

Comments of the International Center for Law & Economics

Response to EU Commission call for evidence concerning a new framework for standard-essential patents

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Introduction

We thank the European Commission for this opportunity to comment on its call for evidence concerning a new framework for standard-essential patents. The International Center for Law and Economics (ICLE) is a nonprofit, nonpartisan research center whose work promotes the use of law & economics methodologies to inform public-policy debates. We believe that intellectually rigorous, data-driven analysis will lead to efficient policy solutions that promote consumer welfare and global economic growth. ICLE's scholars have written extensively on competition, intellectual property, and consumer-protection policy.

In this comment, we express concerns about the commission's plan to update the legal framework that underpins standard-essential patent licensing in Europe.

For obvious reasons, the way intellectual property disputes are resolved has tremendous ramifications for firms that operate in standard-reliant industries. Not only do many of the firms in this space derive a large share of their revenue from patents but, perhaps more importantly, the prospect of litigation dictates how firms structure the transfer of intellectual property assets. In simple terms, ineffectual judicial remedies for IP infringements and uncertainty concerning the resolution of IP disputes discourage firms from concluding license agreements in the first place.

The key role that IP plays in these industries should impel policymakers to proceed with caution. By virtually all available metrics, the current system works. The development of innovative technologies through standards development organizations (SDOs) has led to the emergence of some of the most groundbreaking technologies that consumers use today;¹ and recent empirical evidence suggests that many of the alleged ills that have been associated with the overenforcement of intellectual property rights simply fail to materialize in industries that rely on standard-essential patents.²

¹ See, e.g., Dirk Auer & Julian Morris, *Governing the Patent Commons*, 38 CARDOZO ARTS & ENT. L.J. 294 (2020).

² See, e.g., Alexander Galetovic, Stephen Haber & Ross Levine, *An Empirical Examination of Patent Holdup*, 11 J. COMPETITION L. & ECON. 549 (2015). This is in keeping with general observations about the dynamic nature of intellectual property protections. See, e.g., RONALD A. CASS & KEITH N. HYLTON, *LAW OF CREATION: PROPERTY RIGHTS IN THE WORLD OF IDEAS* 42-44 (2013).

At the same time, “there is no empirical evidence of structural and systematic problems of holdup and royalty stacking affecting standard-essential patent (“SEP”) licensing.”³ Indeed, “[t]he notion that implementers in such innovation-driven industries are being suffocated by an insurmountable patent royalty stack has turned out to be nothing more than horror fiction.”⁴ Yet, without a sound basis, the anti-injunctions approach increasingly espoused by policymakers unnecessarily “adds a layer of additional legal complexity and alters bargaining processes, unduly favoring implementers.”⁵

Licensing negotiations involving complex technologies are legally intricate. It is simply not helpful for a regulatory body to impose a particular vision of licensing negotiations if the goal is more innovation and greater ultimate returns to consumers. Instead, where possible, policy should prefer allowing parties to negotiate at arm’s length and to resolve disputes through courts. In addition to maintaining the sometimes-necessary remedy of injunctive relief against bad-faith implementers, this approach allows courts to explore when injunctive relief is appropriate on a case-by-case basis. Thus, over the course of examining actual cases, courts can refine the standards that determine when an injunctive remedy is inappropriate. Indeed, the very exercise of designing *ex ante* rules and guidelines to inform F/RAND licensing is antagonistic to optimal policymaking, as judges are far better situated and equipped to make the necessary marginal adjustments to the system.

Against this backdrop, our comments highlight several factors that should counsel the commission to preserve the rules that currently govern SEP-licensing agreements:

For a start, the SEP space is far more complex than many recognize. Critics often assume that collaborative standard development creates significant scope for opportunistic behavior—notably patent holdup. However, the tremendous growth of SEP-reliant industries and market participants’ strong preference for this form of technological development suggest these problems are nowhere near as widespread as many believe.

Second, weakening the protections afforded to SEP holders would have second-order effects that are widely ignored in contemporary policy debates. Weaker SEP protection would notably encourage firms to integrate vertically, rather than to specialize. It would reduce startup companies’ access to capital markets by making it harder to collateralize IP. Curbing existing IP protections would also erode the West’s technological leadership over economies that are heavily reliant on manufacturing and whose policymakers routinely undermine the intellectual property rights of foreign firms.

³ Oscar Borgogno & Giuseppe Colangelo, *Disentangling the FRAND Conundrum*, DEEP-IN Research Paper (Dec. 5, 2019) at 5, available at <https://ssrn.com/abstract=3498995>.

⁴ Richard A. Epstein & Kayvan B. Noroozi, *Why Incentives for “Patent Holdout” Threaten to Dismantle FRAND, and Why It Matters*, 32 BERKELEY TECH. L.J. 1381, 1411 (2017).

⁵ Borgogno & Colangelo, *supra* note 3, at 5.

Finally, critics often overlook the important benefits conferred by existing IP protections. This includes the comparative advantage of injunctions over damages awards, as well as firms' ability to decide at what level of the value chain royalties will be calculated.

I. The standard-development process: Aligning incentives to collaborate

It's tempting for lawmakers to look at the complex SEP licensing process as a Gordian Knot to be solved through regulatory fiat. But pursuing Alexander's solution, though expedient, would similarly leave the SEP licensing ecosystem in tatters. Owing to the highly complex nature of technology and the standards-setting process, courts are in a much better position than regulators to adjudicate disputes between innovators and implementers. A key component of this approach is patent holders' ability to enforce their rights with injunctions against infringers.

Consider smartphones: Tens of thousands of patents are essential to making smartphone technology work.⁶ Some critics posit that this makes it extremely difficult to market smartphones effectively, but no evidence supports this claim, and the proliferation of smartphones suggests otherwise.⁷ It is worth considering that cellphone technology marks the culmination of research efforts spanning the entire globe. The coordinated efforts of these numerous firms are not the result of government coercion, but the free play of competitive forces.

Coordination on such a vast scale is no simple task. And yet, of the vast array of options available to them, an increasing number of firms have settled on one particular paradigm to solve these coordination problems: the development of new technologies and open standards within SDOs. These organizations and their members are responsible not only for wireless cellular technologies (e.g., 3G, 4G, 5G) but also for such high-profile technologies as Wi-Fi, USB, and Blu-ray, among many others.⁸

Throughout history, economic actors have sought to reap the benefits of specialization and interoperability. This has led to the emergence of various standardization practices, ranging from *de facto* standards and competition for the market, to complex standard-setting procedures within SDOs.

⁶ See, e.g., JORGE PADILLA, JOHN DAVIES, & ALEKSANDRA BOUTIN, ECONOMIC IMPACT OF TECHNOLOGY STANDARDS: THE PAST AND THE ROAD AHEAD (2017), available at https://www.compasslexecon.com/wp-content/uploads/2018/04/CL_Economic_Impact_of_Technology_Standards_Report_FINAL.pdf (Section 3 has an in-depth discussion of the adoption of standards and the benefits to the growth of mobile technology); IRUNWAY, PATENT & LANDSCAPE ANALYSIS OF 4G-LTE TECHNOLOGY 9-12 (2012), <https://www.i-runway.com/images/pdf/iRunway%20-%20Patent%20&%20Landscape%20Analysis%20of%204G-LTE.pdf>.

⁷ See, e.g., Galetovic, et al., *supra* note 2; Keith Mallinson, *Don't Fix What Isn't Broken: The Extraordinary Record of Innovation and Success in the Cellular Industry under Existing Licensing Practices*, 23 GEO. MASON L. REV. 967 (2016); Damien Geradin, Anne Layne-Farrar, & Jorge Padilla, *The Complements Problem within Standard Setting: Assessing the Evidence on Royalty Stacking*, 14 B.U. J. SCI. & TECH. L.144 (2008).

⁸ Auer & Morris, *supra* note 1, at 5.

Ultimately, because interoperability standards rely on firms being able to coordinate their behavior, standardization necessarily implies a degree of incentive compatibility. That is, parties will coordinate their behavior only if they expect that doing so will be mutually beneficial. “This mutuality of considerations has been at the heart of the voluntary FRAND bargain from the outset, given that any risks of holdup or misappropriation of information are bilateral—that is, such risks work in both directions.”⁹ This implies that SDOs must design balanced internal rules that bring both patent holders *and implementers* to the table through mutually agreeable interoperability standards, and guarantee that they will continue to work together into the future as new technologies emerge.¹⁰

Establishment of SDO interoperability standards typically follows a process by which interested parties come together and identify technological problems that they might be able to solve cooperatively.¹¹ SDO members include a wide range of stakeholders, including (among others): companies that manufacture products implementing the technology, companies that market services that use the standards, companies that operate networks that practice the standards, technology firms that create technologies that are included in the standards, academic institutions, and government agencies.¹²

The SDO provides information to interested parties about the standard-setting project and a forum for collaboration.¹³ Members attend standard-setting meetings, vote on standardization decisions, and make technological contributions. Participation in standard setting can be subject to a substantial fee and always entails considerable time. There are policies and procedures (“bylaws”) that govern the process of adoption and standard development. Participation in SDOs is voluntary and is subject to acceptance of the terms and conditions set out in the bylaws. These aim to allow the most appropriate technology to become standardized, based on several factors. This is a democratic and consensus-based process designed to ensure that no single participant can manipulate it. Many SDOs also allow for post-adoption appeals by dissenting members. This ultimately leads to a series of technical specifications upon which implementers can build products.

⁹ Epstein & Noroozi, *supra* note 4, at 1394.

¹⁰ See, e.g., Daniel F. Spulber, *Standard Setting Organisations and Standard Essential Patents: Voting and Markets*, 129 *ECON. J.* 1477, 1502-03 (2018) (“The interaction between inventors and adopters helps explain the variation of decision rules among SSOs, ranging from majority rule to consensus requirements.... Technology standards will be efficient when SSO decision making reflects the countervailing effects of voting power and market power.”).

¹¹ See Kirti Gupta, *How SSOs Work: Unpacking the Mobile Industry’s 3GPP Standards*, in *THE CAMBRIDGE HANDBOOK OF TECHNICAL STANDARDIZATION LAW: COMPETITION, ANTITRUST, AND PATENTS* (Jorge L. Contreras ed., 2017).

¹² See Kristen Jakobsen Osenga, *Ignorance Over Innovation: Why Misunderstanding Standard Setting Organizations Will Hinder Technological Progress*, 56 *U. LOUISVILLE L. REV.* 159, 178 (2018); Andrew Updegrave, *Value Propositions, Roles and Strategies: Participating in a SSO*, in *THE ESSENTIAL GUIDE TO STANDARDS*, <https://www.consortiuminfo.org/guide/> (last visited Jan. 23, 2022).

