

Hidden Costs of Free Patents

LIZA VERTINSKY*

A growing number of companies, including some of the world's largest patent holders, appear to be giving patent rights away for free. These companies are making patent pledges, defined here as voluntary unilateral promises to the public to limit the enforcement of their patents. While these pledges are widely celebrated as socially beneficial efforts to mitigate the negative impact of patents on open innovation, this Article challenges the conventional wisdom. Just as there is no free lunch, there is no free patent. The Article shows that patent pledges can sometimes create hidden costs for innovation that the law is not currently equipped to deal with. It identifies three ways in which patent pledges can create social costs: (1) enhanced opportunities for patent hold-up; (2) foreclosure of alternative technology paths; and (3) use of pledges to create entry barriers. These costs arise where patent holders exploit limitations in the legal framework governing patent pledges along with private information about their intellectual property and business strategies to act opportunistically. Drawing from other areas of law in which similar problems of opportunism occur, the Article applies Professor Henry Smith's theory of equity as a second-order safety valve for law to show how these costs could be mitigated through limited expansion of equitable doctrines within patent law.

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I. INTRODUCTION

“For every promise, there is a price to pay.”
-Jim Rohn¹

Some of the world’s most innovative companies appear to be giving their patents away for free.² They are making patent pledges, defined here as voluntary unilateral promises to the public to limit the enforcement of patents

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¹ JIM ROHN, *THE TREASURY OF QUOTES* 25 (2010).

² See, e.g., Colleen V. Chien, *Opening the Patent System: Diffusionary Levers in Patent Law*, 89 S. CAL. L. REV. 793, 822 (2016) [hereinafter Chien, *Opening*]; Colleen V. Chien, *Why It’s Time To Open Up Our Patent System*, WASH. POST (June 30, 2015) [hereinafter Chien, *Why*], https://www.washingtonpost.com/news/innovations/wp/2015/06/30/why-its-time-to-open-up-our-patent-system/?utm_term=.3b8f6133959c [<https://perma.cc/K67Q-98TT>] (describing patent pledges as heralding in a “quiet revolution” in which some of the largest companies seek to share their patents to support open innovation); *Non-SDO Patent Statements and Commitments*, PROGRAM ON INFO. JUSTICE & INTELL. PROP., <http://www.pijip.org/non-sdo-patent-commitments/> [<https://perma.cc/RWD7-XARY>] (last updated Sept. 7, 2017) (a compilation of patent pledges made outside of SDOs). Analogies can be drawn to the growth in zero-price markets. See, e.g., John M. Newman, *Antitrust in Zero-Price Markets: Foundations*, 164 U. PA. L. REV. 149, 163–74 (2015) (discussing costs of free goods and arguing for a broader antitrust role within zero-price markets); see also Michal S. Gal & Daniel L. Rubinfeld, *The Hidden Costs of Free Goods: Implications for Antitrust Enforcement*, 80 ANTITRUST L.J. 521, 533–40 (2016) (examining the welfare effect of free goods); Chris Jay Hoofnagle & Jan Whittington, *Free: Accounting for the Costs of the Internet’s Most Popular Price*, 61 UCLA L. REV. 606, 614–20 (2014) (applying transaction cost analysis to examine the costs of “free” internet services); Jonathan M. Barnett, *The Costs of Free: Commodification, Bundling, and Concentration 2* (Univ. S. Cal. Gould Law Sch. Legal Studies Working Paper Series, Paper No. 242, 2017) [hereinafter Barnett, *Costs*] (re-examining the “free is good” proposition and suggesting that unpriced distribution of information goods may create social costs).

without charge.³ The number of patent holders making promises to share their patents in areas of rapid technological growth is already significant, with over two thousand companies, including five of the ten largest patent holders, committed to sharing their patents in various ways.⁴ New approaches to patent sharing continue to emerge, covering a broad group of patent owners and a growing number of patents.⁵ While there is no definitive count of just how many patents are the subject of voluntary promises to limit their assertion without charge, there is no doubt that such promises now implicate broad swathes of the patent landscape in some of the most innovative sectors.⁶ One of the newer patent sharing arrangements, the LOT (license on transfer) Network, already includes more than half a million patents.⁷

As the number of patent pledges continues to increase, they remain widely celebrated as socially beneficial efforts to mitigate the negative impact of patents on open innovation.⁸ According to the conventional view of patent

³ See generally Jorge L. Contreras, *Patent Pledges*, 47 ARIZ. ST. L.J. 543, 546 (2015) [hereinafter Contreras, *Patent*] (describing the characteristics of patent pledges).

⁴ See, e.g., Chien, *Opening*, *supra* note 2, at 822 (exploring the way in which the patent system can encourage diffusion of technology through pledges and other forms of patent sharing and discussing different ways in which companies are sharing their patents).

⁵ See generally MARTA BELCHER & JOHN CASEY, JUELSGAARD INTELLECTUAL PROP. & INNOVATION CLINIC, STANFORD LAW SCH., HACKING THE PATENT SYSTEM: A GUIDE TO ALTERNATIVE PATENT LICENSING FOR INNOVATORS (Jan. 2016), <https://www.eff.org/document/hacking-patent-system-2016> [https://perma.cc/NHY7-77YX] (providing an overview of patent aggregators, individual patent pledges, and a variety of defensive patent pledges and royalty-free licensing strategies).

⁶ See Chien, *Opening*, *supra* note 2, at 798–801 (suggesting defensive patent licensing is practiced by more than half of patent holders and summarizing survey and other evidence suggesting importance of diffusionary patent practices).

