability of an intellectual property holder to extract more favorable licensing terms after a standard is set." (UNITED STATES; FEDERAL, 2007, at 5).

and each SEP owner could demand a monopoly price to permit use of the standard.

We address the proper role of antitrust in this setting. While many holdup problems can be solved without antitrust law, antitrust has a role to play in policing holdup, particularly in cases where the patent owner avoids its contractual commitments or uses a SEP to restrict competition in adjacent markets. The very forces in the federal government that currently oppose antitrust intervention also oppose using patent or contract law to enforce commitments to license patents on Fair Reasonable and Non-Discriminatory ("FRAND") terms. They have done so in part by denying the very existence of the problem. Ironically, their efforts may make antitrust intervention more, not less, important.

The problem of patent holdup is a special instance of the general problem of holdup that has been studied extensively in the literature on transaction cost economics.[5] Opportunism by firms generally discourages investments that are subject to holdup. As a special case of that general principle, patent holdup retards innovation. With more than 300,000 utility patents issued each year by the U.S. Patent and Trademark Office ("PTO"),[6] preventing patent holdup is critical to promoting economic growth, especially in industries experiencing rapid technological progress, where patent holdup can act as a headwind slowing down innovation.

Considerable progress to address the problem of patent holdup was made from 2006 to 2016:

- the Supreme Court's 2006 *eBay* decision greatly reduced the threat of patent holdup by limiting the availability of injunctions;

[5] "This type of hold up is a variant of the classical 'hold-up problem.'." *Id.* at 35 n.11. *See infra* Section I for further discussion.

[6] *U.S. Patent Activity Calendar Years 1790 to the Present*, USPTO. Available in: <https://www.uspto.gov/web/offices/ac/ido/oeip/taf/h_counts.htm>. (last visited Apr. 10, 2020).

- to patent holders, particularly those patent holders whose only legitimate interest was in collecting a reasonable licensing fee;[7]
- the Federal Circuit cracked down on junk science in patent damages in a series of decisions. These decisions rejected the "25 percent rule of thumb."[8] They require courts in complex product cases to apportion damages, awarding the patentee damages only for the value their invention contributed and preventing them from using an inflated claim over the entire product to hold up the manufacturer.[9] They also empower district courts to vet and reject untested economic theories before trial in a *Daubert* proceeding;[10]
- the Supreme Court and the Federal Circuit made it easier for defendants to recover their attorneys' fees in frivolous cases,[11] significantly reducing the profitability of "bottom-

[7] *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 392-93 (2006) (rejecting the rule that injunctions are automatic on a finding of infringement); *id.* at 396-97 (Kennedy, J., concurring) ("Legal damages may well be sufficient to compensate for the infringement [of patents used primarily for obtaining licensing fees] and an injunction may not serve the public interest.").

[8] *See* Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1315 (Fed. Cir. 2011) (holding that "the 25 percent rule of thumb is [...] fundamentally flawed").

[9] *See* Finjan, Inc. v Blue Coat Sys., Inc., 879 F.3d 1299, 1309 (Fed. Cir. 2018) ("When the accused technology does not make up the whole of the accused product, apportionment is required."); Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1226 (Fed. Cir. 2014) ("The ultimate reasonable royalty award must be based on the incremental value that the patented invention adds to the end product."); Lucent Techs., Inc. v. Gateway, 580 F.3d 1301, 1338 (Fed. Cir. 2009) (rejecting a damages calculation that used an inflated royalty rate).

[10] *See Uniloc*, 632 F.3d at 1306 ("Under *Daubert*, the District Court must exercise its 'gatekeeper' function in ensuring that scientific testimony is relevant and reliable.").

[11] *See* Octane Fitness, LLC v. Icon Health & Fitness, Inc., 572 U.S. 545, 557 (2014) (rejecting the "Federal Circuit's requirement that patent litigants establish their entitlement to fees under § 285 by 'clear and convincing evidence'."); Adjustacam, LLC v. Newegg, Inc., 861 F.3d 1353, 1361 (Fed. Cir. 2017) (awarding attorney's fees to the defendant under § 285 as a result of "dubious behavior" by the

-feeder" patent trolls that relied on the cost of litigation as the basis of holdup;[12]

- the United States Trade Representative in 2013 vetoed an exclusion order awarded by the International Trade Commission (ITC) related to a Samsung SEP infringed by certain Apple smartphones and tablets, explicitly expressing concerns about patent hold-up (*See* FROMAN, 2013, at 2);[13]
- the Federal Circuit's 2014 decision in *Ericsson v. D-Link Systems, Inc.* established, in the context of SEPs where a patent owner has promised to license on FRAND terms, that "reasonable royalties" should reflect the incremental value of the patented invention prior to its inclusion in an industry standard and *not* the value associated with standardization (*Ericsson, Inc.*, 773 F. 3d at 1.226, 1.232);
- the Institute of Electrical and Electronics Engineers (IEEE) in 2015 substantially clarified and strengthened the FRAND commitments it requires of participants, limiting the circumstances under which SEP holders could seek injunctions and clarifying the meaning of "reasonable rates," (*See* IEEE-SA, 2015)[14] with support from the Department of Justice in the form of a favorable business review letter (HESSE, 2015);[15]

plaintiff). As a disclosure, one of us (Lemley) represented defendant Newegg in that case.

[12] For a discussion of this problem, see Lemley; Melamed (2013, at 2.126, 2.167).

[13] (citing patent holdup as one of the bases for his veto).

[14] (defining "Reasonable Rates" as "appropriate compensation to the patent holder for the practice of an Essential Patent Claim excluding the value, if any, resulting from the inclusion of that Essential Patent Claim's technology in the IEEE Standard" and including a list of considerations for determining reasonable rates).

[15] (noting that IEEE's new RAND commitment "may further help to mitigate hold up").

- the Federal Trade Commission and its European and Asian counterparts took several actions to prevent owners of SEPs from behaving opportunistically by seeking injunctions on FRAND-encumbered patents.[16]

Further progress to limit patent holdup can be made in three areas.

- PRIVATE CONTRACTS: industry participants can do more to prevent patent holdup. Notably, more Standards Setting Organizations ("SSOs") can follow the lead of the IEEE by clarifying and strengthening their FRAND policies and creating mechanisms to enforce those policies;
- PATENT LAW: the courts can continue to build the case law establishing that patent damages should be based on the value of the patented invention to the infringing party prior to that party making investments specific to that technology, and simplifying patent damages to insure that reasonable royalties do not exceed that incremental value;

[16] The FTC enforcement actions were taken against Bosch and Google. *In re* Robert Bosch GmbH Corp., 155 F.T.C. 713 (2013); Motorola Mobility LLC & Google Inc., 156 F.T.C. 147 (2013). In Europe, the Court of Justice of the European Union issued injunctive relief for violating FRAND terms. Case C-170/13, Huawei Techs. Co. Ltd. v. ZTE Corp., EU:C:2015:477 at 10-11 (July 16, 2015). Chinese and Korean courts issued similar injunctive relief against Motorola and Samsung. *See* Esther H. Lim & C. Brandon Rash, *China Court Swiftly Enforces U.S. Company's IP Rights Against Chinese Company in* Motorola v. Guangzhou Weierwei, FINNEGAN (Mar. 2008). Available in: <https://www.finnegan.com/en/insights/articles/china-court-swiftly-enforces-u-s-company-s-ip-rights-against.html>. (describing a Chinese court issuing such injunctive relief against Motorola); Eric Pfanner, *Korean Court Rejects Samsung Lawsuit Against Apple*, N.Y. TIMES (Dec. 12, 2013). Available in: <https://www.nytimes.com/2013/12/13/technology/korean-court-rejects-samsung-lawsuit-against-apple.html>. (describing a Korean court issuing such injunctive relief against Apple).

- ANTITRUST ENFORCEMENT: as a backstop, competition authorities can promote innovation and protect consumers by taking appropriate enforcement actions against firms that abuse the market power associated with SEPs and/or breach their FRAND commitments to avoid those patent and contract law limits.

We focus below on the role of antitrust enforcement in limiting patent holdup. However, we emphasize that we see private contracts and patent law as the primary methods to prevent patent holdup. Antitrust is a complement and a backstop to these methods, not a substitute for them.[17] If SSOs were to adopt and enforce effective FRAND policies and courts were to give them effect in both contract and patent law, most of the patent holdup problem would go away (*See* LEMLEY; SHAPIRO, 2013, at 1.166).[18] Even then, however, antitrust would still be necessary in some circumstances to prevent companies from undermining or evading their FRAND commitments, as was the case in *Rambus Inc. v. FTC* [522 F.3d 456, 459 (D.C. Cir. 2008)], *Broadcom Corp. v. Qualcomm Inc.* [501 F.3d 297, 304-05 (3d Cir. 2007)], and *FTC v. Qualcomm Inc.* [411 F. Supp. 3d 658, 672-74 (N.D. Cal. 2019)].[19]

Unfortunately, antitrust enforcement to prevent patent holdup is in danger of becoming *less* effective due to the policy positions currently being taken by the Antitrust Division of the Department of Justice. These new policy positions appear to be based a specious argument that patent holdup is rare or unproven, combined with a

[17] *See* Lemley (2007, at 167) ("Antitrust law serves a valuable purpose, but where the holdup problem is concerned, it is a backstop.").

[18] ("SSOs can and should adopt best practices that will prevent patentee holdup while ensuring that the question of the appropriate royalty is resolved in a fair and predictable way.").

[19] Shapiro testified on behalf of the FTC in the *Qualcomm* case. See below for a further discussion of this case, including a critique of the Ninth Circuit decision in August 2020 reversing the District Court.

fundamental misconception about the proper role of patents in a market economy. Ironically, while patent and contract law can largely solve the patent holdup problem, and while progress on those fronts has been made in the past, the Antitrust Division is undermining those efforts in ways that might require *stronger* antitrust intervention.

In Part I, we discuss transaction cost economics and the general theory of holdup. In Part II, we draw on our prior work to explain how these general principles apply to the particular case of patent holdup. Part III addresses various ways of limiting patent holdup, focusing on the role of antitrust and the recent efforts by some, including the Trump Administration, to undo recent progress in this area.

I. TRANSACTION COST ECONOMICS AND THE GENERAL THEORY OF HOLDUP

Transactions cost economics explores how for-profit firms in a market economy structure their affairs to promote efficient investment in productive assets.[20] Oliver Williamson in particular stressed the dangers of opportunism that can arise in the presence of relationship-specific investments. Williamson recently explained:

> TCE [transaction cost economics] gave early prominence to the relatively neglected condition of *asset specificity*, which became a crucial defining attribute of transactions. Asset specificity describes the condition where the identity of the parties matters for the continuity of a relationship. [...] these assets cannot be redeployed to alternative uses or users without loss of productive value (TADELIS; WILLIAMSON, 2012, at. 159, § 3.1.1, emphasis in original, citations omitted).[21]

[20] Oliver Williamson was awarded the 2009 Nobel Prize in Economics "for his analysis of economic governance, especially the boundaries of the firm." Ronald Coase was awarded the 1991 Nobel Prize in Economics "for his discovery and clarification of the significance of transaction costs and property rights for the institutional structure and functioning of the economy."

[21] Williamson was exploring these ideas over forty years ago. *See* Williamson

Williamson has long emphasized what he calls the fundamental transformation that occurs when parties make relationship-specific investments: ex ante competition can be replaced by ex post monopoly (*See, e.g.*, WILLIAMSON, 1979, 241).[22] This is the problem of holdup: the owner of a key asset can charge more than the asset is worth ex ante if the buyer has made asset-specific investments that will be lost unless the parties agree on terms of trade.

A. THE CONDITIONS UNDER WHICH THE HOLDUP PROBLEM IS GREATEST

As with all great ideas in microeconomics, the general theory of holdup identifies a simple and robust economic concept that is amenable to empirical testing and validation. The core idea behind the theory of holdup is that a party that makes substantial investments, the value of which relies heavily upon the actions of another party, is vulnerable to exploitation by that other party and thus may have lessened incentives to invest. This core idea is intuitive and very general.