¹³ Adapted from Auer & Morris, *supra* note 1, at 18-19.

Throughout this process, a critical challenge for SDOs is to ensure that their internal regulations remain “*incentive compatible*.” To optimize their technological output and ensure the success of their standards, SDOs must attract the right mix of both implementers and innovators. “Most succinctly, the ‘right membership’ comprises a significant portion of *each class of stakeholder* whose active support is needed to achieve broad adoption.”¹⁴ They thus need to design internal procedures that strike a balance between the sometimes-diverging interests of these stakeholders.

This is no simple task. Although there are numerous ways in which these rules may favor a particular group of participants, allocating the profits of standardization is perhaps the most salient. To a first approximation, SEP holders will tend to favor internal rules that allow them to charge prices that are close to the monopoly benchmark (though not the double-marginalization one). Conversely, implementers will generally prefer policies that limit SEP holders’ returns (so long as this does not dry up the supply of inventions). However, these first-order incentives may not always hold true in the real world. Practical considerations may, for instance, urge SEP holders to accept a pricing structure that is not “profit maximizing” in the short run, but which may incentivize further cooperation or the adoption of an underlying technology.¹⁵

The above has important consequences for patent and antitrust policy in SEP-reliant industries. As we have explained, collaborative standard development gives rise to complex incentives, as well as a web of heterogeneous and deliberately incomplete contracts (i.e., where the parties choose not to specify some aspects of their agreement).¹⁶ Given this diversity, uniform and centralized policies that needlessly constrain the range of negotiation—such as a federal-enforcement presumption against injunctions—would likely lead to fewer agreements and inefficient outcomes in numerous cases, especially compared to case-by-case adjudication of F/RAND commitments under the common law of

¹⁴ Andrew Updegrave, *Business Considerations: Forming and Managing a SSO*, in THE ESSENTIAL GUIDE TO STANDARDS, <https://www.consortiuminfo.org/guide/forming-managing-a-ss0/business-considerations/> (last visited Jan. 23, 2022).

¹⁵ See, e.g., Jonathan M. Barnett, *The Host’s Dilemma: Strategic Forfeiture in Platform Markets for Informational Goods*, 124 HARV. L. REV. 1861, 1883 (2010) (showing that firms routinely forfeit their intellectual assets in order to boost the growth of the platform they operate).

¹⁶ See Joanna Tsai & Joshua D. Wright, *Standard Setting, Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts*, 80 ANTITRUST L.J. 157, 159 (2015) (“SSOs [standard-setting organizations] and their IPR policies appear to be responsive to changes in perceived patent holdup risks and other factors. We find the SSOs’ responses to these changes are varied, and that contractual incompleteness and ambiguity persist across SSOs and over time, despite many revisions and improvements to IPR policies. **We interpret the evidence as consistent with a competitive contracting process and with the view that contractual incompleteness is an intended and efficient feature of SSO contracts.**”) (emphasis added).

contract.¹⁷ In short, “standards organizations and market participants are better than regulators at balancing the interests of patent holders and implementers.”¹⁸

As we discuss below, it is wrong to presume that bargaining power uniformly resides with inventors (rather than implementers).¹⁹ In short, interfering with the emergent norms of the standard-development industry risks undermining innovators’ expectations of a reasonable return on their investments:

Each of the innovative companies that agrees to be an SSO participant does so with the understanding of the investments they have made in research, development, and participation, as well as the risks that their innovations may not be selected for incorporation in the standard. They bear these investments and risk with the further understanding that they will receive adequate and fair remuneration as part of the FRAND commitment they have made to the SSO.

Unfortunately, the actions of the courts and the proposals by commentators are greatly undermining the value and benefits of SSO participation that are expected....²⁰

II. The second-order effects of collaborative standard setting and their implications for IP policy

Commentators often think of intellectual property as merely protecting original creations and inventions, thus boosting investments. While IP certainly does this (Section II.A), it is important to look beyond this narrow framing. Indeed, by protecting these creations, intellectual property protection—particularly that of patents—produces beneficial *second-order* effects in several important policy areas.

Consequently, weakening patent protection could have detrimental ramifications that are routinely overlooked by policymakers. These include 1) increasing inventors’ incentives to vertically integrate

¹⁷ See, e.g., Daniel F. Spulber, *Licensing Standard Essential Patents with FRAND Commitments: Preparing for 5G Mobile Telecommunications*, 18 CO. TECH. L.J. 79, 147 (2020) (“Adjudication of SEP disputes guided by common law principles and comparable licenses complements SSO FRAND commitments and market negotiation of SEP licenses. Adjudication based on common law and comparable licenses provides general rules for the resolution of SEP disputes that does not restrict SSO IP policies and or interfere with consensus decision making by SSOs. Such adjudication also does not interfere with efficient market negotiation of SEP licenses.”).

¹⁸ *Id.* at 148.

¹⁹ See, e.g., Epstein & Noroozi, *supra* note 4, at 1404 (“Indeed, absent the backstop of the injunction threat, implementers will have powerful incentives to breach their end of the FRAND contract and pursue their own ex post strategy of ‘patent holdout’ or ‘efficient infringement.’”). See also *id.* at 136-37 (“The sharing of benefits of standardization is achieved by the combination of consensus standardization within SSOs and SEP license negotiation in the marketplace. The notion that patent holders extract monopoly rents from implementers is misleading. Both inventors and implementers contribute to economic value and both obtain gains from trade in patent license agreements. The extensive participation of industry members in standardization suggests that the benefits of participation are widespread among industry participants.”).

²⁰ Osenga, *supra* note 12, at 213-14.

rather than develop innovations collaboratively (Section II.B); 2) reducing startup activity (especially when combined with antitrust enforcers' newfound proclivity to challenge startup acquisitions) (Section II.C); and 3) and giving a leg up to jurisdictions that are heavily geared toward manufacturing as opposed to R&D, particularly China (with knock-on effects for ongoing political tensions between these two superpowers) (Section II.D).

A. Intellectual property, innovation, and growth

Before we delve into the broader ramifications of IP protection, it is worth recalling its foundational benefit: increased innovation and economic growth. Indeed, “[t]here is abundant evidence from economics and history that the world’s wealthy countries grew rich because they had well-developed systems of private property.”²¹ Property rights (including intellectual property rights) enable economic agents to specialize and trade, and this leads to innovation and growth.

Intellectual property is an essential part of this process. Although one can always quibble about the specific margins of any particular patent-protection regime, there is abundant evidence that strong patent protection is essential to economic growth. Stephen Haber, for example, adduces evidence that *enforceable* patent rights are associated with significant increases in GDP.²² Patricia Schneider’s empirical research suggests that intellectual property significantly boosts innovation for developed

²¹ Stephen Haber, *Patents and the Wealth of Nations*, 23 GEO. MASON L. REV. 811, 811 (2016). See also, Zorina Khan & Kenneth L. Sokoloff, *Institutions and Democratic Invention in 19th-Century America: Evidence from “Great Inventors,” 1790-1930*, 94 AM. ECON. REV. 400 (2004). See also, Josh Lerner, *The Economics of Technology and Innovation: 150 Years of Patent Protection*, 92 AM. ECON. REV. 221 (2002); Albert G.Z. Hu & Ivan P.L. Png, *Patent Rights and Economic Growth: Evidence from Cross-Country Panels of Manufacturing Industries*, 65 OXFORD ECON. PAPERS 675 (2013) (finding faster growth and higher value in patent intensive industries in countries that improve the strength of patents); Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the US Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101, 125 (2001) (identifying “two ways in which the pro-patent shift in the U.S. legal environment appears to be causally related to the otherwise perplexing surge in U.S. patenting rates, at least in the semiconductor industry”); Nikos C. Varsakelis, *The Impact of Patent Protection, Economy Openness and National Culture on R&D Investment: A Cross-country Empirical Investigation*, 30 RES. POL’Y 1059, 1067 (2001) (“Patent protection is a strong determinant of the R&D intensity, and countries with a strong patent protection framework invest more in R&D.”); David M. Gould & William C. Gruben, *The Role of Intellectual Property Rights in Economic Growth*, in DYNAMICS OF GLOBALIZATION & DEVELOPMENT 209 (Satya Dev Gupta & Nanda K. Choudhry eds., 1997) (“The evidence suggests that intellectual property protection is a significant determinant of economic growth. These effects appear to be slightly stronger in relatively open economies and are robust to both the measure of openness used and to other alternative model specifications.”).

²² Haber, *supra* note 21, at 816. (“Figure 1 therefore presents a graph of the strength of enforceable patent rights and levels of economic development for all non-petro states in 2010. There is nothing ambiguous about the resulting pattern: there are no wealthy countries with weak patent rights, and there are no poor countries with strong patent rights. Indeed..., as patent rights increase, GDP per capita increases with it. Roughly speaking, for every one-unit increase in patent rights (measured from zero to fifty) per capita income increases by \$780. **A simple regression of patent rights and patent rights squared on GDP indicates that roughly three-quarters of the cross-sectional variance in per capita GDP around the world is explained by the strength of patent rights.**”) (emphasis added). See also CASS & HYLTON, *supra* note 2, at 45-46 (discussing results of regression analysis providing evidence that “countries with stronger intellectual property rights tend to grow economically more than those with weak intellectual property rights”).

countries.²³ Empirical work by Yee Kyoung Kim and his co-authors arrives at the same conclusion.²⁴ This echoes theoretical work by Acemoglu and Akcigit, showing that patents are particularly important when inventors are technologically far ahead of their rivals.²⁵ Along similar lines, Kwan and Lai find that the insufficient protection of intellectual property generates more severe welfare losses than its overprotection.²⁶ Finally, Nobel Laureate William Nordhaus famously found that, even in the presence of patents to facilitate the appropriability of the value of innovation by inventors, “only a miniscule fraction of the social returns from technological advances over the 1948-2001 period was captured by producers, indicating that most of the benefits of technological change are passed on to consumers rather than captured by producers.”²⁷

The upshot is that intellectual property contributes significantly to the production of innovation and should thus be a key part of growth strategies. This assertion is relatively uncontroversial. Few economists dismiss intellectual property today, especially when it comes to industries where firms rely heavily on patents to earn returns on their investments.

But that is not to say that all is well and good. Intellectual property protection is inherently fragile. Indeed, it ultimately protects information that could otherwise be copied at little to no cost (and, unfortunately, often is). Even small erosions of intellectual property protection are thus liable to have outsized effects, as freeriding soon becomes a viable strategy. In turn, this may lead to underinvestment and economic stagnation.