⁷ KEN SEDDON, LOT NETWORK, INVEST IN GROWTH: HOW LOT NETWORK ADDRESSES THE PAE PROBLEM (Jan. 2017), <http://lotnet.com/wp-content/uploads/2017/01/Introduction-of-LOT-2.0.pdf> [https://perma.cc/4NQV-LZTF] (providing the basics on how LOT addresses the PAE problem); LOT NETWORK, <http://lotnet.com/> [https://perma.cc/R4VW-M94X] (showing LOT Network now has over 100 members and its pledges cover more than 630,000 patents as of February 23, 2017).

⁸ See, e.g., Matthew W. Callahan & Jason M. Schultz, *Is Patent Reform via Private Ordering Anticompetitive? An Analysis of Open Patent Agreements*, in PATENT PLEDGES: GLOBAL PERSPECTIVES ON PATENT LAW'S PRIVATE ORDERING FRONTIER 151, 152–55 (Jorge Contreras & Meredith Jacob eds., 2017); Jason Schultz & Jennifer M. Urban, *Protecting Open Innovation: The Defensive Patent License as a New Approach to Patent Threats, Transaction Costs, and Tactical Disarmament*, 26 HARV. J.L. & TECH. 1, 26–37 (2012) (surveying types of patent strategies and documenting benefits of these approaches); Mariateresa Maggolino & Maria Lilla Montagnani, *Pledges and Covenants: The Keys To Unlock Patents 2* (Bocconi Legal Studies Research Paper No. 2615061, 2015) (describing role of pledges in “unlocking” patents); Eric Schulman, *Working Together To Reduce Patent Litigation*, GOOGLE PUB. POLICY BLOG (Mar. 12, 2013), <https://publicpolicy.googleblog.com/2013/03/working-together-to-reduce-patent.html> [https://perma.cc/P5BH-GL56] (describing the LOT Network and other proposals made to the industry to engage in royalty-free cross-licensing). See generally Jorge L. Contreras, *A Market Reliance Theory for FRAND*

pledges, they are simply one of many ways in which private actors seek to mitigate inefficiencies that patents may create for open innovation, something to be welcomed as an efficient market response to patent shortcomings.⁹ Patent pools and collective rights organizations form to reduce transaction costs and mitigate concerns about patent hold-up and patent thickets.¹⁰ Open-source licensing and defensive patent pools are used to protect and encourage areas of open-source development.¹¹ Standard-setting organizations are formed in response to needs for open standards to support interoperability and compatibility in emerging technology areas.¹² Patent pledges can be seen as adding to this socially desirable menu of private action designed to protect and encourage open innovation.¹³ While patent pledges may well prove to be

Commitments and Other Patent Pledges, 2015 UTAH L. REV. 479 [hereinafter Contreras, *Market*] (describing role and prevalence of pledges and proposing an enforcement mechanism).

⁹For a few of the many examples of private orderings emerging in the shadow of patent law, see Jonathan M. Barnett, *The Anti-Commons Revisited*, 29 HARV. J.L. & TECH. 127, 141–64 (2015) (reviewing historical and contemporary examples of private responses to patent challenges and suggesting the market can and does respond to mitigate problems that patents may sometimes create for innovation); Daniel R. Cahoy & Leland Glenna, *Private Ordering and Public Energy Innovation Policy*, 36 FLA. ST. U. L.J. 415, 452–58 (2009) (suggesting that market-based reordering of patent ownership may promote efficient commercialization in certain alternative fuel energies); Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 CAL. L. REV. 1889, 1937–48 (2002); Robert P. Merges, *Contracting Into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 CAL. L. REV. 1293, 1295 (1996); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 INNOVATION POL. & ECON. 119, 122–29 (2000) (describing an economic framework examining how firms address problems of overlapping patent rights); Julie Samuels, *The Defensive Patent License and Other Ways To Beat the Patent System*, ELECTRIC FRONTIER FOUND.: DEEPLINKS BLOG (June 10, 2012), <https://www.eff.org/deeplinks/2012/06/defensive-patent-license-and-other-ways-beat-patent-system> [<https://perma.cc/5N87-FUM9>] (acknowledging the patent system is broken and innovators must adopt even a non-perfect solution in the meantime); see also Chien, *Opening*, *supra* note 2, at 795–802.

¹⁰See Merges, *supra* note 9, at 1295; Shapiro, *supra* note 9, at 120–22.

¹¹See, e.g., Schultz & Urban, *supra* note 8, at 37–38 (proposing new type of defensive royalty-free patent cross-licensing as a way of promoting open innovation).

¹²See, e.g., Joanna Tsai & Joshua D. Wright, *Standard Setting, Intellectual Property Rights, and the Role of Antitrust in Regulating Incomplete Contracts*, 80 ANTITRUST L.J. 157, 159–60 (2015) (examining presumption that incompleteness of SSO contracts requires increased role of antitrust regulators in deterring patent hold-up and suggesting that empirical evidence is consistent with a competitive contracting process that is responsive to risk); Joshua D. Wright, *SSOs, FRAND, and Antitrust: Lessons from the Economics of Incomplete Contracts*, 21 GEO. MASON L. REV. 791, 792–95 (2014) (examining role of standard-setting organizations in facilitating innovation). See generally Lemley, *supra* note 9 (discussing the role and nature of standard-setting organizations and implications for IP).