Naturally, a party making a large relationship-specific investment has a strong incentive to protect itself from ex post exploitation. Over the past fifty years, the field of transaction cost economics has grown rapidly based on its powerful ability to use asset specificity to explain fundamental business relationships. Notable successes include explaining the presence or absence of vertical integration and the design and use of long-term contracts. Both are mechanisms designed to guard against holdup. In such settings, the terms that well-informed parties would negotiate ex ante provide the competitive benchmark against

(1973, *at* 317-318) (noting that the cost advantages of firm-specific knowledge lead to smaller pools of potential players); Williamson (1971, *at* 1160 (describing the cost advantage of prior players with firm-specific knowledge).

[22] ("Initial large-numbers competition [...] is quickly thereafter *transformed* into one of bilateral monopoly – on account of the transaction-specific costs. [...]") (emphasis in original).

which potential solutions to the problem of holdup can be evaluated.[23]

As Williamson has emphasized since the 1970s, the potential for holdup – which we will refer to as "the holdup problem" – is greatest in situations where one party invests heavily in assets that are specific to its relationship with another party. Situations where efficiency requires substantial investment in relationship--specific assets are very common: the worker moving to take a new job and learning skills specific to that job; the tenant customizing rental space to suit its preferences and needs; the supplier of specialized components investing to serve a large customer; and a firm developing and designing a new product that might later be found to infringe another party's patent. Likewise, Klein, Crawford and Alchian, in their seminal 1978 paper, emphasized the risk of "post-contractual opportunistic behavior" after such investments are made (KLEIN; CRAWFORD; ALCHIAN, 1978, at 297). They state: "After a specific investment is made and such quasi rents are created, the possibility of opportunistic behavior is very real." (KLEIN; CRAWFORD; ALCHIAN, 1978, at 298).[24]

Managing the holdup problem is most difficult in dynamic and uncertain environments where ex ante contracts are necessarily incomplete in significant respects. Much of the theoretical literature has explored the optimal design of long-term contracts, while the empirical literature has identified contracting imperfections and obstacles in a variety of different settings (*See generally* TADELIS;

[23] This competitive benchmark is both sensible and practical: sensible because it rewards a supplier based on its superiority over its competitors, and practical because it does not require invoking any pre-specified notion of competition, much less perfect competition (which would make no sense when we get to patent holdup).

[24] *See also* Tadelis; Williamson (2012, § 3.1.1, at 164); ("These [transaction--specific] assets cannot be redeployed to alternative uses or users without loss of productive value."); Williamson (1985, at 64) ("Some individuals are opportunistic some of the time and that differential trustworthiness is rarely transparent *ex ante*.").

WILLIAMSON, 2012, § 3.1.1, at 164; BRESNAHAN; LEVIN, 2012, at 853).

B. THE SOCIAL COSTS OF HOLDUP

Holdup causes several types of social costs. First, there are costs associated with whatever arrangements are used to control and limit holdup. Second, to the extent that those arrangements are imperfect, parties making specific investments will not be fully protected from holdup, so their incentives to invest and innovate will be undermined, creating deadweight loss and inefficiency. Third, actual holdups can create ex post inefficiencies and deadweight losses of the sort normally associated with monopoly power. Fourth, the prospect of engaging in hold-up can lead to inefficient rent--seeking behavior by parties trying to place themselves in a position to behave opportunistically. This welfare analysis is very similar to the analysis of the social costs associated with the problem of theft, which include analogous categories: (1) the costs incurred to prevent or mitigate actual thefts; (2) the deadweight loss associated with activities deterred due to the fear of theft; (3) the costs caused by actual thefts that nonetheless occur; and (4) the cost of activities undertaken by would-be thieves to engage in theft.[25]

While it is difficult to measure the social costs caused by the holdup problem, we can be confident that these costs are elevated by legal rules or other public policies that make it more difficult for market participants to structure their relationships to manage holdup efficiently. This will be important below when we discuss SSO rules to control SEP holdup.

[25] For seminal work on this topic, see Tullock (1967, at 224). Similarly, Gibbons describes the three sources of "transactional failures" that arise in "difficult transactions," namely: "(a) unprogrammed adaption because ex ante contracts are incomplete, (b) lock-in arising from the 'fundamental transformation' and (c) haggling (i.e. inefficient bargaining) because *ex post* contracts are incomplete." (GIBBONS, 2010, at 268).

C. MARKET RESPONSES TO HOLDUP

Market participants will structure their relationships as best they can to avoid or minimize the inefficiencies associated with opportunism. Three mechanisms stand out as common responses to the problem of holdup: (1) vertical integration, which aligns interests by placing both parties to the relationship inside a single firm; (2) long-term contracts, which ideally can be designed to protect the party making the specific investments while rewarding the other party based on its ex ante superiority over alternatives; and (3) flexibility, whereby the party making the investments shifts from specific investments toward more general investments in order to reduce its reliance on the other party. Classic examples in the empirical literature include vertical integration in the automobile and aerospace industries, the structure of contracts between franchisors and franchisees, and the duration of contracts for the supply of coal and natural gas.

However, when efficiency calls for substantial investments in specific assets, there is no costless way to solve the holdup problem. Each of the three mechanisms above comes with its own costs. Vertical integration may deprive the downstream firm of the benefits of competition and innovation among input suppliers. Preserving flexibility, through dual sourcing or relying on standardized inputs, sacrifices some of the efficiencies associated with specific investments.

The general theory of holdup does not predict that actual ex post holdups will be common, even in situations where the holdup *problem* is substantial. To the contrary, under the general theory of holdup, actual ex post holdups represent *failures* by market participants to efficiently structure their relationships. Indeed, transaction cost economics predicts that such failures will be relatively rare in stable, well-understood business settings with limited private information, at least for transactions between sophisticated parties taking place in economies where property rights are well-defined, contract law is well-developed, and contracts are reliably enforceable. But that does

not mean that holdup is not a problem, or that successful efforts to avoid it by altering existing business relationships are costless.

D. EMPIRICAL SUPPORT FOR THE GENERAL THEORY OF HOLDUP

An impressive body of empirical work supports the general theory of holdup described above. Literally hundreds of papers have been published in peer-reviewed journals developing and testing the general theory of holdup. As Robert Gibbons, one of the editors of the *Handbook of Organizational Economics*, stated in his article on transaction cost economics, "the huge body of TCE literature is overwhelmingly empirical." (GIBBONS, 2010, at 273).

One extensive line of research uses transaction cost economics to explain the scope and incidence of vertical integration (*See* WRIGHT, 2007).[26] Put differently, these papers use transaction cost economics to explain the "make vs. buy" decisions of firms. A closely related line of research uses transaction cost economics to explain how firms structure their contractual relationships. Shelanski and Klein provide an early survey of this literature (*See* SHELANSKI; KLEIN, 1995, p. 341-350).[27] As they conclude, "Studies that examine the make-or-buy decision and the structure of long-term contracts, in particular, overwhelmingly confirm transaction cost economic predictions." (*See* SHELANSKI; KLEIN, 1995, p. 352).[28]

[26] ("The holdup theory and the relationship between asset specificity and vertical integration is perhaps the most empirically tested economic propositions [sic] of modern industrial organization.").

[27] (surveying "vertical integration, 'hybrid' contracting modes, long-term commercial contracts, informal agreements, and franchise contracting").

[28] Shelanski and Klein note the presence of some conflicting evidence, but go on to say, "taken as a whole, the body of empirical research in TCE shows that a good deal of economic activity aligns with transactions in the manner predicted by the theory." *Id.* They then concur with Paul Joskow's view that the empirical evidence in transaction cost economics is in "much better shape than much of the empirical work in industrial organization generally." *Id.* (quoting JOSKOW, 1991, at 53).

Masten assembles some of the best early empirical articles on vertical integration and vertical contracting.[29] Whinston notes that "TCE predicts that any increase in quasi-rents will increase the likelihood of vertical integration (a finding that is so far consistent with nearly all of the existing empirical literature)." (WHINSTON, 2003, p. 2). Macher and Richtman reviewed "over 3,500 abstracts from which [they] obtained approximately 900 articles that empirically test some aspect of TCE theory." (MACHER; RICHMAN, 2008, p. 2).[30] After recognizing considerable variability in the quality of the empirical work that they surveyed, they concluded, "even so, the volume of our findings lend considerable support overall for the main predictions of TCE." (MACHER; RICHMAN, 2008, p. 43).[31]

In addition, there is an enormous amount of anecdotal evidence based on long-term contracts between sophisticated parties in situations where substantial specific investments are involved and the parties come to rely on each other. It is safe to say that anyone who has seen a good number of such contracts will confirm that they normally contain provisions by which one party obtains price and performance protections to limit opportunism by the other party.

E. ACTUAL HOLDUPS ARE VERY DIFFICULT TO MEASURE

As just noted, the extensive empirical support for the general theory of holdup consists primarily of studies showing that firms structure their relationships to avoid or minimize the adverse effects of holdup. Critically, the evidence does *not* involve quantifying

[29] See Case Studies in Contracting and Organization (Scott Masten, Ed.) (1996).

[30] Macher and Richman are especially interested in the "reach of transaction cost applications in fields outside [industrial organization] economics and in a variety of social sciences." *Id.* Macher; Richman (2008, at. 42-43).

[31] *See also* Bresnahan; Levin (2012, § 3, at 862) (characterizing the empirical evidence as "quite favorable" for transaction-cost theory); Lafontaine; Slade (2007, at 658) ("Virtually all predictions from transaction-cost analysis appear to be borne out by the data.").

the magnitude of actual ex post holdups.[32] Indeed, the empirical literature on holdup has relatively few documented examples of large-scale actual holdups.[33] This will be important below when we turn to evaluating the empirical evidence regarding patent holdup in particular.

Anticipating the arguments being made by those who deny that the patent holdup problem is real and significant, it is instructive to ask *why* the empirical literature on the general holdup problem has not proceeded by measuring the frequency or magnitude of actual holdups.

In part this is for a very good conceptual reason: the theory predicts that market participants will structure their affairs to avoid or mitigate actual holdups. As stressed above, the social costs caused by the holdup problem can be large even if large-scale holdups are very infrequent. The validity of the general theory of holdup, and the importance of the holdup problem, do not hinge on the frequency or magnitude of actual holdups.

But practical considerations also play a big role in explaining why the very large empirical literature on the holdup problem includes few documented instances of actual holdups. Even in situations where such holdups take place, they are exceedingly difficult for researchers to reliably detect and quantify. To see why, denote the holdup (ex post monopoly) price by $P_H P_H$ and the ex ante competitive price by P^*

[32] Lafontaine and Slade explain that empirical work regarding inter-firm contracts has been quite successful at explaining the *incidence* of various practices, but less successful at quantifying the effects of these practices, primarily because such quantification would require access to data that is typically proprietary (LAFONTAINE; SLADE, 2012, § 3.2).

[33] Perhaps the most famous example involves General Motors and Fisher Body. *See* Klein (2000, at 106-126) (detailing Fisher Body's holdup of General Motors after General Motor's demand for Fisher's products exceeded supply). Yet even this famous example is hotly disputed as a factual matter. *See* Casadesus-Masanell; Spulber (2000, at 76). ("A number of significant aspects of the [Fisher Body] account in the economics literature are incorrect.").

P^*. The (per-unit) magnitude of the actual ex post holdup is equal to $(P_H - P^*)(P_H - P^*)$. Measuring either component of this difference can pose quite a challenge for researchers. Actual transaction prices in complex business-to-business transactions are rarely observable by researchers. Plus, even when a measure of price is available, it typically is confounded by other terms and conditions, making P_H P_H very hard to observe. Coming up with a good measure of the competitive benchmark price P^*P^* is even harder, since it reflects a counterfactual and since the transactions at issue are by nature idiosyncratic. Practical considerations also explain why the empirical literature on the holdup problem includes few documented instances in which the *prospect* of holdup has discouraged investment. The resulting reduction in investment typically will not normally be observable to researchers, much less attributable to holdup.