²³ Patricia Higinio Schneider, *International Trade, Economic Growth and Intellectual Property Rights: A Panel Data Study of Developed and Developing Countries*, 78 J. DEV. ECON. 529, 539 (2005) (“The results suggest that IPRs have a stronger impact on domestic innovation for developed countries. This variable is positive and statistically significant in all OLS regressions in Table 4 (developed countries).”).

²⁴ Yee Kyoung Kim, Keun Lee, Walter G. Park & Kineung Choo, *Appropriate Intellectual Property Protection and Economic Growth in Countries at Different Levels of Development*, 41 RES. POL’Y 358, 367 (2012) (“[T]he impact of patenting intensity on growth is much larger in high income countries, as can be seen from the positive coefficient of the interaction term between the high income country dummy and patenting intensity – this coefficient being statistically significant at the 1% level of statistical significance. From column 6, the measured net effect of patent intensity on growth in high income countries is 0.0683 (=−0.027 + 0.953, where the former is the coefficient of the patenting intensity of middle-to-low income countries and the latter the coefficient of the interaction term between the high income country dummy and patenting intensity).”).

²⁵ Daron Acemoglu & Ufuk Akcigit, *Intellectual Property Rights Policy, Competition and Innovation*, 10 J. EUR. ECON. ASS’N. 1, 1 (2012) (“[O]ptimal policy involves state-dependent IPR protection, providing greater protection to technology leaders that are further ahead than those that are close to their followers.”).

²⁶ Yum K. Kwan & Edwin L-C Lai, *Intellectual Property Rights Protection and Endogenous Economic Growth*, 27 J. ECON. DYNAMICS & CONTROL 853, 854 (2003) (“The calibration results indicate that there is under-protection of IPR (relative to the optimal level) within plausible range of parameter values, and that under-protection of IPR is much more likely than over-protection. More complete computation indicates that in the case of over-protection, the welfare losses are trivial; whereas in the case of under-protection, the welfare losses can be substantial. One interpretation of this result is that the US should protect IPR much more than it currently does.”).

²⁷ William D. Nordhaus, *Schumpeterian Profits in the American Economy: Theory and Measurement* at 1 (Nat’l Bureau of Econ. Res. Working Paper No. 10433 Apr. 2004), available at <http://www.nber.org/papers/w10433>.

B. Collaborative standard setting and specialization as substitutes for proprietary standards and vertical integration

People often think of intellectual property in general, and patents more specifically, as a means to increase the monetary returns accrued from the creation and distribution of innovations. While this is undeniably the case, this framing overlooks the essential role that IP also plays in promoting specialization throughout the economy.²⁸

As Ronald Coase famously showed in his Nobel-winning work, firms must constantly decide whether to perform functions in-house (by vertically integrating), or contract them out to third parties (via the market mechanism).²⁹ Coase concluded that these decisions hinge on whether the transaction costs associated with the market mechanism outweigh the cost of organizing production internally.³⁰ Decades later, Oliver Williamson added a key finding to this insight. He found that among the most important transaction costs that firms encounter are those that stem from incomplete contracts and the scope for opportunistic behavior they entail.³¹ This leads to a simple rule of thumb: as the scope for opportunistic behavior increases, firms are less likely to use the market mechanism and will instead perform tasks in-house, leading to increased vertical integration.

Intellectual property plays a key role in this respect. Patents drastically reduce the transaction costs associated with the transfer of knowledge (i.e., information goods, in economic terms).³²

[K]ey features of the patent system—exclusion, transferability, disclosure, certification, standardization, and divisibility—*increase transaction efficiencies and stimulate competition* in the market for inventions. These properties of patents reduce transaction costs associated with transferring, licensing, cross-licensing, combining, implementing, and developing inventions. Patents give owners rights to exclude others from making, using, or selling their inventions. Patents help convert inventions into transferable assets, so that inventors and adopters can transact more efficiently in the market for inventions. Patents promote disclosure of inventions, which reduces costs of search and bargaining in the market for inventions. Patents provide certification of technologies, which decreases

²⁸ See generally Auer & Morris, *supra* note 1.

²⁹ Ronald H. Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386, 390 (1937) (“The main reason why it is profitable to establish a firm would seem to be that there is a cost of using the price mechanism.”).

³⁰ *Id.*

³¹ See Oliver E. Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 *J.L. & ECON.* 233, 241 (1979); see also Armen A. Alchian & Susan Woodward, *The Firm is Dead; Long Live the Firm: A Review of Oliver E. Williamson’s The Economic Institutions of Capitalism*, 26 *J. ECON. LIT.* 65 (1988) (referring to this situation as “composite quasi-rents”). For a further discussion of opportunism, see OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM* 47 (1985).

³² See, e.g., Paul J. Heald, *A Transaction Costs Theory of Patent Law*, 66 *OHIO ST. L.J.* 473, 473 (2005) (“Patent law is under-theorized in the sense that the predominating incentive-based justifications cannot by themselves adequately explain empirical evidence on patenting gathered by research economists. This article provides an alternative justification for patent law based on private transaction costs savings offered by patent law in comparison to alternative options available to those who wish to exploit information assets.”).

information asymmetry in the market for inventions. Patents provide standardization in IP, which reduces the costs of contracting in the market for inventions. Finally, patents allow greater divisibility of technology, which promotes modularity and increases gains from trade in the market for inventions. Patents thus generate economic benefits that are based on more efficient transactions and greater competition in the market for inventions.³³

IP gives firms the opportunity to develop innovations collaboratively and without fear that trading partners might opportunistically appropriate their inventions. This enables firms to specialize in innovation and to outsource functions such as development and commercialization to specialized third parties: “Patents facilitate arms-length trade of a technology-intensive input, leading to entry and specialization.”³⁴ In other words, intellectual property protection does not just increase the *rate* of innovation; it also affects the very fabric of industry, making startup companies and other innovation-focused firms far more viable than would otherwise be the case. “[T]he rationale for the business enterprise is not just to achieve efficiencies relative to a theoretical market-based benchmark, but also to create and manage co-specialization.”³⁵

This raises two critical questions: 1) When it comes to the research, development, and commercialization of inventions, what type of opportunistic behavior is most common?; and 2) Is there anything IP policy should do about it?

Scholars usually identify two different problems in this regard: patent holdup and patent holdout. Holdup is the idea that inventors might opportunistically extract the rents of implementers that are locked-in to a standard by charging exorbitant royalties, thus reducing implementers’ incentive to create goods based upon standard-essential technologies.³⁶ Holdout refers to the notion that implementers might opportunistically extract the rents of inventors by refusing to compensate them for

³³ DANIEL SPULBER, *THE CASE FOR PATENTS* 3 (2021) (italics in original).

³⁴ Robert P. Merges, *Intellectual Property Rights, Input Markets, and the Value of Intangible Assets*, at 45 (Feb. 1, 1999), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3327663.

³⁵ David J. Teece, *Intangible Assets and a Theory of Heterogeneous Firms*, in *INTANGIBLES, MARKET FAILURE AND INNOVATION PERFORMANCE* 217 (Bounfour & Miyagawa eds., 2015).

³⁶ See Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 *TEX. L. REV.* 1991, 1992-93 (2006) (“The threat that a patent holder will obtain an injunction that will force the downstream producer to pull its product from the market can be very powerful. These threats can greatly affect licensing negotiations, especially in cases where the injunction is based on a patent covering one small component of a complex, profitable, and popular product. Injunction threats often involve a strong element of holdup in the common circumstance in which the defendant has already invested heavily to design, manufacture, market, and sell the product with the allegedly infringing feature.”).

the use of their inventions, while employing legal process to delay or entirely forestall paying licensing fees.³⁷

While patent holdup has drawn the lion's share of policymakers' attention, empirical and anecdotal evidence suggest that *holdout* is the more salient problem. Consider the following pieces of evidence: Scholars have shown that technological progress is particularly rapid in SEP-reliant industries (the opposite of what patent-holdup theory suggests);³⁸ curbing injunctions does not increase the rate of innovation in these industries (contrary to what proponents of patent-holdup theory argued);³⁹ the profit margins of technology implementers in SEP-reliant industries are substantial (contrary to what holdout theory predicts);⁴⁰ and the profit margins of innovators in SEP industries are significantly smaller.⁴¹ Finally, there is at least anecdotal evidence that *holdout* is a more widespread problem than it is generally given credit for.⁴² All of this suggests that, at the margin, rules that prevent patent *holdout* are more likely to promote specialization.

Intellectual property remedies are particularly important in this regard, especially in standard-reliant industries. The development and commercialization of standards (as well as products that rely on them) usually involves significant relationship-specific investments that raise the prospect of opportunistic behavior. As the previous paragraph suggests, patent *holdout* is particularly salient, and more

³⁷ See Colleen V. Chien, *Holding Up and Holding Out*, 21 MICH. TELECOMM. & TECH. L. REV. 1, 20 (2014) (defining hold-out as “the practice of companies ignoring patents and patent demands because the high costs of enforcing patents makes prosecution unlikely—or, in other words, because they can get away with it”).

³⁸ See Galetovic, et al., *supra* note 2, at 554-65. See also Mallinson, *supra* note 7, at 969. With the first commercial services of GPRS in 2000, this 2G GSM technology initially provided users with data speeds of up to fifty-six kilobits per second. By around 2005, in most developed nations, 3G UMTS with WCDMA provided users up to 384 kilobits per second. Technology enhancements to WCDMA with HSDPA and HSPA+ then provided ever-increasing speeds from megabits per second to tens of megabits per second. Today, 4G Long-Term-Evolution (LTE) networks are providing users over 100,000 kilobits per second (one-hundred megabits per second).

³⁹ See Galetovic, et al., *supra* note 2, at 571. The authors obtained this result by looking at the effect of the United States Supreme Court's *eBay Inc. v. MercExchange, LLC* case that overruled years of existing precedent under which patent holders could automatically obtain an injunction against an infringing defendant, holding that courts must engage in the traditional four-factor test for injunctions. See *eBay Inc. v. MercExchange, LLC*, 547 U.S. 388 (2006). See also, Kirti Gupta & Jay P. Kesan, *Studying the Impact of eBay on Injunctive Relief in Patent Cases*, Hoover Inst. Working Grp. on Intellectual Prop., Innovation, & Prosperity, Stanford Univ. Working Paper No. 17004 (2017), available at <http://hooverip2.org/wp-content/uploads/ip2-wpl17004-paper.pdf>.