¹³See, e.g., Schultz & Urban, *supra* note 8, at 30–33 (describing how patent pledges are used to respond to threats of patents on open-source innovation); see also BELCHER & CASEY, *supra* note 5, at 10, 16–17.

efficient ways of supporting open innovation, however, there is a darker side to patent pledging that should not be ignored.

This Article departs from the existing literature on patent pledges, which focuses primarily on questions of enforceability and often presumes the benefits of pledges, to show that these types of “free” promises can create hidden costs for innovation that the law is not currently equipped to deal with.¹⁴ Some of the costs inherent in relying on private promises to share patents as a means of ensuring socially beneficial access have already surfaced in the context of high profile litigation involving standards for mobile technologies, otherwise known as the smartphone wars.¹⁵ The smartphone wars reveal the limitations of relying solely on an exchange of private promises to make patents available on fair, reasonable and nondiscriminatory (FRAND) terms as a mechanism for ensuring efficient access to industry-wide technology standards.¹⁶ Opportunistic use, and abuse, of FRAND commitments have triggered review of pledges made in the context of standard setting by the Federal Trade Commission (FTC) and the Department of Justice (DOJ), as well as advisory statements from the U.S. Patent and Trademark Office (USPTO).¹⁷ These agency reviews have remained narrowly focused on FRAND licensing, however, neglecting to consider the broader implications of a growing industry practice of patent pledges and related

¹⁴ See Contreras, *Market*, *supra* note 8, at 482–84; Catharina Maracke & Axel Metzger, *Playing Nice With Patents: Do Voluntary Non-Aggression Pledges Provide a Sound Basis for Innovation?*, 17 N.C. J.L. & TECH. 483, 489–94 (2016) (providing overview of benefits). *But see* Barnett, *Costs*, *supra* note 2, at 2 (suggesting that unpriced distribution of information goods may create social costs). See generally Jonathan M. Barnett, *The Host's Dilemma: Strategic Forfeiture in Platform Markets for Informational Goods*, 124 HARV. L. REV. 1861 (2011) [hereinafter Barnett, *Host's*] (examining potential issues with strategic forfeiture of IP in platform competition).

¹⁵ See, e.g., Michael Carrier, *A Roadmap to the Smartphone Patent Wars and FRAND Licensing*, 2 CPI ANTITRUST CHRONICLE 2–5 (2012) (providing overview of the litigation and the IP and antitrust issues involved).

¹⁶ See, e.g., Raymond Millien, *The Smart Phone Patent Wars: What the FRAND is Going On?*, IP WATCHDOG (Mar. 27, 2012), <http://www.ipwatchdog.com/2012/03/27/the-smart-phone-patent-wars-what-the-frand-is-going-on/id=23635/> [<https://perma.cc/M9CZ-7ZVB>] (examining the FRAND licensing terms SSOs require of their participants); *Smart-Phone Lawsuits: The Great Patent Battle*, ECONOMIST (Oct. 21, 2010), <https://www.economist.com/node/17309237#footnote1> [<https://perma.cc/E7FJ-T3SV>] (considering the likelihood that smart phone lawsuits are here to stay).

¹⁷ See generally U.S. DEP'T OF JUSTICE & U.S. PATENT & TRADEMARK OFFICE, POLICY STATEMENT ON REMEDIES FOR STANDARDS-ESSENTIAL PATENTS SUBJECT TO VOLUNTARY F/RAND COMMITMENTS (2013) [hereinafter DOJ & PTO], <https://www.justice.gov/sites/default/files/atr/legacy/2014/09/18/290994.pdf> [<https://perma.cc/L5MC-Z446>] (issuing a statement on proper procedure when a patent holder seeks remedy that is encumbered by a FRAND licensing commitment); Press Release, Fed. Trade Comm'n, *FTC Charges Qualcomm with Monopolizing Key Semiconductor Device Used in Cell Phones* (Jan. 17, 2017), <https://www.ftc.gov/news-events/press-releases/2017/01/ftc-charges-qualcomm-monopolizing-key-semiconductor-device-used> [<https://perma.cc/6US3-FGFT>] (alleging, among other things, that Qualcomm has refused to license standard essential patents despite FRAND commitments).

defensive cross-licensing practices on competition and innovation.¹⁸ This Article focuses on the neglected subset of patent pledges that are made outside of formal standard setting, where costs, if any, remain hidden or ignored. But the arguments made have application to a broad arena of promises to share patents or otherwise limit the assertion of patents, including those made in standard-setting contexts.

This Article identifies three types of social welfare costs that patent pledges can sometimes create: (1) enhanced opportunities for patent hold-up; (2) foreclosure of alternative technology paths; and (3) the creation of barriers to entry. These costs arise where patent holders exploit limitations in the legal framework governing patent pledges along with private information about their intellectual property, technology and business strategies to act opportunistically at the expense of other technology developers and technology users.¹⁹ Where this opportunistic use of pledges results in the foreclosure or deterred entry of better or ultimately cheaper technologies and/or the extraction of supranormal rents from innovators, the social welfare costs are likely to exceed any private benefits accrued by those making the patent pledges.²⁰ In the absence of ways to sort desirable from undesirable uses of patent pledges, such opportunistic uses have the further disadvantage of undermining trust and increasing uncertainty in all uses of patent pledges.²¹

Finding an effective way of responding to these costs through a change in patent law or some other body of law is challenging because the types of behavior that generate the costs are varied, changeable, hard to predict, and difficult to disentangle from desirable behavior *ex ante*.²² There will be inevitable gaps in any set of legal rules, but the costs associated with these gaps are often evident only after private actors have exploited the gaps in socially

¹⁸ See generally DOJ & PTO, *supra* note 17.