For all of these reasons, scholars studying the holdup problem widely agree that the general theory of holdup is very well supported empirically without expecting, much less demanding, a body of empirical work measuring actual holdups. This same sensible approach should be applied to patent holdup.

When we turn to look at patent holdup below, we will examine the two types of evidence used in the more general empirical literature on holdup. First, we look for evidence identifying situations in which the patent holdup problem is significant. The telltale marker that the patent holdup problem is significant in a given setting is the presence of substantial investments specific to a given patent or patent portfolio. Second, we look for evidence that the mechanisms used to manage the patent holdup problem are costly or imperfect. There is clear evidence that the mechanisms used by SSOs to manage SEP holdup are costly and imperfect.

F. THE ROLE OF ANTITRUST IN LIMITING HOLDUP GENERALLY

Antitrust can assist contract law and other private arrangements to limit holdup in some circumstances. In many cases, holdup is purely a private matter involving two parties, such as a landlord and a tenant, or a coal mine and a railroad. In those cases, where holdup or its prospect does not have marketwide effects and does not harm third parties, antitrust is generally unnecessary. Other legal doctrines, including contract law, criminal and civil antifraud laws, and tort law, suffice. Furthermore, antitrust law must be careful not to impede private solutions to the holdup problem, as when rivals engage in cross licensing to allow themselves greater freedom to design new products (*See* SHAPIRO, 2000, p. 120, 130).[34] However, when holdup has marketwide effects that cause harm to third parties, including consumers, antitrust has a role to play in preventing holdup. Antitrust law is especially needed when the incidence of holdup falls on downstream customers rather than intermediaries. This can occur when a platform company follows an "open early, closed late" strategy, building its market position with a promise of openness that it later breaches (*See* LEMLEY; McGOWAN, 1998, at 770-771).[35] Such a policy standing alone might not violate the antitrust law; it could simply be contractual opportunism (*See* LEMLEY; McGOWAN, 1998, at 770-771). But both deliberate misrepresentations that a standard will remain open and breach of a contractual commitment to keep it open can serve to interfere with competition in a way antitrust law should care about.

The role of antitrust in limiting holdup has been explored extensively in the antitrust treatment of practices involving

[34] ("From the perspective of competition policy, cross licenses of this sort are quite attractive.").

[35] (discussing the risk that Java would gain popularity as an open platform and then close the platform). That risk came to pass; Oracle bought Sun and closed Java. For a discussion of the costs faced by consumers locked in by this "open early, closed late" strategy, see Shapiro; Varian (1999, 103-34).

aftermarkets. Consider a manufacturer of a durable good that competes with other manufacturers by promising not to discriminate against third parties who service its equipment, so customers can be assured of competition in the aftermarket to service the equipment. This is a contractual solution to the holdup problem faced by customers. Suppose, after building up an installed base of users, this manufacturer breaches that commitment and monopolizes the aftermarket for servicing the equipment, perhaps as part of a strategy to harvest the installed base through inflated service charges while exiting the equipment market. That type of breach of contract is likely to harm customers by disrupting the competitive process. Those are the key elements of an antitrust violation.[36]

Antitrust also can guard against deceptive practices that undermine various contractual and organizational mechanisms designed to prevent holdup. Parties seeking to benefit from holdup may engage in fraud or other deceptive or misleading conduct that prevents third parties, including consumers, from enjoying the benefits of competition or from creating efficient private arrangements to avoid holdup. For example, they may conceal information ex ante in order to avoid triggering a negotiation until after their power is locked in, as Unocal and Rambus both did in hiding their patents from standard-setting organizations.[37] Antitrust prohibits that misbehavior, ensuring that parties have the information and ability to contract privately to avoid holdup.

[36] For a real-life example of this type of fact pattern, see Eastman Kodak Co. v. Image Tech. Servs., Inc., 504 U.S. 451 (1992).

[37] *See* Rambus Inc. v. FTC, 522 F.3d 456, 459 (D.C. Cir. 2008) (reporting the FTC's findings that Rambus "deceptively failed to disclose" its patent interests in four standardized technologies); Union Oil Co. of California, 140 F.T.C. 123, 125 (2005) (alleging that Union Oil pursued patents while misrepresenting to regulatory authority that the relevant research was in the public domain). Shapiro testified on behalf of the FTC in the *Unocal* case.

II. PATENT HOLDUP

A. THEORY OF PATENT HOLDUP

Patent holdup is a specific application of the general theory of holdup. When an actual ex post patent holdup occurs in the form of a patent license, its (per-unit) magnitude equals the difference between the royalty rate obtained by the patent holder and the royalty rate the patent holder would have been able to negotiate prior to the licensee making investments specific to practicing the patent. The royalty rate without holdup reflects the intrinsic value of the patented invention, which will be large for major inventions. Nothing we say should be taken to suggest that a patent holder should be prevented from obtaining the reasonable royalty rate that reflects the ex ante incremental value of its inventions, properly discounted to reflect the chance that the patent is invalid or not infringed (*See* LEMLEY; SHAPIRO, 2007, p. 1.999).[38] Rather, our concern is with the ability of patent owners to capture more than that intrinsic value by exploiting the irreversible investments made by the licensee.

Patent holdup, like all holdup, arises when products and services require specific investments. In this context, an investment to develop a new product is "specific" to a given patent to the extent that it cannot readily be transferred to a product that does not infringe that patent.[39] If the patent holder owns a whole portfolio of patents, an investment to develop the new product is "specific" to that portfolio if it cannot be transferred to a product that avoids infringing the entire *portfolio* of patents.[40]

[38] ("The [reasonable and expected] royalty rate must be discounted to reflect patent strength.").

[39] In many cases, an infringing product can be redesigned to avoid infringing, but this process takes time, so it does not avoid holdup altogether.

[40] This assessment must be based on the patent portfolios that will be in place after the firm introduces its product. Patent holdup can arise, or become more severe, due to a horizontal consolidation of patents reading on the firm's product, or

Due to the probabilistic nature of patents, patent holdup does not require surprise or ambush: it can occur even if the firm developing a new product is well informed and able to negotiate with the patent holder before making any specific investments. We prove this as theoretical matter in a simple bargaining model in prior work. (*See* LEMLEY; SHAPIRO, 2007, at 2.003-2.005).[41] Patent holdup without surprise can occur because both outside options available to the firm developing the new product, in its ex ante negotiation with the patent holder, are costly to that firm. The first outside option is to design its new product to avoid any danger of later being found to infringe the patent. The cost of designing around the patent is the same, regardless of the probability that the patent will later be found invalid or not infringed by the new product. As a result, the royalties paid by a firm negotiating based on this outside option will be unreasonably high, especially for weak patents. The second outside option is to proceed ahead with product development and face the possibility of later being found to infringe the patent. But invoking this option negates the value to the downstream firm of knowing about the patent in advance and leaves that firm vulnerable to ex post holdup. As a result, negotiating based on this outside option also leads to unreasonably high royalties.[42]

Based on the general theory of holdup and the results just described, the danger of patent holdup is greatest when (1) a firm is developing a new product that may (or may not) later be found to infringe a patent, and (2) efficient development of that new product requires that firm to make substantial investments that are specific to the patent(s) in question. Patent holdup does not require "surprise" and can be especially problematic for vague or weak patents. Furthermore, the patent holdup problem is exacerbated if multiple

because a practicing entity who would not assert its patents due to the cost of a countersuit sells its patents to a Patent Assertion Entity (PAE).

[41] (setting forth the "early negotiation" model); Shapiro (2010, at 298-300).

[42] For a fuller discussion of this point, see Shapiro (2010, at 298-300).

firms own such patents, leading to royalty stacking infringed (*See* LEMLEY; SHAPIRO, 2007, p. 1.999). Notably, the harm caused by the holdup problem here often does not take the form of an injunction shutting down a product for patent infringement. Rather, its most common form is the payment of unreasonably high royalties to the patentee to avoid the costly and inefficient measures to avoid the holdup that patentee could otherwise impose.

B. EVIDENCE OF PATENT HOLDUP

We now turn to the empirical evidence relating to patent holdup. We address both categories of evidence identified above relating to the general theory of holdup.

B.1. THE PATENT HOLDUP PROBLEM IS SIGNIFICANT FOR MANY HIGH-TECH PRODUCTS

Large patent-specific investments are common in the information and communications technology (ICT) sector (*See* UNITED STATES; FEDERAL, 2007, at 3-4, 35-36).[43] When SEPs covering widely used compatibility standards are involved, the presence of large specific investments surely is the norm. After all, any investment that would be lost if the infringing firm were forced to stop selling all of its compatible products is specific to even a single SEP.

The significance of patent-specific investments in any particular patent infringement case is an empirical question that depends upon the facts of that case. In an individual case where a party is arguing that it is subject to ex post patent holdup, that party should be required to establish that it has made significant

[43] (explaining that the ITC sector relies on a variety of patented technologies that must be licensed or designed around); *See* UNITED STATES; FEDERAL (2007, at 43, n. 50) (noting the costly nature of SEPs in the ICT sector).

investments specific to the patent or patent portfolio in question.[44] In cases involving SEPs reading on widely used industry standards, noncompliant products are unlikely to be commercially viable, so it will normally be sufficient for the party to show that it has made significant investments specific to the product category in question.

Notably, a company does not need to be aware of a particular patent to make an investment specific to that patent. Indeed, the vast majority of holdup cases (and indeed the vast majority of patent lawsuits) involve patents discovered only after the investment is made (*See* COTROPIA; LEMLEY, 2009, at 1.442, 1.446).[45] The fact that the patent can be argued by its owner to cover the specific investment is what gives rise to the holdup problem.

B.2. MANAGING THE PATENT HOLDUP PROBLEM IS VERY DIFFICULT FOR HIGH-TECH PRODUCTS

The general theory of holdup suggests several mechanisms that a firm developing a new product might employ to protect itself from patent holdup. To be effective, these mechanisms must be deployed prior to the firm's development effort. First, the firm might vertically integrate, which in the case of patent holdup would mean acquiring the patents in question. Second, the firm might sign a longterm contract, which in the case of patent holdup would mean entering into a long-term licensing contract with the patent holder prior to product development. Third, the firm might retain flexibility to use other inputs, which in the case of patent holdup would mean designing its product to allow it to easily and rapidly modify its product to avoid infringement.

[44] This assessment should be made under the assumption that the patent(s) involved are valid and infringed. Additionally, a party seeking in advance to avoid patent holdup may argue that it will likely make such specific investments, or would do so in the absence of the threat of patent holdup.

[45] (reporting that only 31.1% of patent infringement cases "involve allegations that the defendant was even aware of the patent before the lawsuit," and the number was much smaller in the IT industries).

We do indeed see each of these responses in some cases, but the mechanisms normally used to limit holdup often do not work well to prevent patent holdup. This implies that the social costs caused by patent holdup also will be high. In prior work, we and others identify a number of factors that make it very difficult for firms developing new products in the information technology and communications sector to protect themselves from patent holdup (*See* LEMLEY; SHAPIRO, 2007, at 1.992):[46]

- *Broad Patents with Vague Boundaries*. Many U.S. patents have broad claims with vague boundaries, making it difficult to determine in advance whether a new product will infringe them, especially since product development takes time and is uncertain. (BESSEN; MEURER, 2008, at 54-56);
- *Uncertainty About Future Product Attributes*. A firm developing a new product may not know its specific features until well down the development path. (*See* LEMLEY; SHAPIRO, 2007);
- *No Independent Invention Defense*. A product infringes a patent even if the firm developed that product entirely on its own, as is the norm in patent infringement cases (COTROPIA; LEMLEY, 2009, at 1.425-1.426);
- *Weak Patents*. Nearly 75% of patent suits fail (ALLISON; LEMLEY; SCHWARTZ, 2014, at 1.787-1.788). Even the small number of cases that involve defendants aware of a patent at the time they invest often involve patents that should not have issued or that are been claimed to cover something they do not plausibly reach. A weak patent can give rise to patent holdup even if the firm is fully aware of that patent when it launches its development effort;

[46] (noting that products in the ITC sector "can easily be covered by dozens or even hundreds of different patents").