⁴⁰ The profit margins of top mobile device manufacturers (one of the most important implementers in SEP-reliant industries) typically range from twenty to forty percent, which implies that their quasi-rents are not being captured. See Kirti Gupta, *The Patent Policy Debate in the High-Tech World*, 9 J. COMPETITION L. & ECON. 827, 845 (2013).

⁴¹ Empirical examinations of the cumulative royalty rates earned by SEP holders in the mobile device industry are within the three to five percent range, which is much lower than royalty stacking would predict. See Alexander Galetovic, et al., *An Estimate of the Average Cumulative Royalty Yield in the World Mobile Phone Industry: Theory, Measurement and Results*, 42 TELECOMM. POL'Y 263, 271 (2018). See also Gregory Sidak, *What Aggregate Royalty Do Manufacturers of Mobile Phones Pay to License Standard-Essential Patents?*, 1 CRITERION J. INNOV. 701, 702 (2016); Mallinson, *supra* note 7, at 997.

⁴² See Bowman Heiden & Nicolas Petit, *Patent “Trespass” and the Royalty Gap: Exploring the Nature and Impact of Patent Holdout*, 34 SANTA CLARA HIGH TECH. L.J. 179 (2017),

likely to occur when inventors are unable to prevent implementers and other third parties from infringing their intellectual property. Thus, remedies are crucial. As we discuss below, injunctions are the only truly effective remedy when patent infringement leads to harms that are difficult to calculate, or when the infringing firms have insufficient assets that can readily be attached. Absent effective remedies of this sort, both contract and intellectual property laws risk being ineffectual. The result, at the margin, is that firms are more likely to resort to other means to develop their inventions (vertical integration and secrecy being frequently employed alternatives).⁴³ In short, ensuring that IP rights are enforceable should directly impact the extent to which firms specialize and collaborate, rather than vertically integrate.

Of course, there is little sense that market transactions are *systematically* preferable to vertical integration. Nevertheless, reducing transaction costs is a worthwhile policy goal—and a relative increase in market transactions is a byproduct of these reduced costs. To put it simply, transaction costs can add unnecessary friction to market transactions, making all sorts of agreements more expensive than they would otherwise be.

Policies that reduce these costs (in a cost-effective manner) *are* worthwhile, with the immediate result that technologies are more widely distributed than would otherwise be the case (increasing inventors' incentives to produce those technologies in the first place). For example, a report published by Jorge Padilla, John Davies, and Aleksandra Boutin finds that the empirical papers on the topic support the conclusion that standards boost growth: “The results typically find that standards contribute between 7.4%-63.6% of GDP growth depending on the geography and period covered.”⁴⁴

While it is important to take these findings (especially the reported magnitudes) with a grain of salt—they exhibit tremendous variation—the underlying papers ultimately paint an unequivocal picture: emergent standardization drives economic growth.

C. The importance of intellectual property rights for startup activity

Intellectual property—and patents in particular—are essential to monetize innovation. For startups, enforceable patent rights are a necessary input to gain a foothold in the marketplace. This is true for three main reasons: 1) injunctions prevent established companies from simply copying innovative startups, with the expectation that they will be able to afford court-set royalties; 2) patent rights can be the basis for securitization, gaining access to startup funding; and 3) patent rights drive venture capital (VC) investment.

⁴³ See Padilla, et al., *supra* note 6, at 46 (“Some form of enforceable intellectual property rights is essential for a market in technology to develop. Without IPR, an innovator and an implementer cannot easily exchange knowledge and nor can the innovation be publicised without losing value. Vertical integration and secrecy can therefore be expected to prevail if IPR protection is weak.”).

⁴⁴ Padilla, et al., *supra* note 6, at 31.

The first of these effects is likely the most straightforward and widely acknowledged. Startup activity depends on patent rights enforceable by an injunction. Weakening patent rights by removing the ability to exclude allows established companies to copy startup innovators and locks in their market power, as larger companies are more likely to afford royalties set by courts than rates negotiated in the context of an inventor's strong right to an injunction. Without the ability to simply copy innovative startups, established companies must instead make the decision to compete by coming up with their own innovations, or to buy the innovators. On the one hand, this effect is well-understood. Most scholars would frame IP (and patents, in particular) as protecting inventions from misappropriation by rivals. What many fail to recognize, however, is that this is particularly important for startup companies.

There is a relatively abundant literature on firms' appropriability mechanisms (these are essentially the strategies firms employ to prevent rivals from copying their inventions). This literature tells us that patent protection is far from the only strategy firms use to protect their inventions.⁴⁵ Perhaps more importantly, the alternative appropriability mechanisms identified by these studies tend to be easier to implement for well-established firms. The studies notably highlight the important role played by complementary good strategies, secrecy, and lead time.⁴⁶ All of these strategies are, arguably, easier to deploy for incumbents. For instance, many firms earn a return on their inventions by incorporating them into a physical product that cannot be reverse engineered. This is epitomized by the apocryphal story of Coca-Cola, whose "secret formula" is supposedly stored in a vault in Atlanta.⁴⁷ Whether true or false, this story neatly illustrates the benefits of patent protection for startups: without some form of property over inventions, the best way to earn returns is to commercialize them in a way that cannot be reverse engineered. In turn, this is much easier for firms that already have a large industry presence and manufacturing capabilities, as opposed to startup companies that, almost by definition, must outsource production. Much of the same applies to appropriability strategies that involve keeping an innovation secret and putting it on the market before rivals

⁴⁵ See, e.g., Edwin Mansfield, *Patents and Innovation: An Empirical Study*, 32 MGMT. SCI. 173, 175-176 (1986) (Mansfield shows through surveys that patent protection only had a limited impact on innovation in industries other than the pharmaceuticals industry and, to a lesser extent, the chemicals industry. Mansfield argues that this is because the effectiveness of patents depends on the extent to which they increase imitation costs; and that this increase is more substantial in the chemical and pharmaceutical industries). Note that this study largely predates standard-reliant industries, such as mobile communications technology, where patents likely play a very important role in creating appropriability. See also Richard C. Levin, Alvin K. Klevorick, Richard R. Nelson, Sidney G. Winter, Richard Gilbert & Zvi Griliches, *Appropriating the Returns from Industrial Research and Development*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 797 (1987). Levin, et al.'s findings are broadly in line with Mansfield's. More recently, these findings were supported by Cohen, et al. See Wesley M. Cohen, Richard R. Nelson & John P. Walsh, *Protecting Their Intellectual Assets: Appropriability Conditions and Why US Manufacturing Firms Patent (or Not)* (NBER Working Paper 7552, Feb. 2000), available at <https://www.nber.org/papers/w7552>.

⁴⁶ Alternative appropriability mechanisms include lead time, secrecy and the existence of "complementary sales, services or manufacturing capabilities." See Cohen, et al., *supra* note 45, at 5. See also Levin, et al., *supra* note 45, at 802. See also Najib Harabi, *Appropriability of technical innovations an empirical analysis*, 24 RES. POL'Y, 981 (1995).

⁴⁷ *Coca-Cola's Formula Is at the World of Coca-Cola*, THE COCA-COLA COMPANY, <https://www.coca-colacompany.com/company/history/coca-cola-formula-is-at-the-world-of-coca-cola> (last accessed Jan. 26, 2022).

do. In both cases, this is easier to do when firms are well-established, and do not have to vertically integrate from scratch.

A second way strong intellectual property rights drive startup activity is through the ability to raise funds through the collateralization of IP. This is particularly true for startups with little or no tangible assets, who could obtain funding without selling a significant portion of ownership by offering security interests in patents, trademarks, and copyrights.⁴⁸ As Gaétan de Rassenfosse puts it:

SMEs can leverage their IP to facilitate R&D financing.... [P]atents materialize the value of knowledge stock: they codify the knowledge and make it tradable, such that they can be used as collaterals. Recent theoretical evidence by Amable et al. (2010) suggests that a systematic use of patents as collateral would allow a high growth rate of innovations despite financial constraints.⁴⁹

While using intellectual property as collateral is a promising avenue for startups to raise cash, it is not without difficulties. Chief among these is the complex question of valuing patents.⁵⁰ Unlike many other assets that sell on highly liquid markets, patents are idiosyncratic and inherently difficult to value (this difficulty also explains why injunctions are such an important remedy, as we explain below). Reducing the uncertainty surrounding the remedies available to combat IP infringement is one way to make this valuation exercise marginally easier. Conversely, reducing inventors' ability to

⁴⁸ See, e.g., Mario Calderini & Maria Cristina Odasso, *Intellectual Property Portfolio Securitization: An Evidence Based Analysis*, INNOVATION STUDIES WORKING PAPER (ISWOP), NO. 1/08, at 33 (2008) (“[I]t seems that patent securitization should be more suitable for small and medium companies with a consistent IP portfolio but that have not easy access to capital market or have a higher financial risk and few possibility to raise unsecured financing.”). See also Dov Solomon & Miriam Bitton, *Intellectual Property Securitization*, 33 CARDOZO ARTS & ENT. L.J. 125, 171-73 (2015) (“Among the famous securitization transactions in the field of IP rights are the securitizations of the copyrights of the singer David Bowie, the trademark of the Domino’s Pizza chain, and the patent on the HIV drug developed by Yale University.”); Nishad Deshpande & Asha Nagendra, *Patents as Collateral for Securitization*, 35 NATURE BIOTECHNOLOGY 514, 514 (2017) (“Patents are important assets for biotech organizations, not only for protecting inventions but also as assets to raise monies.”); Tahir M. Nisar, *Intellectual Property Securitization and Growth Capital in Retail Franchising*, 87 J. RETAILING 393, 393 (2011) (“A method of raising finance particularly suited to retail franchisors is intellectual property (IP) securitization that allows companies to account for intangible assets such as intellectual property, royalty and brands and realize their full value. In recent years, a number of large restaurant franchisors have securitized their brands to raise funds, including Dunkin Brands and Domino’s Pizza (Domino’s). We use property rights approach to show that IP securitization provides mechanisms that explicitly define ownership of intangible assets within the securitization structure and thus enables a company to raise funds against these assets.”).

⁴⁹ Gaétan De Rassenfosse, *How SMEs Exploit Their Intellectual Property Assets: Evidence from Survey Data*, 39 SMALL BUS. ECON. 437, 439 (2012).