¹⁹ See Henry E. Smith, *Property as Platform: Coordinating Standards for Technological Innovation*, 9 J. COMPETITION L. & ECON. 1057, 1062 (2013) [hereinafter Smith, *Property*] (applying information theory of property to standard-setting organizations and showing how opportunism becomes possible because of property/intellectual property separation and specialization).

²⁰ See U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 8 (2007) [hereinafter DOJ & FTC, ENFORCEMENT], <https://www.ftc.gov/sites/default/files/documents/reports/antitrust-enforcement-and-intellectual-property-rights-promoting-innovation-and-competition-report.s.department-justice-and-federal-trade-commission/p040101promotinginnovationandcompetitionrpt0704.pdf> [<https://perma.cc/NZA2-TN7Q>] (“Although both cross-licensing and patent-pooling agreements have the potential to generate significant efficiencies, they also may generate anticompetitive effects if the arrangements result in price fixing, coordinated output restrictions among competitors, or foreclosure of innovation.”); see also Henry E. Smith, *An Economic Analysis of Law Versus Equity* 6–10 (Oct. 22, 2010) [hereinafter Smith, *Economic*] (unpublished manuscript), https://law.yale.edu/system/files/area/workshop/leo/document/HSmith_LawVersusEquity7.pdf [<https://perma.cc/HF3V-6F5M>].

²¹ See Chien, *Opening*, *supra* note 2, at 813.

²² Smith, *Economic*, *supra* note 20, at 6–10.

costly ways.²³ Drawing from other areas of law in which similar problems of opportunism occur, this Article applies Professor Henry Smith's theory of equity as a second-order safety valve for law to show how at least some of the costs of patent pledges could be mitigated.²⁴ The Article concludes that, rather than seeking *ex ante* changes in patent law, the potential costs of patent pledges could be reduced and the benefits enhanced through limited expansion of equitable doctrines within patent law to deter opportunism.

The Article proceeds as follows. Part II identifies characteristics that many patent pledges share that, when taken together, create a distinctive form of private ordering of patents. Part III provides two examples of industries where patent pledges that have these characteristics are being used as innovation strategies. Part IV identifies some of the benefits of these patent pledges that make them appear to be attractive and even socially desirable innovation strategies. It then outlines three types of underappreciated costs that they could create for innovation and provides examples drawn from the industry settings described in Part III to illustrate how such costs might arise. Part V highlights the limitations of the current legal framework to address these costs and suggests ways in which a greater use of equitable doctrines within patent law could mitigate them. The discussion has implications that extend beyond patent pledges to other private orderings designed to open up patents in the name of open innovation.²⁵ The Article concludes that there's no such thing as a free patent,²⁶ and that patent policymakers therefore need to be responsive not just to the changing ways in which patents are used, but also to the changing ways in which patents are "not used."

²³ See *id.* at 8, 23–24.

²⁴ See *id.* at 17–51 (providing a functional motivation for equity as a way of addressing the problem of opportunism in ways that support the operation of law); see also Smith, *Property*, *supra* note 19, at 1078–81 (describing how equity as a safety valve can serve as an anti-opportunism device that can mitigate opportunism in standard-setting context). See generally Henry E. Smith, *Equity as Second-Order Law: The Problem of Opportunism* (Harvard Pub. Law, Working Paper No. 15-13, 2015) [hereinafter Smith, *Equity*], <https://ssrn.com/abstract=2617413> [<https://perma.cc/QCT6-HVTB>] (describing theory of equity as second order safety valve for dealing with the problem of opportunism).

²⁵ Chien, *Why*, *supra* note 2 (commenting on private companies strategic use of the patent system to include, rather than exclude, which boosts "freedom to operate and dissemination of their own ideas").

²⁶ This is a play on Friedman's well-known statement that there's no such thing as a free lunch. See generally MILTON FRIEDMAN, *THERE'S NO SUCH THING AS A FREE LUNCH* (Open Court Publishing Co. 1975).

II. CHARACTERISTICS OF PATENT PLEDGES

“Promises are the uniquely human way of ordering the future”
—Hannah Arendt²⁷

Patent pledges are defined here as voluntary unilateral promises to the public to limit the enforcement of specified patents.²⁸ To borrow from a widely used general definition of pledges:

These *patent pledges* share several key characteristics: they are commitments made voluntarily by patent holders to limit the enforcement or other exploitation of their patents. They are made not to direct contractual counterparties, but to the public at large, or at least to large segments of certain markets. And they are made without any direct compensation or other consideration.²⁹

These pledges provide assurances to parties interested in using patented technologies that the patent owner will not sue them for infringement of the pledged patents provided that they comply with the terms of the promise. Beyond this basic definition, patent pledges can take on a wide variety of forms, ranging from pledges that take place within formal standard-setting organizations to informal unilateral promises made by patent owners on blogs or in other public forums.³⁰ While much of the legal analysis and policy discussion about patent pledges involve pledges made within a formal standard-setting process or patent pooling organization, the relatively ignored pledges made outside of these institutions continue to grow in number and impact.³¹ It is this latter group of pledges and their potential impact on innovation that are the focus of this Article. This Part II identifies core characteristics that many of these patent pledges share and explores how these characteristics make this subset of pledges similar to, and different from, other patent arrangements.