- *Patent Pendency Lags*. Patents take 3-4 years to issue on average (LEMLEY, 2013, p. 11, n. 43). Even if a firm carefully reads all pertinent patent applications when they are published, and steers well clear of their claims, that firm can still be exposed to patent holdup due to the lag between a patent's priority date and the publication of that patent application by the United States Patent and Trademark Office (PTO). That is especially true since patent applicants can and do modify their claims during the patent prosecution process to cover products they see being introduced in the market and ongoing standardization efforts;[47]
- *Patent Thickets*. Many patents may plausibly be asserted against a single product, and these patents are likely to be held by multiple owners (PARCHOMOVSKY; WAGNER, 2005, p. 35; SHAPIRO, 2000, p. 126).

In certain other industries, by contrast, a firm planning to develop a new product can easily identify the single firm that owns strong, clear patents that are likely to be asserted against that product. In those situations, if entry raises joint profits, an ex ante licensing contract could work well. Thus, firms in industries like pharmaceuticals or medical devices tend to identify the (many fewer, more certain) holders of potentially critical patent rights and either negotiate a license up front or change the way they design their product. Most new high-tech products, and certainly those

[47] In *Kingsdown Medical Consultants, Ltd. v. Hollister Inc.*, the Federal Circuit stated that "there is nothing improper, illegal or inequitable in filing a patent application for the purpose of obtaining a right to exclude a known competitor's product from the market." 863 F.2d 867, 874 (Fed. Cir. 1988). "Nor," noted the Federal Circuit, "is it in any manner improper to amend or insert claims intended to cover a competitor's product the applicant's attorney has learned about during the prosecution of a patent application." *Id.*; *see also* Lemley; Moore (2004, at 69) (noting that firms use continuation applications to "track changes in the marketplace").

complying with popular industry standards, do not fit this more benign fact pattern.

For all of these reasons, holdup tends to be a thornier problem in the information technology and telecommunications industries. As an illustrative example, there are strong reasons to believe that effectively avoiding patent holdup is more difficult for a firm developing a new industrial robot than in the typical bilateral holdup situation studied in the transaction cost economics literature, such as an electric utility building a new generating facility that relies on a specific mine to supply coal, or an entrepreneur opening a new franchise. The electric utility can enter into a long-term contract with the mine or acquire the mine if necessary. The entrepreneur can sign a detailed long-term contract with the franchisor. In contrast, for the reasons given above, the robot maker will have difficulty even identifying all of the (possibly thousands of) patents that might be asserted in the future against its new robot, many of which might not issue until the robot maker is well down the road in its development process.

Furthermore, even for those patents that can confidently be identified in advance, there are substantial transaction costs associated with each of the three mechanisms normally used to avoid holdup.

- *Vertical Integration*. Vertical integration is rarely a good solution for patent holdup. If one robot manufacturer purchases a group of patents and patent applications that are likely to be asserted against tomorrow's robots, the danger of patent holdup may actually become greater for the other robot manufacturers.[48] This suggests that patent holdup would

[48] This can happen because a robot manufacturer asserting the patent is more likely than a non-practicing entity to be able to obtain an injunction against other robot manufacturers, and because one robot manufacturer gains by excluding or raising the costs of its rivals. These forces can be offset if the party subject to holdup has its own patents that can be asserted in a countersuit.

best be mitigated overall if a group of robot manufacturers purchases these patents. However, that solution involves its own substantial transaction costs, not to mention potential antitrust exposure. Further, there are just too many patents to make this feasible in the information technology sector;

- *Long-Term Contracts*. Long-term ex ante patent licensing contracts intended to cover future products involve substantial transaction costs. Our robot manufacturer is likely to have a relatively poor sense of what its future products will look like when it first begins developing them, yet that is the point in time when it must begin making substantial specific investments. Furthermore, it may be very difficult for the robot maker to identify all of the patents that might be asserted against its future products, or what the scope of those patents will be, especially for patent applications that have not yet been issued or that will later be filed as continuations. On top of that, there may well be multiple parties who have applied for patents that are likely to be asserted against the new robots, raising issues of royalty stacking, which multiplies the patent holdup problem. For all of these reasons, very few companies developing complex products in the information, technology, and communications area are able, as a practical matter, to "clear" their products by entering into ex ante licensing arrangements with most or all of the parties holding patents that might later be asserted against their new products.[49] For SEPs, FRAND commitments seek to overcome these problems, but these commitments do not specify royalty rates and even if they are effective, enforcing them involves substantial transaction costs;[50]

[49] For a fuller discussion of this patent preclearance dynamic, see Lee; Melamed (2016, at 404-09).

[50] This highlights the benefits of reducing those transaction costs, e.g., by clarifying the circumstances under which SEP holders can obtain injunctions and the meaning of the term "reasonable royalties." *See supra* note 15.

- *Retaining Flexibility*. Retaining flexibility during the development process so as to dodge possible infringement claims for the resulting product can be exceedingly difficult, especially given the large number of patents and their vague boundaries. Further, even if such flexibility could be achieved, it might be very costly in terms of reduced product performance or the need to deploy additional engineering resources. That is especially true when the patent is an SEP, since standardization is critical to many IT technologies. Those, too, are inefficiencies, which can lead to elevated royalty rates or cause other costs associated with mitigating patent holdup.

To summarize, each of the three basic mechanisms for mitigating patent holdup – vertical integration, long-term contracts, and retaining flexibility – faces *greater* obstacles when it comes to patent holdup in the high-tech sector than it does for more traditional types of holdup.

Reputational concerns also can mitigate holdup to some degree. However, the reputation mechanism also performs relatively poorly in the context of patent licensing for a number of reasons. It is difficult to identify the patents that may be asserted against a new product. Licensing terms are typically kept secret. Reputational effects may operate with a significant delay. A patent holder's incentives can change (as when an operating company fails and then aggressively monetizes its patents). And patent owners can and do sell their patents to Patent Assertion Entities (PAEs) to assert them aggressively.[51] Plus, for SEPs, the standard-setting process can make it difficult for SSO participants to steer new standards clear of a firm that has behaved opportunistically in the past if that firm makes a

[51] Indeed, PAEs typically find it valuable to develop a reputation for aggressively pursuing patent infringement claims. (MORTON; SHAPIRO, 2016, at 91).

FRAND commitment to the new standard. Reputation works only if you can avoid dealing with companies that behave unreasonably; that may not be possible if they own SEPs.

The conclusion from this analysis is unambiguous: patent holdup is an especially thorny subspecies of holdup, making it especially costly and difficult for firms developing new complex products to protect themselves from patent holdup.

C. ACTUAL PATENT HOLDUPS ARE VERY DIFFICULT TO MEASURE

As with holdup in general, quantifying the frequency and magnitude of actual patent holdups is very difficult as a practical matter and not a useful way of assessing the importance of the patent holdup problem. Rarely can researchers observe the ex post price, because patent licensing terms are normally confidential. Even when researchers can observe the license fees, they are often embedded in a complex agreement. And even in those rare cases where researchers can accurately observe the ex post price, they are unlikely to observe the ex ante price, making it difficult if not impossible to measure the magnitude of the holdup.

Litigated cases also are problematic as a source of data to quantify the magnitude of actual patent holdups. A litigated case resulting in an award of reasonable royalties may well involve attempted holdup, but by definition it cannot provide smoking-gun evidence of actual holdup, at least if one accepts that the royalties awarded by the court are reasonable.[52] Rather, at least since the

[52] Two recent SEP cases provide good examples of this fact pattern. In *Microsoft v. Motorola*, Judge Robart found that the reasonable royalties for Motorola's SEPs were $1.8 million, a "tiny fraction" of the $4 billion that Motorola was seeking. (TEECE; SHERRY, 2016, at 119). In the *Innovatio* case, Judge Holderman found that the reasonable royalties were 9.56¢ per unit, a tiny fraction of the $36 per unit demanded for a bar code scanner. *In re* Innovatio IP Ventures, LLC, MDL Nº 2303, 2013 WL 5593609 at *3, *12 (N.D. Ill. Oct. 3, 2013).

Supreme Court eliminated the automatic entitlement to an injunction, litigation to judgment (which is rare) often reflects a refusal to give in to holdup by a defendant willing to take its chances in court. And the vast majority of patent cases settle. The terms of a settlement are rarely observable, so it is impossible to know whether those settlements reflected the value of holdup.

Notwithstanding these points, a number of authors have pointed to a lack of empirical evidence to argue that patent holdup either does not exist or is not a significant problem (*See, e.g.*, WRIGHT; GINSBURG, 2015).[53] Even taken on their own terms, many of these papers are deeply flawed. One such paper, which has often been cited by those who downplay the importance of patent holdup, purports to offer empirical evidence inconsistent with the hypothesis that SEP holdup has slowed innovation or harmed consumers (*See* GALETOVIC, HABER; LEVINE, 2015a, p. 551-554).[54] The conclusion to this Qualcomm-funded paper states, "we cannot reject the hypothesis of no SEP holdup." (*See* GALETOVIC, HABER; LEVINE, 2015a, p. 572). How do these authors reach this conclusion? They compare rates of change of quality-adjusted prices in "SEP-reliant" industries with "similar" non-SEP-reliant industries, primarily over the 1997-2013 period (*See* GALETOVIC, HABER; LEVINE, 2015a, p. 551-552).[55] For example, they show

[53] ("There is no empirical evidence that anticompetitive patent holdup is prevalent."); see also Layne-Farrar, 2014, at 2 ("The empirical studies conducted thus far have not shown that holdup or royalty stacking is a common problem in practice.").

[54] (finding no empirical support for the notion that SEP holdup hypothesis has slowed innovation or harmed consumers).

[55] They also attempt to test for SEP holdup by asking whether the *eBay* decision differentially affected the rate of change of quality-adjusted prices in SEP--reliant industries and non-SEP-reliant industries. *Id.* at 555. This test, too, has exceptionally low power, given the lags in the system and the many other factors that affect the rate of change of quality-adjusted prices. Worse yet, the basic assumption behind the test – that *eBay* had a greater impact on SEPs than on other types of patents – is highly questionable. More likely, *eBay* had a greater effect on *non-SEPs* than on SEPs. Prior to the *eBay* decision, FRAND

that quality-adjusted prices of cellular phones have fallen faster than the quality-adjusted prices of automobiles (*See* GALETOVIC, HABER; LEVINE, 2015a, p. 564-566).[56] This exercise does not address the relevant hypothesis: whether SEP holdup increased the price of cellular phones from what it otherwise would have been (*See* GALETOVIC; HABER; LEVINE (2015b).[57] The quality-adjusted prices of pharmaceuticals have risen much faster than automobiles over the same period of time, but that similarly is not proof that pharmaceuticals are subject to a patent holdup problem.

Beyond the obvious and fatal flaws in this empirical work,[58] the whole line of inquiry is of limited relevance for the purpose of measuring the social costs of holdup or designing institutions to limit patent holdup, because it only looks for instances of actual patent holdup. As explained above, these instances are very difficult to detect and are only the tip of the iceberg in terms of the social costs of patent holdup (*See* COTTER; HOVENKAMP; SIEBRASSE, 2019, at 1.547-1.548).[59] So far as we can tell, the vast majority of these

commitments already limited the use of injunctions for SEPs, while non-SEPs automatically received injunctions.

[56] The original version of this paper used the price of *bananas* as a "comparable" benchmark (GALETOVIC; HABER; LEVINE, 2014).

[57] (acknowledging that "the equilibrium outcome of the SEP hold-up hypothesis is that consumers either face higher prices or lower quality products than they would if hold-up was not taking place").