⁵⁰ See Solomon & Bitton, *supra* note (discussing the difficulties in valuing patents as a barrier to securitization). See also Aleksandar Nikolic, *Securitization of Patents and Its Continued Viability in Light of the Current Economic Conditions*, 19 ALBANY L.J. SCI. & TECH. 393, 491 (2009) (“Anyone attempting to accurately assess the value of a patent portfolio faces numerous challenges including potential invalidity proceedings, potential infringement and infringement proceedings, obsolescence, or lack of demand for a license or the invention itself.”).

effectively prevent infringement can drastically reduce the value of patents as collateral. As Jayan Kumar observes:

Infringement action (most obviously music piracy) can seriously erode revenue streams and plans for combating infringement through litigation must be in place in order to protect the value of IP. Given the above risks and complexities, due diligence on IP before securitization is more expensive than with traditionally securitized assets.⁵¹

While the market for intellectual property as collateral is still burgeoning, a case can be made that more robust and predictable enforcement of IP rights will facilitate small and medium-sized enterprises' (SMEs) efforts to raise cash.

Finally, and somewhat relatedly, there is reason to believe intellectual property protection is an important driver of venture capital activity. This relates to all the points mentioned above (IP's role in preventing the imitation of inventions, its potential use as collateral, etc.), as well as the overarching point that patent protection permits vertical disintegration and specialization, leading to the entry of new, specialized firms.⁵²

There is, however, one aspect we have not yet touched upon. Intellectual property protection—and patents, in particular—might signal to potential investors that a company is successful and/or valuable. Empirical research by Hsu and Ziedonis, for instance, supports this hypothesis:

[W]e find a statistically significant and economically large effect of patent filings on investor estimates of start-up value.... A doubling in the patent application stock of a new venture [in] this sector is associated with a 28 percent increase in valuation, representing an upward funding-round adjustment of approximately \$16.8 million for the average start-up in our sample.⁵³

The authors find this effect is more pronounced in earlier financing rounds, when uncertainty surrounding the value of the underlying company is greater.⁵⁴ Along similar lines, Häussler, Harhoff,

⁵¹ Jayan Kumar, *Intellectual Property Securitization: How Far Possible and Effective*, 11 J. INTELLECTUAL PROP. RIGHTS 98, 98 (2006).

⁵² See Bronwyn H. Hall & Rosemarie H. Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101, 125 (2008) (finding evidence confirming the hypothesis that “stronger patent rights may have facilitated entry by specialized firms and contributed to vertical disintegration in [the semiconductor] industry”).

⁵³ David H. Hsu & Rosemarie H. Ziedonis, *Patents as Quality Signals for Entrepreneurial Ventures*, ACAD. MGMT. PROCEEDINGS, VOL. 1, at 6 (2008), available at <https://faculty.wharton.upenn.edu/wp-content/uploads/2015/07/11.pdf>.

⁵⁴ *Id.* (“Consistent with the view that the signaling value of patents is particularly important when uncertainty is greatest, we find that the effect of patenting on start-up valuation is more pronounced in earlier financing rounds.... We also find that the signaling value of patents is higher when funds are secured from more prominent investors.... Start-ups backed by prominent VCs may tap into superior complementary legal and organizational resources, thus improving the odds that the patents they file will confer greater economic value to entrepreneurs and their investors. Surprisingly, we find little evidence that the signaling value of patents is larger for novices than it is for more experienced entrepreneurs....”).

and Mueller show that “companies’ patenting activities have consistent and cogent effects on the timing of VC financing. Having at least one patent application reduces the time to the first VC investment by 76%.”⁵⁵ Finally, other authors argue that patents may serve as a commitment device to protect entrepreneurs from the risk of expropriation by their early investors.⁵⁶

In short, intellectual property can stimulate startup activity through a variety of mechanisms. There is thus a sense that, at the margin, weakening patent protection will make it harder for entrepreneurs to embark upon new business ventures.

D. The role of strong SEP rights in guarding against China’s “cyber great power” ambitions

Europe aspires to become (and arguably remain) a continent of innovators, in part by turning the production of IP into one of its important comparative advantages.⁵⁷ As European President Ursula von der Leyen remarked:

Europe is a powerhouse in science.... But we also face a big paradox: We, Europeans, are excellent in making science with money. But we are not so good in making money out of science. And the new European Innovation Council is there to help resolve this paradox.⁵⁸

IP and its legal protections will become increasingly important if Europe is to achieve these lofty ambitions, especially when dealing with international jurisdictions, like China, that don’t offer

⁵⁵ Carolin Häussler, Dietmar Harhoff & Elisabeth Müller, *To Be Financed or Not... – The Role of Patents for Venture Capital Financing*, at 3 (ZEW-Centre for European Economic Research Discussion Paper 09-003, Mar. 28, 2013), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1393725. See also De Rassenfosse, *supra* note 49, at 441.

⁵⁶ See Ronald J. Mann & Thomas W. Sager, *Patents, Venture Capital, and Software Start-Ups*, 36 RESEARCH POL’Y 193, 207 (2007). (“We note one additional possibility suggested by the data, that portfolio firms obtain the patents not because they increase the value of the firm to its investors, but because they protect the contributions of the firm from expropriation by the investors. The idea here is that by giving the portfolio firm a cognizable property right in its technology, the patents increase the value of the firm by decreasing the costs of moral hazard and hold-up in the relations between the entrepreneurs and their investors. Shane (2002) proposes a similar mechanism to explain patterns in licensing of patents assigned to MIT.”)

⁵⁷ See, e.g., U.S. PATENT OFFICE, INTELLECTUAL PROPERTY AND THE U.S. ECONOMY: 2016 UPDATE (2016), available at <https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf>; Shayerah Ilias Akhtar, Liana Wong & Ian F. Fergusson, *Intellectual Property Rights and International Trade*, at 6 (Congressional Research Service, May 12, 2020), available at <https://crsreports.congress.gov/product/pdf/RL/RL34292> (“Intellectual property generally is viewed as a long-standing strategic driver of U.S. productivity, economic growth, employment, higher wages, and exports. It also is considered a key source of U.S. comparative advantage, such as in innovation and high-technology products. Nearly every industry depends on it for its businesses. Industries that rely on patent protection include the aerospace, automotive, computer, consumer electronics, pharmaceutical, and semiconductor industries.”).

⁵⁸ Ursula von der Leyen, *Opening speech by President von der Leyen at the European Innovation Council Launch Ceremony* (Mar. 18, 2021), https://ec.europa.eu/commission/presscorner/detail/en/speech_21_1241.

similar levels of legal protection.⁵⁹ By making it harder for patent holders to obtain injunctions, licensees and implementers gain the advantage in the short term, because they are able to use patented technology without having to engage in negotiations to pay the full market price. In the case of many SEPs—particularly those in the telecommunications sector—a great many patent holders are western companies (largely US-based), while the lion’s share of implementers are Chinese. Potential anti-injunction policies may thus amount to a subsidy to Chinese infringers of western technology.

At the same time, China routinely undermines western intellectual property protections through its industrial policy. The government’s stated goal is to promote “fair and reasonable” international rules, but it is clear that China stretches its power over intellectual property around the world by granting “anti-suit injunctions” on behalf of Chinese smartphone makers, designed to curtail enforcement of foreign companies’ patent rights.⁶⁰

In several recent cases, Chinese courts have claimed jurisdiction over F/RAND issues.⁶¹ In *Oppo v. Sharp*, the Supreme People’s Court of China determined that Chinese courts can set the global terms of what is a fair and reasonable price for a license,⁶² even if that award would be considerably lower than in other jurisdictions. This decision follows *Huawei v. Conversant*, in which a Chinese court for the first time claimed the ability to issue an anti-suit injunction against the Chinese company.⁶³

⁵⁹ See, e.g., Martina F. Ferracane & Hosuk Lee-Makiyama, *China’s Technology Protectionism and Its Non-negotiable Rationales*, ECIPE (Jun. 2017), available at <https://ecipe.org/publications/chinas-technology-protectionism/>. Consider that, even for actual citizens of the People’s Republic of China, individual rights are legally subordinate to “the interests of the state.” Const. of the People’s Rep. of China, Art. 51, available at <http://www.npc.gov.cn/englishnpc/constitution2019/201911/1f65146fb6104dd3a2793875d19b5b29.shtml>. One has to imagine that the level of legal protections afforded foreign firms is no better, and surely must be subordinate to the objectives of China’s industrial policy, including the goal of leapfrogging the United States in IP production. See, e.g., Karen M. Sutter, “Made in China 2025” *Industrial Policies: Issues for Congress* (Congressional Research Service, Aug. 11, 2020), available at <https://sgp.fas.org/crs/row/IF10964.pdf>.

⁶⁰ See *China is becoming more assertive in international legal disputes*, THE ECONOMIST (Sep. 18, 2021), <https://www.economist.com/china/2021/09/18/china-is-becoming-more-assertive-in-international-legal-disputes> (“In the past year Chinese courts have issued sweeping orders on behalf of Chinese smartphone-makers that seek to prevent lawsuits against them in other countries over the use of foreign companies’ intellectual property... so that they (rather than foreign courts) can decide how much Chinese firms should pay in royalties to the holders of patents that their products use.”).

⁶¹ See Matthew Laight, *Shifting landscape in SEP FRAND litigation – 2021 will see hard fought disputes in China and India*, DIGITAL BUSINESS (Dec. 9, 2020), <https://digitalbusiness.law/2020/12/shifting-landscape-in-sep-frand-litigation-2021-will-see-hard-fought-disputes-in-china-and-india/>.

⁶² See RPX Corporation, *China: Chinese Courts Can Set Global SEP License Terms, Rules Supreme People’s Court*, MONDAQ (Oct. 21, 2021), <https://www.mondaq.com/china/patent/1120114/chinese-courts-can-set-global-sep-license-terms-rules-supreme-people39s-court>.

⁶³ *Id.*

All of this is part of the Chinese government's larger approach to industrial policy, which seeks to expand Chinese power in international trade negotiations and in global standards bodies.⁶⁴ As one Chinese Communist Party official put it: "Standards are the commanding heights, the right to speak, and the right to control. Therefore, the one who obtains the standards gains the world."⁶⁵ Chinese President Xi Jinping frequently (but only domestically) references China's "cyber great power" ambitions: "We must accelerate the promotion of China's international discourse power and rule-making power in cyberspace and make unremitting efforts towards the goal of building a cyber great power."⁶⁶ Chinese leaders are intentionally pursuing a two-track strategy of taking over standards bodies and focusing on building platforms to create path dependencies that cause others to rely on Chinese technology.⁶⁷ As a Hinrich Foundation Report notes:

Trade and technical standards are inherently interrelated. They are mutually reinforcing. But Beijing treats standard setting, and standards organizations, as competitive domains. This approach risks distorting global trade. **Beijing does not support a neutral architecture where iterative negotiating strives for technical interoperability. Instead, Beijing promotes an architecture that bolsters and cements Chinese competitiveness.** Due to China's size and centralization, the consequences of this approach will reverberate across the international system. Given the nature of emerging technology and standards, the consequences will endure.⁶⁸

Insufficient protections for intellectual property will hasten China's objective of dominating collaborative standard development in the medium- to long-term.⁶⁹ European entrepreneurs are able to

⁶⁴ See Rush Doshi, Emily De La Bruyère, Nathan Picarsic, & John Ferguson, *China as a "Cyber Great Power": Beijing's Two Voices in Telecommunications*, Brookings Institute Foreign Policy Paper (Apr. 2021) at 16, available at https://www.brookings.edu/wp-content/uploads/2021/04/FP_20210405_china_cyber_power.pdf. ("In March 2018, Beijing launched the China Standards 2035 project, led by the Chinese Academy of Engineering. After a two-year research phase, that project evolved into the National Standardization Development Strategy Research in January 2020. The 'Main Points of Standardization Work in 2020' issued by China's National Standardization Committee in March 2020 outlined intentions to 'strengthen the interaction between the standardization strategy and major national strategies.'").