In the most basic sense many patent pledges occurring outside of formal standard-setting arrangements are simply unilateral offers of royalty-free cross-

²⁷ HANNAH ARENDT, *CRISES OF THE REPUBLIC* 92 (1972).

²⁸ See Contreras, *Patent*, *supra* note 3, at 546.

²⁹ See *id.* (footnote omitted).

³⁰ See Chien, *Opening*, *supra* note 2, at 800 (“Unilateral public patent pledges . . . can be implemented flexibly—by announcement, blog post, or other informal mechanism”); Contreras, *Patent*, *supra* note 3, at 564 (“Patent pledges come in a wide variety of shapes and sizes, from uniform, check-the-box forms to free-style blog postings, press releases and oral statements.”).

³¹ There is a small amount of literature on pledges made outside of formal standard setting, but this literature still remains heavily focused on pledges made in connection with standards and does little to explore the potential costs of pledges. See Contreras, *Patent*, *supra* note 3, at 546–47, 547 n.12 (summarizing recent literature on standards-related pledges made outside of formal standard setting).

licensing or patent non-assertion³², thus falling under existing antitrust and intellectual property guidelines governing such intellectual property arrangements.³³ But patent pledges have a unique combination of characteristics that makes them a particularly flexible and low cost way of achieving cross-licensing or mutual non-assertion in ways that may not have been contemplated when these agency guidelines were developed. They allow companies to unilaterally commit to limit patent assertion in privately tailored ways to further private interests with no guarantee that the results will improve, or at least not harm, social welfare.³⁴

I argue that despite the variety of forms that they take, many of the patent pledges occurring outside of formal standard-setting arrangements share four characteristics that make them useful, although not always socially beneficial, innovation strategies.³⁵ The patent pledges in this subset are: (A) unilateral public promises (B) to limit the assertion of specified patents without charge, (C) subject to defensive termination in response to patent infringement suits and (D) associated with a social mission that is either directly or indirectly tied to open innovation. These four characteristics are discussed in greater detail below, and the subsequent analysis applies primarily to those patent pledges that share all four of these characteristics.

A. *Unilateral Public Promises*

These patent pledges are made voluntarily and unilaterally by patent pledgors to the public. Often the pledges are made on company blogs or through company press releases or statements to the media.³⁶ Patent pledges can be as simple as a public announcement at a press conference, a web blog entry, or a Facebook posting, stating that the patent holder will not initiate patent lawsuits against anyone who uses their patented technology.³⁷ This is the approach taken by Tesla's CEO Elon Musk, who promises in a blog that "Tesla will not initiate patent lawsuits against anyone who, in good faith, wants to use our technology."³⁸ Patent pledges can also be highly detailed and formalized,

³² Contreras, *Patent*, *supra* note 3, at 570 (referring to pledges as "predominantly non-assertion or royalty-free licensing commitments").

³³ See DOJ & FTC, ENFORCEMENT, *supra* note 20, at 87–91 (examining variety of intellectual property practices and their likely impact on competition); U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY 8–9 (1995) [hereinafter DOJ & FTC, GUIDELINES] (providing guidelines for analyzing the antitrust effects of different IP arrangements).

³⁴ See Barnett, *Host's*, *supra* note 14, at 1925–26;

³⁵ For an example of alternative taxonomy, see Contreras, *Patent*, *supra* note 3, at 547–48.

³⁶ See *id.* at 570–72.

³⁷ See, e.g., *id.* at 571–72.

³⁸ Elon Musk, *All Our Patent Are Belong to You*, TESLA: BLOG (June 12, 2014), <https://www.tesla.com/blog/all-our-patent-are-belong-to-you> [<https://perma.cc/E29H-TKQC>]. For more discussion on this patent pledge see *infra* Part III.

specifying patents covered, types of uses permitted, duration, and even a process for formalizing the promise.³⁹ Microsoft makes patent pledges that are similar in format to its online software licenses, with carefully defined terms and fields of use delineating its promise not to assert select patents.⁴⁰ Technology startup Blockstream's patent pledge takes the form of a commitment to provide its current and future patents under the terms of the Defensive Patent License, a patent license designed to be the patent equivalent of the well-known open-source GPL copyright license.⁴¹

These patent pledges are made without prior negotiation or coordination with other patent holders or users, and they can be and often are communicated through widely accessible mediums at low cost.⁴² Pledges are frequently short and informal, leaving out most of the details that would normally go into a licensing agreement.⁴³ No negotiation is required or expected, although a few of the pledges require the recipient to enter into a subsequent written license agreement.⁴⁴ Toyota's patent pledge, for example, requires interested users of its hydrogen fuel cell patents to take the further step of entering into a license with Toyota.⁴⁵

Many of the pledges, such as IBM's promise not to assert specified patents against developers and users of open-source software and Tesla's promise not to assert its patents against anyone who in good faith wants to use their electric vehicle technology, are made to the public at large.⁴⁶ Others are announced to the public but limited in scope to distinct categories of users. Toyota specifies particular groups of users in its pledge of patents covering hydrogen fuel cell technology.⁴⁷ Twitter's patent pledge takes the form of a promise not to assert patents issued to its employees without their permission.⁴⁸ Airbnb joins a group

³⁹ See, e.g., *Microsoft Patent Pledge for Open Source Developers*, MSDN, <https://msdn.microsoft.com/en-us/openspecifications/dn646762.aspx#MIPLedger> [<https://perma.cc/Y7PG-4XRT>].

⁴⁰ *Id.*; see also Contreras, *Patent*, *supra* note 3, at 570.