[58] More recent work fares no better. One recent paper claims to have counted up all the royalties on phones worldwide and found that they amount to only 3% of the price of a phone. (GALETOVIC; HABER; ZARETZKI, 2018, at 271-272). But the authors reach that conclusion only by ignoring the value of patents owned by companies that make phones or phone components, which collectively own the largest number and likely the most valuable patents. *See* Lemley; Melamed (2013, at 2.130) (noting that "smartphone companies alone spent over $15 billion acquiring patents" over the course of a few years). Even apart from that huge omission, their data are suspect, since later court evidence revealed that just one company – Qualcomm – charged 3% across the board for its patents alone. FTC v. Qualcomm Inc., 411 F. Supp. 3d 658, 673 (N.D. Cal. 2019).

[59] (noting that patent holdup can be a problem even if it isn't systemic, and that "it may be that case law imposing limits on the entry of injunctions is itself a leading factor constraining firms from engaging in holdup").

papers have been funded by Qualcomm and other patent holders seeking to weaken the institutions designed to control patent holdup, increase their leverage in licensing negotiations, and thus increase their ability to monetize their patents.[60]

Despite the difficulties of observing the incidence and magnitude of actual patent holdups, we *are* able to observe the telltale signs of actual patent holdup. Transaction cost economics, and simple bargaining theory for that matter, tell us that actual patent holdup can be expected to occur when three conditions are present: (1) a firm has developed a new product independently; (2) that firm has made significant investments that are specific to one or more patents asserted against that product; and (3) the firm is not protected

[60] To be sure, companies on both sides have funded work in this area. But Qualcomm's investment has been extraordinary and has led to the creation of entire centers as well as funding scholarly papers. *See, e.g.* Brooks; Geradin (2011, at 1) (acknowledging that the author previously represented Qualcomm); Brooks (2011, at 435) (acknowledging that the author was representing Qualcomm in litigation pending when the article was written); Geradin; Layne-Farrar; Padilla (2008, at 144) (acknowledging financial support from Qualcomm); Ko (2014, at 209) (acknowledging financial support from Qualcomm); Layne-Farrar; Llobet; Padilla (2014, at 24) (acknowledging financial support from Qualcomm); Layne--Farrar; Llobet; Padilla (2009, at 445) (acknowledging financial support from Qualcomm); Layne-Farrar; Padilla; Schmalensee (2007, at 671) (acknowledging financial support from Qualcomm); *About*, HOOVER IP². Available in: <https://hooverip2.org/about/>. (last visited May 20, 2020) (acknowledging financial support from Qualcomm); *Qualcomm Gives $2 Million for Patent Research*, NW. PRITZKER SCH. L. (Aug. 2013). Available in: <https://www.law.northwestern.edu/campaign/gifts/qualcomm/index.html>. Explaining that Qualcomm gave at $2 million gift "to establish the Project on Innovation Economics, research that will investigate the role of patents in incentivizing technological innovation"; Supporters, Ctr. for the Protection of Intell. Prop. Available in: <https://cpip.gmu.edu/about/supporters/>. (last visited May 20, 2020) (acknowledging financial support from Qualcomm); TILEC News (Apr. 26, 2007). Available in: <https://perma.cc/2ET3-CDAK>. (acknowledging Qualcomm support); U.S. Telecom Firm Boosts Research Funds at Tilburg University Law and Economics Center Beneficiary, Go Dutch. Available in: <http://www.godutch.com/newspaper/index.php?id=1181>. (last visited June 2, 2020) ("Research Center TILEC, the Tilburg Law and Economics Center, has received almost €300,000 from American telecom company Qualcomm.").

from patent holdup.[61] As discussed above, conditions (1) and (2) are common in the high-tech sector, placing considerable weight on the institutions that protect firms from patent holdup.

The presence of those institutions is itself evidence that the patent holdup problem is real and significant. As we noted in Part I, companies try to structure their transactions to avoid holdup, developing institutions for that purpose. As we have seen, the traditional market solutions do not work well for patents. In most industries, the central mechanisms limiting patent holdup come from patent law, namely the rules governing injunctions and patent damages. In the high-tech sector, companies have overwhelmingly turned to SSOs in an effort to obtain global commitments to an ex ante royalty, which appear in the form of FRAND commitments. The near-universal recognition in the industry of the need for such a mechanism is strong evidence that companies view holdup as a problem they must build institutions to avoid.

D. FRAND *COMMITMENTS FOR STANDARD-ESSENTIAL PATENTS*

The danger of patent holdup is particularly high for SEPs that read on popular industry standards. The reason is not hard to see: the patents are by definition thought to be essential to work in the field.[62] If compliance with a standard is essential to market success, as it often is in network markets, a company has no choice but to invest in assets that might later turn out to be subject to SEPs. Further, there is

[61] As explained above, actual patent holdup also can be expected to occur even without "ambush" when a firm is anticipating making specific investments and cannot easily identify the patents that may be asserted against its new products or when the identified patents are relatively weak. *See supra* notes 40-41 and accompanying text.

[62] Whether they actually are essential is open to some debate. *See* Lemley; Simcoe (2019, at 628-632) ("When SEPs are asserted in court, most of them turn out not to be infringed.").

unambiguous evidence of substantial patent thickets for many patent standards, as measured by the number of declared SEPs for those standards (*See* BIDDLE; WHITE; WOODS, 2010).[63]

Precisely because patent holdup is such a grave problem for SEPs, SSOs commonly, if not uniformly, require that participants agree to license any SEPs on FRAND terms.[64] Indeed, the FRAND commitment itself developed as a response to anticompetitive conduct by patent owners that failed to disclose their claim to own rights in a standard and then demanded excessive royalties after the standard-setting organization was locked in.[65] There is a broad consensus that the primary purpose of these FRAND commitments is to prevent SEP holdup by ensuring that parties seeking to make, use, or sell products that comply with the standard are able to do so, provided they pay reasonable royalties for the required SEPs (*See* SIEBRASSE; COTTER, 2017; COTTER, 2009, at 1.201).[66]

The widespread requirement that owners of SEPs commit to licensing them on FRAND terms is an application of the general

[63] ("identifying 251 technical interoperability standards implemented in a modern laptop"); Lemley; Shapiro (2013, at 1.158) (noting the thousands of patents claimed to be essential to smartphone technology); Armstrong; Mueller; Syrett (2014, at 7) (unpublished manuscript). Available in: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2443848>. ("One estimate suggests that there are 250,000 current patents relevant to the modern smartphone.").

[64] Much has been written about these FRAND policies. For a fine review, see generally Contreras (2019).

[65] *See* Contreras (2015, at 42-44, 64-66) ("In response to the perceived threat of patent hold-up, many [standards-development organizations] have adopted formal policies that impose one or both of the following obligations on participants: (1) an obligation to disclose patents essential to implementation of a standard, and/or (2) an obligation to license such patents on FRAND terms.").

[66] ("SSOs have experimented with or considered various policies designed to minimize the risk of patent holdup. [...] such as requiring SSO members/patent owners to commit to licensing their technology, if at all, on RAND terms."); Lemley (2002, at 1.924-1.925) ("If an IP owner agrees to license its patents that cover a standard on reasonable and nondiscriminatory terms, others will assume that they are free to use that standard so long as they pay a reasonable royalty.").

theory of holdup. Firms developing products that will comply with an industry standard typically need to make very substantial investments that are specific to these SEPs. This makes SEP holdup an obvious danger. The general theory of holdup teaches us that market participants will migrate towards the most efficient way of avoiding or mitigating SEP holdup. What are their choices?

Vertical integration cannot solve the SEP holdup problem, since the whole idea of standard setting is to enable many downstream firms to make compliant products, which requires practicing SEPs.[67] For a standard to work, *every* firm needs access to *every* SEP; they cannot simply vertically integrate with some of the SEPs that read on that standard. Nor can product design flexibility solve the SEP holdup problem because a compliant product will infringe SEPs by definition.[68] The best hope for dealing with SEP holdup is to rely on disclosure of SEPs together with some type of ex ante long-term contract.

Enter FRAND commitments: promises made by all participants in a standards body that they will license all essential patents on "fair, reasonable, and nondiscriminatory terms." Those ubiquitous commitments are evidence of an entire industry trying to protect itself from patent holdup.

[67] Vertical integration can work to some degree, e.g., if a large downstream firm acquires a collection of SEPs. But other downstream firms would still need access to those SEPs on reasonable terms. A group of downstream firms could acquire a collection of SEPs, but again other downstream firms would still need access to those SEPs. Patent pools can help mitigate the SEP holdup problem, but downstream firms who are not pool members still need access to those SEPs on reasonable terms.

[68] Flexibility can help in some circumstances, e.g. by making certain aspects of the standard optional rather than mandatory, thereby reducing the number of SEPs. But mandatory elements are typically critical for an interoperability standard to work properly, and as a factual matter many SEPs read on these mandatory elements.

However, because FRAND commitments require collective action, and because SSOs typically operate on the basis of consensus, they are subject to their own substantial imperfections and transaction costs. In particular, the FRAND commitments called for by most SSOs are surprisingly vague given their critical role in limiting SEP holdup. The most common provision simply requires that SEP holders make irrevocable commitments to license their SEPs on reasonable and non-discriminatory terms, but does nothing to specify or limit those terms.[69] Despite these obstacles, FRAND commitments can be made more explicit and more effective at preventing SEP holdup, as exemplified by the recent salutary changes at the IEEE.[70] However, in this paper we simply take as given existing SSO policies, vagueness and all. For our purposes here, the key point is that these FRAND commitments are the central mechanism used by SSOs to address the problem of SEP holdup. We can apply the general theory of holdup to ask how well these FRAND commitments work to mitigate holdup. We also can apply the general theory of holdup to help us understand the economic effects, and formulate the best policy responses, when SEP owners breach their FRAND commitments. But the very fact that those commitments are ubiquitous is itself evidence of an entire industry seeking to mitigate a widespread holdup problem.

Fortunately, United States courts have come to understand the critical role played by FRAND commitments in mitigating SEP holdup. Most notably, the Federal Circuit has explicitly found that the concept of reasonable royalties, as applied to SEPs, means the royalties that would be negotiated prior to the establishment of the standard rather than transferring to the patent owner the value of

[69] For a survey of standard-setting organization rules relating to IP, *see* Lemley (2002, at 1.924-1.925).

[70] *See* IEEE-SA (2015, at 4) (requiring all proposed IEEE standards to be accompanied by an assurance that any SEPs would be available for a reasonable royalty). Importantly, the IEEE rules also provide a mechanism for SEP owners to control holdout by patent users who refuse to pay reasonable royalties. *Id.*

collective adoption of the standard.[71] In addition, the Federal Circuit, applying *eBay*, has indicated that injunctions will normally not be available for SEPs: "a patentee subject to FRAND commitments may have difficulty establishing irreparable harm."[72] The Ninth Circuit has taken the same position.[73] Nothing in these decisions prevents SEP owners from properly protecting themselves from non--paying users,but they do give force to the contractual mechanisms companies use to try to avoid holdup and replicate what a negotiation might look like absent irreversible investments.

Another significant step to avoiding holdup was the Supreme Court's decision in *eBay v. MercExchange* that successful patent holders were not automatically entitled to an injunction.[74] Following *eBay*, the lower courts have generally ruled that non-practicing entities are normally entitled to reasonable royalties but not permanent

[71] *See* Ericsson, Inc. v. D-Link Sys., Inc., 773 F.3d 1201, 1232 (Fed. Cir. 2014). The Federal Circuit laid out two "special" considerations for "dealing with SEPs." *Id.* "First, the patented feature must be apportioned from all of the unpatented features reflected in the standard. Second, the patentee's royalty must be premised on the value of the patented feature, not any value added by the standard's adoption of the patented technology." *Id.* As the Federal Circuit noted, "these steps are necessary to ensure that the royalty award is based on the incremental value that the patented *invention* adds to the product, not any value added by the standardization of that technology." *Id.* (emphasis in original).