⁶⁵ Quoted in *id.*

⁶⁶ *Id.* "The phrase 'cyber great power' is a key concept guiding Chinese strategy in telecommunications as well as IT more broadly. It appears in the title of almost every major speech by President Xi Jinping on China's telecommunications and network strategy aimed at a domestic audience since 2014. But the phrase is rarely found in messaging aimed at external foreign audiences, appearing only once in six years of remarks by Foreign Ministry spokespersons. **This suggests that Beijing intentionally dilutes discussions of its ambitions in order not to alarm foreign audiences.**" *Id.* at 3 (emphasis added).

⁶⁷ See Danny Russel & Blake Berger, *Is China Stacking the Technology Deck by Setting International Standards?*, THE DIPLOMAT (Dec. 2, 2021), <https://thediplomat.com/2021/12/is-china-stacking-the-technology-deck-by-setting-international-standards/>.

⁶⁸ Emily de la Bruyere, *China's Quest to Shape the World Through Standards Setting*, (Hinrich Foundation Report, Jul. 2021), at 11 (emphasis added), available at <https://www.hinrichfoundation.com/research/article/tech/china-quest-to-shape-the-world-through-standards-setting/>.

⁶⁹ Although China is currently under-represented in most SDOs, that is already rapidly changing. See Justus Baron & Olia Kanevskaia, *Global Competition for Leadership Positions in Standards Development Organizations*, Working Paper (Mar. 31, 2021), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3818143. As Baron and Kanevskaia note, "[t]he surge in

engage in the types of research and development that drive innovation because they can monetize those innovations. Reducing the returns for patents that eventually become standards will lead to less investment in those technologies. It will also harm the competitive position of European companies that refrain from collaborating because the benefits don't outweigh the costs, including "missing the opportunity to steer a standard in the manner most compatible with a company's product offerings, falling behind competitors, or failing to head off broad adoption of a second standard...."⁷⁰

Simultaneously, this will engender a switch to greater reliance on proprietary, closed standards rather than collaborative, open standards. Proprietary standards (and competition among those standards) are sometimes the most efficient outcome: for instance, when the costs of interoperability outweigh the benefits. The same cannot be said, however, for government policies that effectively *coerce* firms into adopting proprietary standards by raising the relative costs of the collaborative standard-development process. In other words, there are social costs when firms are artificially prevented from taking part in collaborative standard setting and forced instead to opt for proprietary standards.

Yet, this is precisely what will happen to European firms if IP rights are not sufficiently enforceable. Indeed, as explained above, collaborative standardization is an important driver of growth.⁷¹ It is crucial that governments do not needlessly undermine these benefits by preventing European firms from competing effectively in these international markets.

These harmful consequences are magnified in the context of the global technology landscape, and in light of China's strategic effort to shape international technology standards.⁷² With European firms systematically deterred from participating in the development of open technology standards, Chinese companies, directed by their government authorities, will gain significant control of the technologies that will underpin tomorrow's digital goods and services. The consequences are potentially catastrophic:

the number of leadership positions held by Huawei... [have] raised concerns that... Huawei [may] gain an undue competitive advantage over Western commercial and strategic interests." *Id.* at 2.

⁷⁰ Updegrove, *supra* note 12.

⁷¹ See *id.* at 30-36 (surveying the economic benefits from standardization). See also Soon-Yong Choi & Andrew B. Whinston, *Benefits and Requirements for Interoperability in the Electronic Marketplace*, 2 *TECH. IN SOC'Y* 33, 33 (2000) ("Economic benefits of interoperability result in lowered production or transaction costs typically utilizing standardized parts or automated processes. In the networked economy, the need for interoperability extends into an entire commercial processes, market organizations and products.").

⁷² Anna Gross, Madhumita Murgia & Yuan Yang, *Chinese Tech Groups Shaping UN Facial Recognition Standards*, *FINANCIAL TIMES* (Dec. 1, 2019), <https://www.ft.com/content/c3555a3c-0d3e-11ea-b2d6-9bf4d1957a67> ("The drive to shape international standards... reflects longstanding concerns that Chinese representatives were not at the table to help set the rules of the game for the global Internet,' the authors of the New America report wrote. 'The Chinese government wants to make sure that this does not happen in other ICT spheres, now that China has become a technology power with a sizeable market and leading technology companies, including in AI.'").

The effect of [China's] approach goes far beyond competitive commercial advantage. The export of Chinese surveillance and censorship technology provides authoritarian governments with new tools of repression. Governments that seek to control their citizens' access to the internet are supportive of Beijing's "cyber sovereignty" paradigm, which can lead to a balkanized internet riddled with incompatibilities that impede international commerce and slow technological innovation. And when cyber sovereignty is paired with Beijing's push to redefine human rights as the "collective" rights of society as defined by the state, authoritarian governments gain a shield of impunity for violations of universal norms.⁷³

With Chinese authorities joining standardization bodies and increasingly claiming jurisdiction over F/RAND disputes, there should be careful reevaluation of the ways weakened IP protection would further hamper Europe's ambitions to become a leader in intellectual property and innovation.

III. SEP disputes and their resolution

It is ironic that the remarkably collaborative SDO process nevertheless engenders endless—yet unsubstantiated—claims of systematic abuse by the SEP-holder participants in the form of patent hold-up and royalty stacking.⁷⁴ Arguably, this stems from a persistent misunderstanding of the nature of patent-licensing disputes:

[M]any claims of patent hold-up and royalty stacking are simply related to disagreements over how much the licensee would prefer to pay versus how much the patent holder is requesting. The fact that these disagreements are not uncommon does not mean, however, that patent hold-up or royalty stacking is taking place. After all, businesses frequently engage in aggressive price negotiations over all sorts of products, and IP licensing is no different.⁷⁵

A. The fundamental value of injunctions

Historically, one of the most important features of property rights in general, and patents in particular, is that they provide owners with the power to exclude unauthorized use by third parties and

⁷³ Russel & Berger, *supra* note 67.

⁷⁴ The canonical fountainhead of these claims is Lemley & Shapiro, *supra* note 36. As noted, however, "this view so far lacks any sound basis in the available body of relevant evidence. Remarkably, the consensus view among other competition regulators, and much of the academic community, rests principally on what is still nothing more than a predictive statement about the *potential* risk posed by SEP owners in wireless communications markets. While theoretical models can be useful tools in competition policy design, the credibility of this particular hypothesis must stand in considerable doubt since no systematic evidence has been found to support it, despite the relevant market having been in operation for over two decades." Jonathan M. Barnett, *How and Why Almost Every Competition Regulator Was Wrong About Standard-Essential Patents*, CPI ANTITRUST CHRONICLE (Dec. 2020), <https://www.competitionpolicyinternational.com/how-and-why-almost-every-competition-regulator-was-wrong-about-standard-essential-patents/>.

⁷⁵ Osenga, *supra* note 12, at 199 (emphasis added).

thus enable them to negotiate over the terms on which use or sale will be authorized.⁷⁶ While the ability to exclude is important in creating the incentive to innovate, it is equally—and perhaps more—important in facilitating the *licensing* of inventions.⁷⁷

There are many reasons that someone may invent a new product or process. But if they are to be optimally encouraged to distribute that product and thus generate the associated social welfare, it is crucial that they retain the ability to engage supply chains to commercialize the invention fully.⁷⁸ “[T]he patent system encourages and enables not just *invention* but also *innovation* by providing the basic, enforceable property rights that facilitate (theoretically) efficient organizations of economic resources and the negotiations necessary to coordinate production among them.”⁷⁹ If a patent holder believes that the path to commercialization and remuneration is hindered by infringers, she will have less incentive to invest fully in the commercialization process (or in the innovation in the first place).

Removing the injunction option... not only changes the bargaining range (and makes infringement a valid business option), but, by extension, it lowers the expected returns of investing in the creation and commercialization of patents, in the first place.... With a no-injunction presumption..., as long as the expected cost of litigation is less than the expected gain from infringing without paying any royalties, potential licensees will always have an incentive to pursue this strategy. The net result is a shift in bargaining power so that, even when license agreements are struck, royalty rates are lower than they would otherwise be, as well as an increased likelihood of infringement.⁸⁰

Because infringement affects both the initial incentive to innovate as well as the complex process of commercialization, courts have historically granted injunctions against those who have used a patent without proper authorization.

B. Damages alone are often insufficient

Injunctions are almost certainly the most powerful means to enforce property rights and remedy breaches. Nonetheless, courts may sometimes award damages, either in addition to or as an

⁷⁶ Richard A. Epstein, *The Clear View of The Cathedral: The Dominance of Property Rules*, 106 YALE L.J. 2091, 2091 (1996) (“Property rights are, in this sense, made absolute because the ownership of some asset confers sole and exclusive power on a given individual to determine whether to retain or part with an asset on whatever terms he sees fit.”)

⁷⁷ See generally Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977); F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697 (2001).

⁷⁸ See, e.g., Barnett, *supra* note 15, at 856 (“Strong patents provide firms with opportunities to disaggregate supply chains through contract-based relationships, which in turn give rise to trading markets in intellectual resources, whereas weak patents foreclose those options.”).

⁷⁹ Dirk Auer, Geoffrey A. Manne, Julian Morris, & Kristian Stout, *The Deterioration of Appropriate Remedies in Patent Disputes*, 21 FEDERALIST SOC’Y REV. 158, 160 (2020).

⁸⁰ *Id.* at 163.

alternative to awarding an injunction.⁸¹ It is often difficult to establish the appropriate size of an award of damages, however, when intangible property—such as invention and innovation, in the case of patents—is the core property being protected.