⁴¹ Schultz & Urban, *supra* note 8, at 38–39. Blockstream provides technology important to financial networks as well as to many other areas where Blockstream's sidechain technology has application. See *Patent Pledge*, BLOCKSTREAM, https://blockstream.com/about/patent_pledge/ [<https://perma.cc/69DL-8AFC>].

⁴² See, e.g., Musk, *supra* note 38.

⁴³ See, e.g., *id.*; see also Contreras, *Market*, *supra* note 8, at 508.

⁴⁴ See, e.g., *Toyota Opens the Door and Invites the Industry to the Hydrogen Future*, TOYOTA (Jan. 5, 2015), <http://corporatenews.pressroom.toyota.com/releases/toyota+fuel+cell+patents+ces+2015.htm> [<https://perma.cc/6RQP-ZD2K>] [hereinafter *Toyota Opens*].

⁴⁵ *Id.*

⁴⁶ *IBM Statement of Non-Assertion of Named Patents Against OSS*, IBM CORP. (Jan. 11, 2005), <https://www.ibm.com/ibm/licensing/patents/pledgedpatents.pdf> [<https://perma.cc/VM2W-5RTW>]; Musk, *supra* note 38.

⁴⁷ *Toyota Opens*, *supra* note 44.

⁴⁸ Adam Messinger (@adam_messinger), *Introducing the Innovator's Patent Agreement*, TWITTER: BLOG (Apr. 17, 2012), <https://blog.twitter.com/2012/introducing-the-innovator-s-patent-agreement> [<https://perma.cc/8YA4-9J7B>].

of other companies in making the Patent Pledge, a promise not to assert patents against small companies.⁴⁹

While their format and the ways in which they are communicated diverge, the decentralized, unilateral, privately tailored nature of patent pledges distinguishes them from many of the other private arrangements controlling the use of patents by patent holders. The fact that the pledge is made unilaterally leaves the design of the pledge and the medium in which it is made solely in the hands of the patent owner.⁵⁰ There is no required standardization, no negotiation over terms, and the pledgor has control over the format and terms of the pledge.⁵¹ This can be contrasted with other mechanisms for making patents available to the public, such as patent pools, collective rights organizations, and even patent pledges made within the confines of a standard-setting organization, all of which involve a commitment to standardized terms that have been negotiated and adopted by the group.⁵² To pass antitrust muster, these groups typically need to allow for relatively open industry participation and access and they are designed with antitrust concerns in mind.⁵³

B. “Free” Patents

These patent pledges are gratuitous promises to limit the assertion of the pledged patents in specified ways.⁵⁴ In many but not all cases, the promise is for royalty-free use of the patents.⁵⁵ This approach to sharing patents can be contrasted with alternatives of relinquishing control of the patent by putting it into the public domain and decisions not to apply for patents in the first place.⁵⁶ It can also be contrasted with traditional royalty-free cross-licensing arrangements, in which parties bargain over their exchange of promises and assume ongoing obligations to each other.⁵⁷ Here, by contrast, the patent owner retains control over the patent and there is no negotiation over terms of the

⁴⁹ PATENT PLEDGE, <http://www.thepatentpledge.org/> [<https://perma.cc/J8XF-M7BZ>].

⁵⁰ See Chien, *Opening*, *supra* note 2, at 800 (“Unilateral public patent pledges . . . can be implemented flexibly—by announcement, blog post, or other informal mechanism . . .”); Contreras, *Market*, *supra* note 8, at 508.

⁵¹ See Contreras, *Market*, *supra* note 8, at 508.

⁵² See Tsai & Wright, *supra* note 12, at 159–60 (discussing the role of standard-setting organizations); see also Contreras, *Market*, *supra* note 8, at 493–97.

⁵³ See Contreras, *Patent*, *supra* note 3, at 588.

⁵⁴ See *id.* at 546, 588.

⁵⁵ See *id.* at 557.

⁵⁶ See Clark D. Asay, *A Case for the Public Domain*, 74 OHIO ST. L.J. 753, 798–805 (2013) (arguing that the best way to support open innovation communities is to enable strong public domain dedication).

⁵⁷ See T. Randolph Beard & David L. Kaserman, *Patent Thickets, Cross-Licensing, and Antitrust*, 47 ANTITRUST BULL. 345, 354 (2002) (describing the role and use of cross-licensing).

license, but the royalty is set to zero and there is no monetary fee attached to the pledge.⁵⁸

The pledge is thus a mechanism for making the pledged patents readily and freely available to interested users of the patented technology without relinquishing control over, or the expense of maintaining, the patents.⁵⁹ But why are the pledges royalty-free? Some patent pledges may simply be private efforts to open up patents for public use in the absence of statutory “open” patent options.⁶⁰ Others may reflect strategic pricing or forfeiture decisions designed to encourage technology adoption and use.⁶¹ The allure associated with things that appear to be free may increase the market impact of these pledges by making technology paths associated with “free” patents appear more attractive than justified by the pledged technology.⁶² Strategic reasons for choosing a zero pricing strategy for patents are further explored in Part II and Part III.

C. *Defensive Termination*

While these patent pledges are royalty-free, they are not free of strings. Almost all of these patent pledges include some kind of defensive provision that suspends or terminates the patent license provided by the pledgor upon the occurrence of certain triggering events such as the threat or initiation of a patent infringement suit against the pledgor by the beneficiary of the pledge.