[72] Apple Inc. v. Motorola, Inc., 757 F.3d 1286, 1332 (Fed. Cir. 2014). The Federal Circuit left open the possibility that an injunction may be warranted if the infringer refuses to pay a FRAND royalty. *See* LEMLEY; SHAPIRO (2013, at 1.144) ("The standard-essential patent owner may seek an injunction against an unwilling licensee.").

[73] "Implicit in such a sweeping promise is, at least arguably, a guarantee that the patent-holder will not take steps to keep would-be users from using the patented material, such as seeking an injunction, but will instead proffer licenses consistent with the commitment made." Microsoft Corp. v. Motorola, Inc., 696 F.3d 872, 884 (9th Cir. 2012). "Motorola, in its declarations to the ITU, promised to 'grant a license to an unrestricted number of applicants on a worldwide, non--discriminatory basis and on reasonable terms and conditions to use the patented material necessary' to practice the ITU standards." *Id.*

[74] eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 394 (2006).

injunctions because their interest is only in a reasonable license fee.[75] While *eBay* did not eliminate the danger of patent holdup, it greatly reduced the scope of patent holdup, at least by non-practicing entities. If a court will not grant an injunction, patent holdup is unlikely so long as reasonable royalties are calculated correctly.

From the perspective of transaction cost economics, *eBay* was a huge step forward. The *eBay* case established a bundle of rights for patent owners that promotes innovation by balancing the twin goals of (1) rewarding invention by patent holders through suitable patent remedies, and (2) encouraging subsequent innovation and commercialization by reducing patent holdup. The Supreme Court's ruling in *eBay*, coupled with the appellate court's rulings on damages, have substantially reduced the danger of SEP holdup in conventional patent infringement actions by aligning the patentee's remedies with the intrinsic value of its invention rather than allowing it to lay claim to the value of standardization itself.[76] Unfortunately, however, these limitations on injunctions for SEPs do not apply to exclusion orders granted by the International Trade Commission (ITC). The ITC has the authority to sharply limit exclusion orders for SEPs if they are not in the public interest, but so far the ITC has not done so, despite urgings from the Department of Justice and the USPTO during the Obama Administration. In one highly visible case, the U.S. Trade Representative vetoed an ITC exclusion order for an SEP.[77]

[75] *See* Seaman (1953) ("District courts appear to have adopted a de facto rule against injunctive relief for [patent assertion entities] and other patent owners who do not directly compete in a product market against an infringer. [...]"); Gupta; Kesan (2015) "District courts [have] consistently denied permanent injunctions [...] in instances when the patent holder and the infringer are not direct competitors in a product market.".

[76] The remaining prospect for holdup in these cases stems primarily from the possibility that the patent infringement damages awarded by the court will exceed the level of reasonable royalties. How often this happens, and why, is beyond the scope of this paper.

[77] *See* Froman, 2013, at 2; *cf.* Certain Electronic Devices, Including Wireless Communication Devices, Portable Music and Data Processing Devices, and

E. THE PATENT HOLDOUT CHIMERA

Patent advocates have sought to deflect concerns about patent holdup not only by denying its existence but by concocting a supposedly parallel story of "patent holdout." On this theory, patent owners are being deprived of the fruits of their R&D investments by implementers who copy their technology but refuse to pay. The idea is to tell a story that parallels patent holdup.[78]

Patent holdout is incoherent as a theoretical matter and rejected as an empirical matter. Empirically, between 95% and 99% of patent defendants in the IT industry are not in fact copying anything (COTROPIA; LEMLEY, 2009, at 1.445-1.446). They are independent inventors.[79] Indeed, as we have seen, it is quite often impossible to know whether someone else invented the same thing you did at around the same time until years after the fact. Coupled with the notorious vagueness of IT patents (*See* BESSEN; MEURER, at 54)[80] and the sheer number of them, patent holdout does not explain what goes on in the technology industry unless it means failing to predict which of 500,000 patents, many of which you cannot see, will someday be asserted against technology you have developed yourself even though you have never heard of the inventor and they never built anything. That is not to say that there are never cases of deliberate copying, but they are a tiny fraction of patent suits in the IT industry.

Tablet Computers, Inv. Nº. 337-TA-794, USITC (June 4, 2013) (Final) (setting forth the original, vetoed exclusion order). For a discussion of ITC remedies involving SEPs, see Colleen; Lemley (2012, at 41-43).

[78] *See, e.g.*, Froeb; Shor (2015, at 2) ("Just as implementers invest before knowing what end-product demand will be, so too must innovators invest before knowing whether an innovation will be implemented."). The authors consult on these issues for Ericsson, the owner of many SEPs.

[79] For a discussion of the prevalence of independent invention, see Lemley (2012, at 712-735); *see also* Shapiro (2006, at 92).

[80] ("Patent law often fails to provide good notice to innovators about the patent rights relevant to adoption of a new technology.").

The problems with patent holdout run far deeper than that, however. According to the patent holdout theory, the patent holder is unfairly disadvantaged because it has incurred the sunk costs of developing its invention before it can negotiate with an alleged infringer. But this is precisely how innovation in the private sector is intended to work in the presence of a patent system. The reward to an inventor is based on the *incremental value of its invention*, not on the amount of money expended to achieve that invention or the risk involved.[81] A major invention can earn enormous profits even if it did not involve large R&D expenditures, and a patented invention may have no commercial value, even if it was very expensive to develop.

Those who express concerns about patent holdout seem to want to increase the returns to patent holders whose inventions add little or no incremental value. That's simply not how the patent system works or is intended to work. Indeed, doing so would create perverse incentives for companies to seek patents with holdup power rather than to fund R&D programs leading to technological advances.

The patent holdout theory boils down to a complaint that basing patent damages on reasonable royalties is not favorable enough to patent holders; that they should be entitled to capture *all* the social value that traces in some way to their technology (*See* ELHAUGE, 2008, p. 541-545). But no property gives its owner the right to all related social surplus, and no market works that way. On top of all that, the patent holdout view seems rooted in the stilted view that all innovation comes in the form of patents. That proposition is disproven by a large literature and impressive body of evidence showing that a great deal of the creation, adoption, and diffusion of new technologies does not take place in the form of patents.[82]

[81] Different systems are used in some circumstances. For example, the government can offer a prize for the first party to achieve a certain goal, or the government can directly fund private research or development efforts.

[82] *See, e.g.*, Levin; Klevorick; Nelson; Winter (1987, at 784, 793-796) (noting that

Those pushing the theory of patent holdout as parallel to patent holdup also misunderstand the actual operation of the patent system. Patent holdup, like any kind of holdup, occurs because the party engaging in patent holdup, namely the patent owner, has the law on its side and can therefore shut down the defendant's conduct unless the defendant pays a surcharge. But there is no similar legal right of the party supposedly engaging in patent holdout to infringe a patent. To the contrary, the law gives patent owners the right to sue for an injunction (if they are practicing entities) and, in any event, for damages adequate to compensate for the infringement.[83] While courts may have difficulty calculating those damages, they tend to err on the side of paying patent owners too much, not too little.[84] Plus, a defendant deliberately infringing a patent must also pay punitive damages for willful infringement,[85] and often attorneys' fees as well.[86] Some companies may try to "hold out" by infringing a patent and refusing to pay reasonable royalties, but the law can and does call them to account for it. Patent holdout might be a worry if we did not have a patent system, but that system by design prevents patent

certain industries primarily rely on non-patent means of appropriating returns); Cohen; Nelson & Walsh (2000), (finding that firms leverage their inventions via "secrecy, lead time advantages, and the use of complementary marketing and manufacturing capabilities"). *See generally* Hall; Rosenberg, 2010a; and Hall; Rosenberg, 2010b.

[83] 35 U.S.C. §§ 283, 284 (2018) (empowering courts to "grant injunctions in accordance with the principles of equity" and to award "damages adequate to compensate for [...] infringement").

[84] *See* Lemley (2009, at 656) ("Courts have [...] artificially raised] the reasonable royalty rate [...] in an effort to compensate patent owners."); Love (2010, at 265) ("Courts' application of the entire market rule routinely overcompensates patentees.").

[85] *See* Halo Elecs. v. Pulse Elecs., 136 S. Ct. 1923, 1932-34 (2016) ("[Punitive damages] should generally be reserved for egregious cases typified by willful misconduct.").

[86] *See* Octane Fitness v. Icon Health & Fitness, 572 U.S. 545, 552 (2014) (explaining that attorneys' fees are awarded in "exceptional" cases). As both Contreras and Cotter et. al. note, holdout essentially resolves to "willful patent infringement" the law already punishes. Contreras *infra* note 104, at 895; Cotter et al. *supra* note 58, at 1.551.

holdout.[87]

It is true that a *group* of companies might conspire together to drive down the price of inputs, just as they might form a cartel to raise their own prices. These "buyers' cartels" are a legitimate worry of antitrust law (HOVENKAMP et al, 2019).[88] But a single company developing a product it made and defending itself in a later patent suit is not a buyers' cartel. Nor is a group of companies that responds to the danger of patent holdup, not by refusing to pay or by setting an artificially low price, but by agreeing *with the patent owners themselves* to pay the price patent law would rightfully charge them anyway – a FRAND royalty.

F. SUMMARY

So far, we have established the following propositions:

- the theory of holdup predicts that the danger of holdup will be greatest for transactions involving large, specific investments, and that market participants will structure their affairs to minimize the costs associated with holdup, including mitigation costs;
- the general theory of holdup has extensive empirical support in the academic literature. This empirical support comes primarily from observing situations in which market participants structure their relationships to mitigate the inefficiencies resulting from holdup;
- looking for the presence or absence of actual holdups in specific settings is not an effective way to test the theory of

[87] True, patent litigation is expensive, and that makes litigation less attractive, particularly if the stakes are small. But that's true for both plaintiffs and defendants.

[88] For an example of such a cartel, see Jones Knitting Corp. v. Morgan, 361 F.2d 451, 452, 459 (3d Cir. 1966).

holdup. There may be little or no actual holdup in a given situation because market participants have effectively adopted strategies to mitigate or eliminate holdup. Furthermore, researchers usually lack the data necessary to quantify actual holdup, even when it occurs;

- the conditions under which holdup is a danger apply with unusual force to patent holdup. The primary mechanisms market participants normally employ to mitigate holdup do not work well to mitigate patent holdup, especially in the information technology and telecommunications sector;
- holdup based on SEPs is an especially grave danger, due to the large number of declared SEPs and the magnitude of the investments that are specific to making products that comply with popular industry standards. Industry participants, well aware of this danger, generally require SEP owners to make FRAND commitments to mitigate the risk of SEP holdup. Injunctions are generally inconsistent with those commitments.[89] The Supreme Court's *eBay* decision, by limiting the availability of permanent injunctions, reduced the danger of patent holdup;
- so-called patent holdout – by which people usually mean "patent infringement" – is adequately addressed by patent law and is in no way comparable to patent holdup.

All of this implies and confirms that FRAND commitments play a major role in limiting SEP holdup. Efforts to make those commitments more effective should be welcomed so long as SEP

[89] *See* Burk (2018, at 333, 338-339) (voicing concerns about a "bait-and-switch on the part of the patent holder who promised non-exclusive fair and reasonable terms but later demands injunctive exclusivity"); Carrier, 2019, at 274) (praising courts for recognizing that injunctions involving SEPs should be issued with care).

owners are able to receive the reasonable royalties to which they are entitled.