In this respect, a key feature of patents is that they possess uncertain value *ex ante*. The value of a particular invention or discovery cannot be known until it is either integrated into the end-product that will be distributed to consumers, or actually used by consumers.⁸² This massive upfront uncertainty creates the need for technology designers to carefully structure their investments such that the risk/reward ratio remains sufficiently low. This, in turn, means ensuring that their inventions' commercialization can reasonably be expected to generate sufficient profits.

Commercializing highly complex innovations, such as pharmaceuticals and advanced technologies, requires a large degree of risk taking and capital investment, as well as massive foregone opportunities. As such, it will often be difficult, or even impossible, to adequately calculate appropriate monetary damages for the unauthorized use of a patent, even if the patent's *ex post* value is knowable. Put differently, the inability to bargain effectively for royalties post-standardization may “deter investment... and ultimately harm consumers.”⁸³

While it is necessary to establish damages for violations after the fact, it will nearly always be appropriate to award injunctions to deter ongoing violations. This would further allow the property owner to do their own value calculations, based on their investments, sunk costs, and—critically—lost opportunities that were foregone in order to realize the particular invention. “[A] property rule is superior to a liability rule when ‘the court lacks information about both damages and benefits.’

⁸¹ See, e.g., Doris Johnson Hines & J. Preston Long, *The Continuing (R)evolution of Injunctive Relief in the District Courts and the International Trade Commission*, IP LITIGATOR (Jan./Feb. 2013) (citing Tracy Lee Sloan, *The 1988 Trade Act and Intellectual Property Cases Before the International Trade Commission*, 30 SANTA CLARA L. REV. 293, 302 (1990) (“Out of 221 intellectual property cases between 1974 and 1987, the ITC found that only five failed to establish sufficient injury... for injunctive-type relief.”)), available at <https://www.finnegan.com/en/insights/articles/the-continuing-r-evolution-of-injunctive-relief-in-the-district.html>.

⁸² And even then, the specific contribution of a particular patent to ultimate consumer value will remain uncertain. See Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 COLUM. L. REV. 2655, 2659 (1994) (“The problems with [clearly defining harms/benefits] in the IPR field result from the abstract quality of the benefits conferred by prior works and the cumulative, interdependent nature of works covered by IPRs. Valuation, then, is at least as great a problem as detection.”)

⁸³ See Richard Epstein, F. Scott Kieff, & Daniel Spulber, *The FTC, IP, and SSOs: Government Hold-Up Replacing Private Coordination*, 8 J. COMPETITION L. & ECON. 1 (2012) at 21, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1907450 (“The simple reality is that before a standard is set, it just is not clear whether a patent might become more or less valuable. Some upward pressure on value may be created later to the extent that the patent is important to a standard that is important to the market. In addition, some downward pressure may be caused by a later RAND commitment or some other factor, such as repeat play. The FTC seems to want to give manufacturers all of the benefits of both of these dynamic effects by in effect giving the manufacturer the free option of picking different focal points for elements of the damages calculations. The patentee is forced to surrender all of the benefit of the upward pressure while the manufacturer is allowed to get all of the benefit of the downward pressure.”).

Without accurate information, the damages may be set below the actual level of harm, encouraging the ‘injurer’ (or infringer) to engage in an excessive level of activity—in our case, increased infringement.”⁸⁴

C. Injunctions encourage efficient licensing negotiations

In addition to the concerns outlined in the previous section, it is worth noting that curbs on injunctions pertaining to SEPs would make inventors bear the risk of opportunistic behavior, thus enabling firms to opt out of commercial negotiations and wait for potential litigation. In turn, this would tilt the bargaining scale in their favor in subsequent royalty negotiations undertaken in the shadow of prior court proceedings.⁸⁵

The US Supreme Court’s 2006 decision in *eBay v. MercExchange* offers a case in point. The court rejected the “general rule” that a prevailing patentee is entitled to an injunction.⁸⁶ In the aftermath of the decision, courts refused to grant injunctions in considerably more cases.⁸⁷

More than a decade later, however, questions remain regarding *eBay*’s effect on patent licensing, negotiation, and litigation.⁸⁸ In particular, it is likely that *eBay* systematically distorted the relative bargaining positions in SEP licensing in favor of implementers, at the expense of patent holders. One post-*eBay* assessment argues that limiting injunctions to prevent holdup results in more “false positives”—where patent holders with no designs of patent holdup are nonetheless denied injunctive

⁸⁴ *Merges*, *supra* note 82, at 2666-67 (quoting A. Mitchell Polinsky, *Resolving Nuisance Disputes: The Simple Economics of Injunctive and Damage Remedies*, 32 STAN. L. REV. 1075, 1092 (1980)).

⁸⁵ See Auer, et al., *supra* note 79, at 163 (“It also establishes this lower royalty rate as the ‘customary’ rate, which ensures that subsequent royalty negotiations, particularly in the standard-setting context, are artificially constrained.”).

⁸⁶ *eBay Inc. v. MercExchange, LLC*, 547 U.S. 388 (2006).

⁸⁷ See Benjamin Petersen, *Injunctive Relief in the Post-eBay World*, 23 BERKELEY TECH. L.J. 193, 196 (2008), (“In the two years after the Supreme Court’s ruling in *eBay*, there were thirty-three district court decisions that interpreted *eBay* when determining whether to grant injunctive relief to a patent holder. Of these decisions, twenty-four have granted permanent injunctions and ten have denied injunctions.”). See also Bernard H. Chao, *After eBay, Inc. v. MercExchange: The Changing Landscape for Patent Remedies*, 9 Minn. J.L. SCI. & TECH. 543, 572 (2008) (“For the first time, courts are not granting permanent injunctions to many successful patent plaintiffs.”); Robin M. Davis, *Failed Attempts to Dwarf the Patent Trolls: Permanent Injunctions in Patent Infringement Cases Under the Proposed Patent Reform Act of 2005 and eBay v. MercExchange*, 17 CORNELL J.L. & PUB. POL’Y 431, 444 (2008) (“However, the first few district courts deciding patent cases following that decision granted injunctions to patent owners in the majority of cases, at a rate of approximately two-to-one.”).

⁸⁸ See generally Epstein & Noroozi, *supra* note 4, at 1406-08.

relief—than it does deterrence of actual holdups.⁸⁹ The result is a reduction in the cost of willful infringement and “under-compensation” for innovation.⁹⁰

One of the important features of injunctions that critics miss is that they are not solely a tool for simple exclusion from property, but a tool that *promotes efficient bargaining*.⁹¹ If a property holder ultimately has the right to exclude infringers, there is relatively more weight placed on the importance of initial bargaining for licenses. “It is the very threat of the injunction right—and its associated high transaction costs—that brings the parties to the negotiating table and motivates them to draw upon the full scope of their knowledge and creativity in forming contractual and institutional solutions to the perceived holdup problem.”⁹²

Post-*eBay*, “efficient infringement” becomes a viable choice for firms seeking to maximize profits. Thus, implementing firms seeking to pay as little as possible for use of an invention have incentive to disregard the bargaining process with a patent holder altogether. The relative decline in the importance of injunctions narrows the bargaining range. The narrower range of prices an implementing firm will offer means that, even where it does bargain, agreement will be less likely. Where rightsholders can be reasonably expected to enforce their patent rights, by contrast, the bargaining range is expanded and agreement is more likely, because the initial cost of negotiating for a license is relatively less than always (or usually) opting for “efficient infringement”; that is, infringement becomes less efficient.

The ultimate tension is not between seeking damages or an injunction, but between whether a firm opts to negotiate or to litigate, while facing the risk of some combination of damages and injunction on the back end.

This reality is *particularly* important in the context of SDOs, where implementers and innovators are in a constant dance both to maximize their own profits as well as to facilitate the product of an incomplete, joint agreement that binds each party. “The seminal example of intentional contractual incompleteness is the F/RAND commitment common in many [SDO’s] IPR policies.”⁹³ Permitting one party, through weakened legal doctrine, to circumvent or artificially constrain the bargaining process inappropriately imbalances the careful commercial relationships that should otherwise exist.

⁸⁹ Vincenzo Denicolò, Damien Geradin, Anne Layne-Farrar & A. Jorge Padilla, *Revisiting Injunctive Relief: Interpreting eBay in High-Tech Industries with Non-Practicing Patent Holders*, 4 J. COMP. L. & ECON. 571 (2008).

⁹⁰ *Id.* at 608. See also Vincenzo Denicolò, *Do Patents Over-Compensate Innovators?*, 22 ECON. POL’Y 681 (2007) (noting that, with respect to patents in general, “a preponderance of what evidence is currently available points against the over-reward hypothesis”).

⁹¹ See, e.g., Mark Schankerman & Suzanne Scotchmer, *Damages and Injunctions in Protecting Intellectual Property*, 32 RAND J. ECON. 201 (2001).

⁹² Epstein & Noroozi, *supra* note 4, at 1408.

⁹³ Tsai & Wright, *supra* note 16, at 163.

In the SEP context, furthermore, it is rarely mentioned that “an implementer’s decision to reject a certifiably F/RAND license and continue to infringe is contrary to the spirit of the F/RAND framework as well.”⁹⁴

Moreover, it is not typically the case that a negotiation process would end with an injunction and a refusal to license, as critics sometimes allege. Rather, the threat of an injunction is important in hastening an infringing implementer to the table and ensuring that protracted litigation to determine the appropriate royalty (which is how such disputes *do* actually end) is costly not only to the patentee, *but also to the infringer*. As James Ratliff and Daniel Rubinfeld explain:

[T]he existence of that threat does not lead to holdup as feared by those who propose that a RAND pledge implies (or should embody) a waiver of seeking injunctive relief. If RAND terms are reached by negotiation, the negotiation is not conducted in the shadow of an injunctive threat but rather in the shadow of knowledge that the court will impose a set of terms if the parties do not reach agreement themselves. The crucial element of this model that substantially diminishes the likelihood that the injunctive threat will have real bite against an implementer willing to license on RAND terms is the assumption that an SEP owner maintains its obligation to offer a RAND license even if its initial offer is challenged by the implementer and, further, even if the court agrees with the SEP owner that its initial offer was indeed RAND. **Thus any implementer that is willing to license on court-certified RAND terms can avoid an injunction by accepting those RAND terms without eschewing any of its challenges to the RAND-ness of the SEP owner’s earlier offers.**⁹⁵

Ultimately, this means that an implementer that accepts nominally RAND terms need not be an actual “willing licensee,” but instead can gain that designation as a matter of law without ever accepting a royalty rate within the *true* bargaining range that includes the licensor’s valid injunction threat. “[B]y stripping the SEP holder’s right to injunctive relief, [a no-injunction rule] may enable a potential licensee to delay good faith negotiation of a F/RAND license and the patent holder could be forced to accept less than fair market value for the use of the patent.... Undermining this bargaining outcome using antitrust rules runs a significant risk of doing more harm than good.”⁹⁶

A. The misguided push for component level pricing

In its call for evidence, the commission appears to question at what level of the value chain SEP licensing should take place in order to fall within FRAND pledges. In its own words:

⁹⁴ James Ratliff & Daniel L. Rubinfeld, *The Use and Threat of Injunctions in the RAND Context*, 9 J. COMPETITION L. & ECON. 14 (2013).