The basic idea behind defensive uses of patents such as this is to deter patent infringement suits with the threat of a counter-suit for patent infringement.⁶³ In the context of standard setting, many patent licensing commitments include a defensive suspension provision that permits the licensor to suspend the license to the pledged patents if the licensee takes specified actions such as threatening

⁵⁸ See Contreras, *Patent*, *supra* note 3, at 545.

⁵⁹ See *id.*

⁶⁰ See, e.g., Chien, *Why*, *supra* note 2 (arguing for creating one or more open patent options that would allow inventors to share technology broadly while retaining rights); see also Chien, *Opening*, *supra* note 2, at 824–44 (claiming that innovation by diffusion is happening less than is socially optimal and arguing that patent law’s traditional focus on exclusion needs to change to accommodate ways in which patents can better support the diffusion of technology through mechanisms such as disclosure, transfer, waiver, and the pursuit of freedom to operate).

⁶¹ For a discussion of strategic forfeiture of IP in platform markets, see, for example, Barnett, *Host’s*, *supra* note 14, at 1887–90 (showing why platform holders may voluntarily forfeit valuable intellectual assets to encourage adoption and use of their platform), and Contreras, *Patent*, *supra* note 3, at 583–86.

⁶² See, e.g., Gal & Rubinfeld, *supra* note 2, at 528–31 (discussing studies illustrating the behavioral impact of offering something for free).

⁶³ See, e.g., Jason Schultz, *Protecting Open Innovation: The Defensive Patent License as a New Approach to Patent Threats, Transaction Costs, and Tactical Disarmament*, 26 HARV. J.L. & TECH. 1 (2012) (discussing the need for defensive use of patents to support open innovation).

or bringing a patent infringement lawsuit against the patent pledgor.⁶⁴ The subset of pledges that are the focus of this Article include similar defensive termination provisions that suspend or terminate the patent license provided by the pledge to any party that asserts or is involved in the assertion of patents against the pledgor or, in some cases, against other parties the pledgor wants to protect.⁶⁵ The patents are free only so long as the party using the patents does not turn around and threaten to assert or assert any of its own patents in specified ways.⁶⁶ Some defensive provisions extend even more broadly to encompass parties that, while not directly asserting patents, nonetheless profit from patent assertion against the pledgor.⁶⁷

The pledge provides the patent holder with an easy way of signaling the likelihood of a return patent infringement suit against any users of the inventions covered by the pledged patents. Since there are alternative ways of engaging in defensive cross-licensing, this raises the question of how pledges diverge from alternatives.⁶⁸ Many defensive patenting strategies involve centralized efforts such as the formation of a patent pool.⁶⁹ Large scale defensive strategies include the organized pooling of patents for defensive purposes that characterizes the Open Invention Network⁷⁰ and the Patent Commons,⁷¹ as well as the practices of large private patent aggregators such as RPX Corporation⁷² and Allied Security Trust.⁷³ In contrast to these centralized pooling approaches to defensive patent use, patent pledges offer a decentralized alternative. While there is no

⁶⁴ See, e.g., STANDARDS DEVELOPMENT PATENT POLICY MANUAL 62–67 (Jorge L. Contreras ed., 2007).

⁶⁵ See Contreras, *Patent*, *supra* note 3, at 545 n.6; see, e.g., *Open Patent Non-Assertion Pledge*, GOOGLE, <https://www.google.com/patents/opnpledge/> [<https://perma.cc/9DZG-4HDG>].

⁶⁶ See Contreras, *Patent*, *supra* note 3, at 545 n.6.

⁶⁷ See Schultz & Urban, *supra* note 8, at 55.

⁶⁸ See generally Colleen V. Chien, *From Arms Race to Marketplace: The New Complex Patent Ecosystem and Its Implications for the Patent System*, 62 HASTINGS L.J. 297 (2010) (discussing growing defensive use of patents and consequences of the emergence of a secondary market for those patents); Colleen V. Chien, *Race to the Bottom*, 51 INTELL. ASSET MGMT. MAG., Jan./Feb. 2012 (discussing defensive patent arms race, consequences, and possible responses); Michael Loney, *The Options for Alternative Patent Licensing Compared*, MANAGING INTELL. PROP. (June 10, 2014), <http://www.managingip.com/Article/3350401/The-options-for-alternative-patent-licensing-compared.html> [<https://perma.cc/QJ89-CAGM>] (providing an overview of the alternative patent licensing models that have emerged).

⁶⁹ See Schultz & Urban, *supra* note 8, at 34–35.

⁷⁰ *About OIN*, OPEN INVENTION NETWORK, <http://www.openinventionnetwork.com/about-us/> [<https://perma.cc/VBE7-ZUEL>].

⁷¹ See, e.g., *The Project*, PAT. COMMONS PROJECT, <http://www.patent-commons.org> [<https://perma.cc/PB4E-VRGH>]. See generally BELCHER & CASEY, *supra* note 5 (providing an overview of RPX, Allied Security Trust, and the Open Innovation Network).

⁷² Loney, *supra* note 68; see also *The RPX Network*, RPX, <http://www.rpxcorp.com/rpx-network/> [<https://perma.cc/DBK3-LKX3>].