III. THE ROLE OF ANTITRUST IN POLICING HOLDUP

A. STANDARD-SETTING ORGANIZATIONS HAVE LONG BEEN RECOGNIZED AS PROCOMPETITIVE

Standard-setting organizations naturally raise antitrust issues, as they involve agreements among competitors affecting the manner in which they compete. Efforts by incumbent firms to use safety and performance standards to exclude new technologies were struck down by the Supreme Court in the 1980s as violations of Section 1 of the Sherman Act, and properly so.[90]

Antitrust attention has shifted to compatibility standards during the past twenty years as the importance of standard-setting in the high-tech sector has grown. The antitrust and scholarly consensus recognizes two important ways in which compatibility standards promote competition and benefit consumers (*See* LEMLEY, 1996, at 1.081).[91] First, compatibility standards can give consumers the low prices, enhanced variety, and improved quality that result from competition, together with the large positive network effects associated with assured compatibility. A phone that can communicate with other phones is much more valuable than one that can't, and a device that can access the Internet anywhere is much more valuable than one tethered to a particular company's version of WiFi. As a consequence, SSO activities in furtherance of these goals should

[90] *See* Allied Tube & Conduit Corp. v. Indian Head, Inc. 486 U.S. 492, 495-97, 501 (1988) (refusing to provide *Noerr-Pennington* immunity to firm that manipulated voting in SSO to shut out new manufacturer); Am. Soc'y of Mech. Eng'rs, Inc. v. Hydrolevel Corp., 456 U.S. 556, 559-64 (1982) (holding SSO liable after it set forth a standards interpretation designed to shut out new manufacturer).

[91] (discussing the benefits of compatibility standards).

be evaluated using the rule of reason, not subject to *per se* liability under Section 1 of the Sherman Act.

Second, SSOs can promote the adoption of new technology by limiting patent holdup. As a consequence, SSO efforts to establish effective rules requiring SEP owners to license their SEPs on FRAND terms to all parties seeking to make or sell compliant devices promote innovation and are pro-competitive. Indeed, it is breaches of these rules that can harm competition and consumers (LEMLEY, 2007, at 156-158, 161).[92] This consensus reflects economic research relating to standard-setting, network effects, and innovation. The implication is not that compatibility SSOs are never problematic, but rather that setting standards and enforcing reasonable patent policies related to those standards promotes rather than impedes competition.[93]

This consensus can be seen in numerous policy statements and enforcement actions by the FTC and the DOJ over the years.[94] As one example, in 2006, the Antitrust Modernization Commission(AMC)

[92] To serve this function, the "reasonable" in FRAND must refer to the reasonable royalties before the standard is established. (*Id.* 2007, at 158. As discussed above, patent law moved decisively in this direction over the same time period.

[93] Indeed, Melamed and Shapiro (2018, at 2.110) have argued that joint standard setting *without* such policies may itself be anticompetitive.

[94] *See, e.g.,* United States; Federal (2007, at 194) ("A definition of RAND based on the ex ante value of the patented technology at the time the standard is set is necessary for consumers to benefit from competition among technologies to be incorporated into the standard. [...]");United States; Federal (2007, at. 37) ("In light of these potential procompetitive benefits, the [DOJ and FTC] would generally expect to apply the rule of reason to evaluate conduct such as multilateral *ex ante* licensing negotiations or SSO requirements to disclose model licensing terms."); Deborah Platt Majoras, Chairman, Federal Trade Commission, Recognizing the Procompetitive Potential of Royalty Discussions in Standard Setting, Prepared Remarks at Standardization and the Law: Developing the Golden Mean for Global Trade at Stanford University 7 (Sept. 23, 2005). Available in: <https://www.ftc.gov/sites/default/files/documents/public_statements/recognizing-procompetitive-potential-royalty-discussions-standard-setting/050923stanford.pdf>. ("Joint ex ante royalty discussions that are reasonably necessary to avoid hold up do not warrant per se condemnation. Rather, they merit the balancing undertaken in a rule of reason review.").

made the following recommendation: "Joint negotiations with intellectual property owners by members of a standard-setting organization with respect to royalties prior to the establishment of the standard, without more, should be evaluated under the rule of reason." (ANTITRUST, 2007). Antitrust and patent agencies have followed this principle for many years (*See* JAMES, 2002, p. 8; KLEIN, 1997, p. 11; KLEIN, 1998, p. 13; and LEMLEY, 2007, at 156-158, 161). Notably, then-Commissioner Makan Delrahim, who now leads the Antitrust Division, dissented from the statement allowing ex ante royalty negotiations with the DVD standard (ANTITRUST, 2007, at 407-409).[95]

B. THE TRUMP ADMINISTRATION REVERSES COURSE

Under Assistant Attorney General Delrahim, the Antitrust Division has reversed course, dramatically changing its approach to SEPs and FRAND commitments. Some policy changes announced by the Antitrust Division weaken antitrust enforcement and thus make it easier for SEP holders to engage in patent holdup. Others threaten to use antitrust offensively to discourage market participants from protecting themselves from patent holdup. The FTC has *not* changed its policies, so there is now a yawning gap between the DOJ and the FTC on these issues.[96]

[95] Separate statement of Commissioner Delrahim. He also criticized the DOJ Business Review Letter to VITA because the Antitrust Division did not object to the VITA policy requiring SEP holders to disclose the maximum royalty rates they would charge for their SEPs. *Id.* (ANTITRUST, 2007, at 409).

[96] *See* Brief for the United States of America as Amicus Curiae Supporting Appellant and Vacatur, Fed. Trade Comm'n v. Qualcomm Inc., 935 F.3d 752 (2019) (Nº 19-16122), 2019 WL 3977818 (opposing the FTC's enforcement action against Qualcomm); Joseph Simons, Chairman, Fed. Trade Comm'n, Prepared Remarks at the Georgetown Law Global Antitrust Enforcement Symposium 6 (Sept. 25, 2018). Available in: <https://www.ftc.gov/system/files/documents/public_statements/1413340/simons_georgetown_lunch_address_9-25-18.pdf> (acknowledging this gap and noting that "the FTC will continue our economically grounded and fact-based enforcement of the antitrust laws in [the standard-setting process]").

The policy changes at the DOJ have been announced and communicated in a series of speeches given by Assistant Attorney General Delrahim starting in November 2017, shortly after he took office. His first speech addressing this topic is illustrative (DELRAHIM, 2017). That speech begins with his assertion that "The Hold-Out Problem Poses a More Serious Threat to Innovation than the Hold-Up Problem" (DELRAHIM, 2017, p. 3) a claim we debunked above. He goes on to state flatly that "Antitrust Law Should Not Police FRAND Commitments to SSOs." (DELRAHIM, 2017, p. 7). In fact, however, the Division's current policy contemplates antitrust intervention in standard-setting – but, shockingly, on the side of those who seek to *avoid* their FRAND commitments and engage in holdup.

Based on a deeply misguided view of how technology competition works and the way in which the patent system functions, the Antitrust Division has put forward antitrust policies designed to favor SEP holders at the expense of other market participants, innovation, and, ultimately, consumers. The Division also has taken a number of actions to implement these policy changes.

- The Antitrust Division sent a letter to the American National Standards Institute (ANSI) in March 2018 stating that "the Antitrust Division will [...] [therefore] be skeptical of rules that SSOs impose that appear designed specifically to shift bargaining leverage from IP creators to implementers, or vice versa." (UNITED STATES, 2018, at 1, quoting DELRAHIM, 2017). This direct attack on SSO rules requiring FRAND commitments is explicitly based on the flawed patent holdout theory;
- in December 2018, the DOJ withdrew from the joint DOJ/PTO policy position regarding SEPs and FRAND commitments (DELRAHIM, 2018a), based in part on the following peculiar assertion by Delrahim: "A FRAND commitment

does not and should not create a compulsory license scheme." (DELRAHIM, 2018a, p. 6). In December 2019, it persuaded the PTO to do the same;[97]

- in September 2020, the DOJ reversed its prior position approving the IEEE's patent policies that establish standards for setting a FRAND royalty. The new letter suggests that an SSO may violate the antitrust laws if it establishes clear rules for determining what a FRAND royalty is, or even if it requires a party to actually commit to a FRAND license at all and give up injunctive relief (*See* DELRAHIM, 2020);
- perhaps most notably, the DOJ has filed briefs attacking its sister antitrust agency, the Federal Trade Commission, for enforcing the antitrust laws against Qualcomm.[98]

Together, these actions reflect a remarkable policy shift at the Antitrust Division, not only abandoning enforcement of the antitrust laws against SEP owners but also imposing antitrust risk on SSOs that enforce FRAND commitments or other policies designed to limit SEP holdup.

There are two prongs to this attack. First, the Antitrust Division now takes the position that antitrust should not be used to control the monopoly power associated with SEPs by limiting patent holdup. According to Delrahim, "first, hold-up is fundamentally not an *antitrust* problem, and therefore antitrust law should not be used as a tool to police FRAND commitments that patent-holders make to standard setting organizations." (DELRAHIM, 2018b). According

[97] *See* U.S. Dep't of Justice, U.S. Patent & Trademark Office & Nat'l Inst. of Standards & Tech., Policy Statement on Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments 3-4 (2019).

[98] Brief for the United States of America as Amicus Curiae Supporting Appellant and Vacatur, FTC v. Qualcomm Inc., 935 F.3d 752 (2019) (Nº 19-16122), 2019 WL 3977818.

to the Antitrust Division, even a SEP holder that gains a monopoly through deception at the SSO and subsequently exerts its monopoly power by breaching its FRAND commitment has not violated the Sherman Act.[99]

Second, the Antitrust Division now takes the position that antitrust should stop SSOs from trying to prevent SEP holdup. According to Delrahim, "standard setting organizations should not become vehicles for concerted actions by market participants to skew conditions for patented technologies' incorporation into a standard in favor of implementers because this can reduce incentives to innovate and encourage patent hold-out." (DELRAHIM, 2018b, at 5). He further states that "because a key feature of patent rights is the right to exclude, standard setting organizations and courts should have a very high burden before they adopt rules that severely restrict that right or – even worse – amount to a de facto compulsory licensing scheme." (DELRAHIM, 2018b, at 5). He appears to include a FRAND commitment in the list of things that face a "very high burden." (DELRAHIM, 2018b, at 5).

These policies are a sharp reversal from the positions long taken by the DOJ and the FTC, as well as the European Commission.[100]

[99] Statement of Interest of the United States at 1-2, 7, 11-20, Cont'l Auto. Sys., Inc. v. Avanci LLC, Nº 3:19-CV-02933-M (N.D. Tex. May 10, 2019). Available in: <https://www.justice.gov/atr/case-document/file/1253361/download>. This amicus brief explicitly rejects the approach taken in Broadcom v. Qualcomm, 501 F. 3d 297 (3d Cir. 2007), under which obtaining a SEP monopoly by deception can violate the Sherman Act. Id. at 8. This brief is part of a series of cases in which the Antitrust Division has intervened, not to enforce the antitrust laws, but to oppose enforcement where SEPs are concerned. For other examples, see Brief for the United States of America as Amicus Curiae in Support of Neither Party, HTC Corp. v. Telefonaktiebolaget LM Ericsson, Nº 19-40566 (5th Cir. Oct. 20, 2019), https://www.justice.gov/atr/case-document/file/1214541/download; Statement of Interest of the United States, Lenovo Inc. v. IPCOM GMBH & Co., Nº 5:19-cv-01389-EJD (N.D. Cal. Oct. 25, 2019), Available in: <https://www.justice.gov/atr/case-document/file/1213856/>.

[100] *See* Case C-170/13, Huawei Techs. Co. vs. ZTE Corp., EU:C:2015:477 at 10-11 (July 16, 2015) (requiring SEP owners to offer FRAND licenses to alleged infringers willing to license); Eur. Comm'n, Setting Out the EU Approach to

Sadly, they rest heavily on the deeply flawed concept of patent holdout and on the specious arguments dismissing patent holdup discussed above. By embracing the patent holdout narrative and downplaying the dangers of patent holdup, the Antitrust Division's new policies risk undoing the progress courts and SSOs have made in bringing SEP holdup under control.