⁹⁵ Ratliff & Rubinfeld, *supra* note 94, at 7 (emphasis added).

⁹⁶ Tsai & Wright, *supra* note 16, at 182.

The initiative will build upon the three policy pillars listed below.... Providing clarity on various aspects of FRAND by developing guiding principles and/or processes for (i) clarifying the concept of FRAND; (ii) negotiating FRAND terms and conditions; and (iii) **determining appropriate level(s) of licensing in a value chain.**⁹⁷

This line of questioning appears to echo concerns that were perhaps most notably voiced during the *Qualcomm* antitrust case in the United States. In a district court ruling that was eventually overturned on appeal, Judge Lucy Koh found that Qualcomm's practice of basing license fees on the value of handsets, rather than on that of modem chips, infringed the FRAND pledges it had made.

In simplified terms, implementers paid Qualcomm a percentage of their devices' resale price. The court found that this was against Federal Circuit law. Instead, it argued that royalties should be based on the value the smallest salable patent-practicing component (in this case, baseband chips):

Further, Qualcomm's use of the handset device as the royalty base is inconsistent with Federal Circuit law on the patent rule of apportionment. Under the rule of apportionment, "[a] patentee is only entitled to a reasonable royalty attributable to the infringing features." In line with that principle, the Federal Circuit held in *Laser Dynamics, Inc. v. Quanta Computer, Inc.* that "it is generally required that royalties be based not on the entire product, but instead on the smallest salable patent-practicing unit." Thus, Qualcomm is not entitled to a royalty on the entire handset Because Qualcomm's own document states that a handset's value is now attributable primarily to the "user experience" and not "modem leadership," Qualcomm's collection of a royalty on the entire handset is inconsistent with *VimetX* and Federal Circuit law on the smallest salable patent practicing unit.⁹⁸

This conclusion is dubious from a policy standpoint. There are essential advantages to basing royalty rates on the price of an end product, rather than on that of an intermediate component.⁹⁹ This type of pricing notably enables parties to better allocate the risk that is inherent in launching a new product. Implementers want to avoid paying large (fixed) license fees for failed devices, and patent holders want to share in the benefits of successful devices that rely on their inventions. The solution is to agree on royalty payments that are contingent on success in the market:

⁹⁷ *FTC v. Qualcomm Inc.*, 411 F. Supp. 3d 658, 778 (N.D. Cal. 2019).

⁹⁸ *Qualcomm Inc.*, 411 F. Supp. 3d at 783 (first quoting *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, 904 F.3d 965, 977 (Fed. Cir. 2018); then quoting *LaserDynamics, Inc. v. Quanta Comput., Inc.*, 694 F.3d 51, 67 (Fed. Cir. 2012)).

⁹⁹ For a more detailed discussion on the merits of the appropriate royalty base, see Gerard Llobet & Jorge Padilla, *The Optimal Scope of the Royalty Base in Patent Licensing*, 59 J.L. & ECON. 45, 65 (2016), ("We have shown that, under many circumstances, ad valorem royalties, which are based on the value of sales, yield superior outcomes from the standpoints of both consumer welfare and total welfare than do per-unit royalty rates, which are based on the value of the components of the infringing product that are covered by the patented technology."). The authors argue that ad valorem licensing decreases double marginalization and increases investments made in new technologies by firms.

Because the demand for a new product is uncertain and/or the potential cost reduction of a new technology is not perfectly known, both seller and buyer may be better off if the payment for the right to use an innovation includes a state-contingent royalty (rather than consisting of just a fixed fee). The inventor wants to benefit from a growing demand for a new product, and the licensee wishes to avoid high payments in case of disappointing sales.¹⁰⁰

While this explains why parties might opt for royalty-based payments over fixed fees, it does not entirely elucidate the practice of basing royalties on the price of an end device. One explanation is that a technology's value will often stem from its combination with other goods or technologies. Basing royalties on the value of an end device enables patent holders to capture the social benefits that flow from these complementarities more effectively.¹⁰¹

Imagine the price of the smallest saleable component is identical across all industries, despite it being incorporated into highly heterogeneous devices. For instance, the same modem chip could be incorporated into smartphones (of various price ranges), tablets, vehicles, and other connected devices. The Bousquet line of reasoning (detailed above) suggests that it is efficient for the patent holder to earn higher royalties (from the IP that underpins the modem chips) in those segments where market demand is strongest (i.e., where there are stronger complementarities between the modem chip and the end device).

One way to make royalties more contingent on market success is to use the price of the modem, which is presumably identical across all segments, as a royalty base and negotiate a separate royalty rate for each end device (charging a higher rate for devices that will presumably benefit from stronger consumer demand). However, this has significant drawbacks. First, identifying those segments or devices that are most likely to be successful is informationally cumbersome for the inventor. Second, this practice could land the patent holder in hot water. Antitrust authorities might naïvely conclude that these varying royalty rates violate the “non-discriminatory” part of FRAND.

A much simpler solution is to apply (or at least attempt to apply) a single royalty rate, but use the price of the end device as a royalty base. This ensures that the patent holder's rewards are not just contingent on the number of devices sold, but also on their value. Royalties will thus more closely track the end devices' success in the marketplace.

In short, basing royalties on the value of an end device is an informationally light way for the inventor to capture some of the unforeseen value that might stem from the inclusion of its technology in

¹⁰⁰ See Alain Bousquet et al., *Risk Sharing in Licensing*, 16 INT'L J. INDUS. ORG. 535, 535-36 (1998).

¹⁰¹ See J. Gregory Sidak, *The Proper Royalty Base for Patent Damages*, 10 J. COMPETITION L. & ECON. 989, 994 (2014), (“The market price of an individual patented component (such as a camera lens contained within a mobile device) may not account for the value of the complementarity effects and the network effects that the component generates. By using the market price of an individual patented component as a reference, the manufacturer of that component does not internalize the benefits that its technology creates when used in conjunction with the other components of the downstream product.”).

an end device. Mandating that royalty rates be based on the value of the smallest saleable component ignores this complex reality.

In *FTC v. Qualcomm Inc.*, Judge Koh was imperceptive when assessing Qualcomm's contribution to the value of key standards, such as LTE and CDMA. For a start, she reasoned that Qualcomm's royalties were substantial, as compared to the number of patents it had contributed to these technologies:

Moreover, Qualcomm's own documents also show that Qualcomm is not the top standards contributor, which confirms Qualcomm's own statements that QCT's monopoly chip market share rather than the value of QTL's patents sustain QTL's unreasonably high royalty rates.¹⁰²

However, given the tremendous heterogeneity that usually exists between the different technologies that make up a standard, simply counting each firm's contributions is a crude way to gauge the value of their patent portfolios. Accordingly, Qualcomm argued that it had made pioneering contributions to technologies such as CDMA and 4G/5G.¹⁰³ Though the value of Qualcomm's technologies is ultimately an empirical question, the court's crude patent counting was unlikely to provide a satisfying answer. Also problematic was the court's conclusion that Qualcomm's royalties were unreasonably high because "modem chips do not drive handset value." The court reasoned that:

[Q]ualcomm's intellectual property is for communication, and Qualcomm does not own intellectual property on color TFT LCD panel, mega-pixel DSC module, user storage memory, decoration, and mechanical parts. The costs of these non-communication-related components have become more expensive and now contribute 60-70% of the phone value. The phone is not just for communication, but also for computing, movie-playing, video-taking, and data storage.¹⁰⁴

The court's reasoning on this point is particularly unfortunate. While it is true that superior LCD panels, cameras, and storage increase a handset's value—regardless of the modem chip that is associated with them—it is equally evident that improvements to these components are far more valuable to consumers when they are also associated with high-performance communications technology. For example, though there is undoubtedly standalone value in being able to take improved pictures on a smartphone, this value is multiplied by the ability to share these pictures with friends instantly and automatically back them up on the cloud. Likewise, improving a smartphone's LCD panel is more valuable if the device is also equipped with a cutting-edge modem (both of which are necessary for consumers to enjoy high-definition media online).

¹⁰² *FTC v. Qualcomm Inc.*, 411 F. Supp. 3d 658, 778 (N.D. Cal. 2019)

¹⁰³ *Id.* at 779.

¹⁰⁴ *Id.* at 722.

In more technical terms, the court failed to acknowledge that, in the presence of perfect complements, each good makes an incremental contribution of one hundred percent to the value of the whole.¹⁰⁵ A smartphone's components would be far less valuable to consumers if they were not associated with a high-performance modem and vice versa. The fallacy to which the court falls prey is encapsulated in a quote from Apple's COO: "Apple invests heavily in the handset's physical design and enclosures to add value, and those physical handset features clearly have nothing to do with Qualcomm's cellular patents, it is unfair for Qualcomm to receive royalty revenue on that added value"¹⁰⁶

The question the court should have asked, however, is whether Apple would have gone to the same lengths to improve its devices were it not for Qualcomm's complementary communications technology. By ignoring this question, Judge Koh all but guaranteed that her assessment of Qualcomm's royalty rates would fall short of the mark.

To summarize, the *FTC v. Qualcomm Inc.* case shows that courts will often struggle when they are made to act as makeshift price regulators. This is especially true in complex industries, such as the standardization space. The colossal number of parameters that affect the price for technology are almost impossible to reproduce in a top-down fashion, as the court attempted to do in *Qualcomm*. As a result, policymakers will routinely draw weak inferences from factors such as the royalty base agreed upon by parties, the number of patents contributed by a firm, and the sophisticated manner in which an individual technology may contribute to the value of an end product.

Returning to the European Commission's call for evidence, we thus recommend the commission steer away from rules or guidelines that impose component-level pricing for SEPs.

¹⁰⁵ See Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2041 (2007) ("When the various patented components are complementary in creating value, the sum of their incremental contributions will exceed their total contribution.")

¹⁰⁶ *Qualcomm Inc.*, 411 F. Supp. 3d at 781.