C. A LIMITED ROLE FOR ANTITRUST IN PROMOTING, NOT IMPEDING, COMPETITION

We favor an important but limited role for antitrust to control patent holdup. One of the authors has previously expressed skepticism of broad antitrust enforcement against patent holdup.[101] But the critical point Lemley made there is that, for the most part, we do not need antitrust if patent and contract law effectively enforce the private solutions SSOs have developed to the holdup problem (*See* LEMLEY, 2007, at 161). In his more temperate moments, Delrahim adds an important caveat that, if taken seriously, might align him more with us: "Antitrust law should play no role in policing unilateral FRAND commitments *where contract or common law remedies would be adequate*." (DELRAHIM, 2018b, at 9, emphasis added). Unfortunately, he seemed to drop that caveat in the joint December 2019 statement with the PTO abandoning long-standing policy on FRAND commitments. There, the Division and the PTO took the position that patentees should be entitled to a full range of patent remedies, explicitly including injunctions, *even if they had*

Standard Essential Patents, at 6-7, COM (2017) 712 final (Nov. 29, 2017), Available in: <https://ec.europa.eu/docsroom/documents/26583> (encouraging "FRAND licensing terms for SEPs" and setting forth comprehensive guidance for such terms).

[101] *See* Lemley (2007, at 161) (arguing that antitrust law should "permit SSO members the latitude to discuss royalty rates collectively before the standard is set" and "even allow SSOs to impose a step-down royalty scheme").

committed to license the patents on FRAND terms.[102] As Herbert Hovenkamp (2020a) has noted, the Justice Department's position contradicts established law on injunctive relief and FRAND.

Even the more limited version of the statement is problematic. If courts effectively enforce FRAND commitments, most of the holdup problem can be solved without resort to antitrust. But antitrust still has an important role to play when contract law and anti-fraud laws fail to fully address the patent holdup problem.[103]

The FTC's case against Qualcomm provides a good example of why antitrust is needed. In that case, the District Court found that Qualcomm had breached its FRAND commitment and used its monopoly power over modem chips to pressure its customers (Original Equipment Manufacturers, or "OEMs") to pay a royalty surcharge for Qualcomm's SEPs, on top of the reasonable royalty rates that Qualcomm would otherwise have been able to obtain. Qualcomm imposed this surcharge when Qualcomm's customers purchased modem chips from Qualcomm's rivals. The District Court correctly found that Qualcomm's royalty surcharge acted like a tax when Qualcomm's customers purchased modem chips from Qualcomm's rivals.[104] Based on this reasoning, the District Court correctly found that Qualcomm's "no-license/no-chips" policy harmed competition by raising rivals' costs and thereby excluding them, and that this same conduct also harmed Qualcomm's customers.[105]

[102] U.S. Dep't of Justice, U.S. Patent & Trademark Office & Nat'l Inst. of Standards & Tech., *supra* note 96, at 4.

[103] *See* Hovenkamp, H., 2020, at 1-2. (Considering circumstances when antitrust enforcement is necessary and denouncing the position that contract makes antitrust enforcement entirely unnecessary as "extreme").

[104] Shapiro's trial testimony on behalf of the FTC emphasized this point and cited an economics textbook as further proof of this basic economics concept.

[105] For a detailed discussion of Qualcomm's efforts, see FTC v. Qualcomm Inc., 411 F. Supp. 3d 658, 672-74 (N.D. Cal. 2019).

The Ninth Circuit reversed, making basic errors of both economics and law.[106] On the economics, the Ninth Circuit mistakenly concluded that "Qualcomm's royalties are 'chip-supplier neutral' because Qualcomm collects them from all OEMS that license its patents, not just 'rival's customers.'."[107] This is flatly incorrect, because the royalty surcharge reduces the gains from trade between an OEM and a rival modem-chip supplier but does *not* reduce the gains from trade between the OEM and Qualcomm.[108] Based on this error, the Ninth Circuit states incorrectly: "The FTC identifies no such harm to competition." (at 37; see also at 49).

On the law, the Ninth Circuit rejects the well-established principle that harming customers can be a way of harming competition: "the primary harms the district court identified here were to the OEMs who agree to pay Qualcomm's royalty rates – that is, Qualcomm's customers, not its competitors. These harms were thus located outside the 'areas of effective competition' – the markets for CDMA and premium LTE modem chips." (at 41). The notion that harms to customers in the relevant market are outside the scope of the antitrust laws is simply bizarre.

In any event, as noted above, the District Court also found harm to Qualcomm's rivals in both of the relevant markets it identified. The Ninth Circuit further erred by stating that "the district court's 'anticompetitive surcharge' theory fails to state a cogent theory of anticompetitive harm." (at 41). The Ninth Circuit The Ninth Circuit's logic at this point *assumes* that Qualcomm's royalties reflect the value of its SEPs, but that is directly contrary to the District Court's finding that Qualcomm used its monopoly over

[106] Ninth Circuit Decision in *FTC v. Qualcomm*, August 11, 2020.

[107] *Id*. at 36.

[108] The Ninth Circuit also states: "Furthermore, competing chip suppliers are permitted to practice Qualcomm's SEPs freely without paying any royalties at all." The real economic question is what fee Qualcomm extracts when an OEM purchases a modem chip from a Qualcomm rival, not whether the OEM or the rival pays that fee. This too is a basic principle of taxation covered in textbooks.

modem chips to obtain a royalty surcharge, above and beyond the royalties Qualcomm could obtain based on its SEPs (at 46).[109] One cannot dismiss findings regarding the effects of a royalty surcharge by assuming away that very surcharge. As of this writing, the FTC has requested rehearing *en banc*. Hopefully the Ninth Circuit (or the Supreme Court) will correct these blatant errors.

Qualcomm's use of its separate monopoly power over modem chips to evade its FRAND commitment couldn't be remedied in contract, making antitrust enforcement a necessity for reasons beyond simply enforcing the FRAND deal.[110] In the standard-setting context, if a SEP owner breaches its FRAND commitment and is thereby able to charge unreasonably high royalties to device manufacturers, those royalties are likely to be passed through in large part to final consumers. Antitrust enforcement can protect consumers from these overcharges.[111]

[109] The panel is attempting here to distinguish this case from Caldera Inc. v. Microsoft Corp. 87 F. Supp. 2nd 1244 (D. Utah, 1999) where Microsoft was found to have violated the antitrust laws by requiring OEMs to pay a royalty on every machine, whether or not it contained Microsoft's operating system.

[110] For a discussion of the importance of the FRAND commitment to the FTC's case against Qualcomm, see Hovenkamp & Simcoe (2020) (manuscript at 6-12).

[111] *See* Farrell; Hayes; Shapiro; Sullivan (2007, at 608-609): "Downstream consumers are harmed when excessive royalties are passed on to them [...] This is [...] an antitrust problem."). Werden and Froeb argue that antitrust can do nothing about misrepresentations and failure to abide by FRAND commitments because those don't attack the process of competition itself. Werden & Froeb (2019, at 1, 2, 21, 26) But they confuse complaints about holdup in the abstract with challenges to misrepresentations and other behavior by a monopolist designed to avoid a commitment to permitting competition. *See* Contreras (2019, at 875) ("Patent hold-up is a form of market behavior, not a legal cause of action. [...] 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."). Anticompetitive conduct by companies like Qualcomm designed to avoid or evade a FRAND commitment can violate the antitrust laws, just as fraud and other conduct – even conduct not itself illegal – can be the anticompetitive conduct necessary for any other sort of monopolization claim. *See, e.g.,* Broadcom Corp. v. Qualcomm Inc., 501 F.3d 297 (3d Cir. 2007); FTC v. Qualcomm Inc., 411 F. Supp. 3d 658 (N.D. Cal. 2019).

But to the extent that antitrust can step back in some settings, that is only possible because the market participants have recognized and responded effectively to the patent holdup problem by requiring reasonable licensing terms, and because the courts have enforced that requirement in contract or patent law. The second prong of the Antitrust Division's attack on FRAND commitments therefore undermines whatever merit there might be to the first prong. While on the one hand Delrahim says that we don't need antitrust because contract and equity will solve the patent holdup problem, on the other hand he is advocating policies that make it harder for contract and patent law to solve that very problem. Threatening SSOs with liability – maybe even *per se* liability – for trying to stop SEP holdup undermines the very contractual solution on which Delrahim purports to rely. So too do Delrahim's periodic claims that holdup is a good thing, or at least something we should accept,[112] his incorrect claim that patent holdout is a bigger problem than patent holdup,[113] and his advocacy for undoing or avoiding *eBay* and giving a patent owner the right to an automatic injunction.[114] Indeed, under Delrahim, the Antitrust Division evidently objects even to voluntary commitments by patent owners not to seek an injunction as part of the standard--setting process (IEEE Letter, 2020). Ironically, this assault on SSOs and FRAND policies may actually necessitate *more* antitrust intervention in standard-setting. If the DOJ encourages companies like Qualcomm to ignore their FRAND commitments, and if the DOJ discourages SSOs from trying to solve the SEP holdup problem, or

[112] Delrahim (2018b, at 8) ("Stating that a patent holder can derive higher licensing fees through hold-up simply reflects basic commercial reality.").

[113] *See* Delrahim (2018b, at 10) ("Implementer hold-out poses a more serious threat to innovation than innovator hold-up.").

[114] *See* U.S. Dept. of Just., *supra* note 96, at 12-14 (arguing that the injunction rights of patent holders should be "protected, not persecuted"); *cf.* U.S. Dep't of Justice, U.S. Patent & Trademark Office & Nat'l Inst. of Standards and Tech., *supra* note 96, at 5 ("The remedies that may apply in a given patent case include injunctive relief [...]"); Delrahim, *supra* note 81, at 6 n.14 (seeming to acknowledge the wisdom of *eBay* but in the same breath giving the ITC free rein to ignore it and impose automatic injunctions).

impedes their efforts to do so, antitrust may ultimately have to step in to protect a functioning market from SEP holdup.

CONCLUSIONS AND RECOMMENDATIONS

The theory of holdup is well-supported by a substantial body of empirical evidence. For valid conceptual and practical reasons, this empirical literature has not involved showing that large-scale actual holdups are common. Rather, the evidence generally comes in the form of efforts by private parties to contract around holdup. The same types of evidence and the same standards regarding empirical work should be applied when testing the theory of patent holdup.

When such standards are applied, it is clear that the problem of patent holdup is substantial. Indeed, patent holdup, and especially SEP holdup, are very difficult strains of holdup to manage. Furthermore, the problem of patent holdup is quite common, since it arises whenever the efficient development of new products and services involves substantial investments that may turn out to be specific to another party's patent portfolio. Not surprisingly, therefore, virtually all players in the high-tech industries affected by holdup participate in voluntary organizations where they agree to limit everyone's rights (including their own) in an effort to pre-commit to avoid holdup.

Both the theory and the empirical work relating to patent holdup indicate that market participants have strong incentives to devise institutions to limit patent holdup. Considerable progress was made between 2006 and 2016 in controlling patent holdup in the United States, primarily through the courts, but also through competition policy enforcement. Unfortunately, some of that progress is now at risk due to a drastic shift in policy at the Antitrust Division of the Department of Justice. That shift is based on faulty economics, relies on flawed arguments, and is contrary to both patent law and the empirical evidence.

Rather than go backward, more forward progress is needed to manage and control patent holdup in general and SEP holdup in particular.

- The costs caused by the problem of SEP holdup can be reduced if more SSOs follow the lead of the IEEE by clarifying and strengthening their patent policies. The SEP policies of many SSOs are certainly valuable, but efforts by Qualcomm and others to ignore or game their FRAND commitments show the necessity of SSOs being more explicit about just what their FRAND commitments entail;
- the costs of SEP holdup can be reduced if the ITC joins the policy mainstream by recognizing that exclusion orders based on FRAND-encumbered SEPs are normally not in the public interest, provided the SEP owner has another available legal venue through which it can secure reasonable royalties. The White House reined in the ITC in 2013 when it sought to grant exclusion orders despite the patentee's commitment to license the patents. The ITC should affirmatively apply that policy;
- most importantly, the courts should enforce reasonable SSO policies that target SEP holdup. Courts have been doing this as a matter of contract law, but patent owners seeking to engage in holdup have strong incentives to ignore or find ways to undermine, avoid, or evade their FRAND obligations. When they do so, antitrust must be willing to step in to protect competition and consumers by stopping patent holdup.

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