⁷³ *About Us*, ALLIED SEC. TR., <http://www.ast.com/about-us/asts-mission/> [<https://perma.cc/B4P2-7JW5>]; Loney, *supra* note 68.

precise count of how many individualized patent pledges have been made, one database hosted by a university includes a list of almost 200 patent pledges, a number of which include defensive termination provisions.⁷⁴

Pledges can either create their own defensive provisions or rely on a standardized form of cross-licensing such as the model provided by the Defensive Patent License in either its “sticky” and “non-sticky” forms.⁷⁵ One of the newest defensive licensing strategies, the LOT (License on Transfer) Network, focuses on royalty-free cross-licenses that are triggered by certain kinds of patent transfer.⁷⁶ The LOT Network was launched by an industry group that includes Google, Canon, Dropbox, and SAP as a way of ensuring that transferred patents are subject to royalty-free patent cross licensing, and the LOT Network now includes over 630,000 patent assets.⁷⁷ Some of the largest patent pledgors, such as Google and IBM, form and join defensive patent pools and use standardized defensive licensing strategies in addition to making individual patent pledges.⁷⁸

The growing role of patents as defensive shields to infringement suits marks a change from the traditional functions of, and justifications for, patents, yet the effects of both large, coordinated efforts to use patents defensively and decentralized defensive patent promises and agreements remain poorly understood.⁷⁹ Some of the potential consequences of this growth in defensive patent pledging are further explored in Part III.

D. *Social Mission*

A close connection between pledges and an announced mission or social purpose tied to open innovation further distinguishes this subset of pledges. These pledges are promoted as and tailored around the advancement of “open innovation,”⁸⁰ either as a goal in itself or as a means of promoting some other

⁷⁴ See *Non-SDO Patent Statements and Commitments*, *supra* note 2.

⁷⁵ See DEFENSIVE PAT. LICENSE, <http://www.defensivepatentlicense.org> [<https://perma.cc/CN9V-KRAT>]; see also Schultz & Urban, *supra* note 8, at 7–10 (describing benefits of patent licensing); *Royalty-Free Patent Licensing: Comparison Table*, GOOGLE, <https://www.google.com/patents/licensing/comparison> [<https://perma.cc/HA29-AXFN>].

⁷⁶ *Royalty-Free Patent Licensing: LOT Agreement*, GOOGLE, <https://www.google.com/patents/licensing/lot/> [<https://perma.cc/99GT-8A6B>].

⁷⁷ *Id.*; see also SEDDON, *supra* note 7.

⁷⁸ See generally BELCHER & CASEY, *supra* note 5 (discussing the various strategies employed by companies, including Google and IBM).

⁷⁹ See generally Clark D. Asay, *Patent Pacifism*, 85 GEO. WASH. L. REV. 645 (2017) (exploring some of the neglected implications of under assertion of patents).

⁸⁰ The term open innovation has been defined in a variety of ways. It has been widely promoted by Henry W. Chesbrough, who defines it as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively.” Henry Chesbrough, *Open Innovation: A New Paradigm for Understanding Industrial Innovation*, in OPEN INNOVATION: RESEARCHING A NEW PARADIGM 1, 1 (Henry Chesbrough et al. eds., 2006). I define open innovation as a system

social good such as a clean environment or affordable access to healthcare products.⁸¹ The pledges are characterized as commitments to pursue a publicly beneficial goal.⁸²

The link with something perceived to be of social value makes these patent pledges a good way of generating positive publicity about technology or product choices.⁸³ This aspect is of particular importance to companies interested in improving either their own image or public views about patenting and companies that rely heavily on branding and customer loyalty.⁸⁴

Patent pledges also provide a way for the patent holder to communicate underlying information regarding intellectual property and innovation strategies to relevant industry stakeholders.⁸⁵ The pledges may publicize intentions to protect open-source projects, to work cooperatively in certain areas of technology, to move defensively on potential challengers, to participate in the adoption of an open standard, or to keep the costs of adopting a particular standard or using a particular technology low.⁸⁶ These communications can be used to influence consumer and developer expectations about the adoption of a specific technology path or the future cost of using that technology path.⁸⁷ They

of innovation that relies upon flows of knowledge across organizational boundaries and encourages the joint production and sharing of knowledge. While open-source systems of innovation such as that used to produce open-source software would fall under this definition, open innovation need not entail the free sharing of discoveries. In the patent pledge context, pledges may have very different views about and meanings attributed to “open innovation.”

⁸¹ See Contreras, *Patent*, *supra* note 3, at 552–55.

⁸² *Id.* at 590–91.

⁸³ *Id.* at 591.

⁸⁴ *Id.*; see also Tamara Rutter, *Why Tesla Has the Most Loyal Customers*, USA TODAY (Sept. 6, 2014), <https://www.usatoday.com/story/money/cars/2014/09/06/why-tesla-has-the-most-loyal-customers/15139377/> [<https://perma.cc/GGV9-EU2C>] (discussing importance of customer loyalty for Tesla’s strategy).

⁸⁵ See Oliver Alexy & Markus Reitzig, *Private-Collective Innovation, Competition and Firms’ Counterintuitive Appropriate Strategy*, 42 RES. POL’Y 895, 898 (2013) (waiving exclusion rights found to foster norms of reciprocity and knowledge sharing).

⁸⁶ See *id.* at 908 (studying how firms involved in private-collective innovation use pledges as subtle coordination mechanisms to compete against firms proposing proprietary solutions). See generally Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSP. 93 (1994) (exploring the economics of market competition between systems, as contrasted with competition between products, and importance of expectations, coordination, and compatibility in competition between systems).

⁸⁷ See Katz & Shapiro, *supra* note 86, at 96 (explaining where demand is a function of expected size of the network, ability to influence expectations about adoption of a technology can lead to tipping effect, giving this technology a dominant position in the market; where purchase of technology today is influenced by price of complementary technology in the future, ability to influence expectations of the price of future technology will impact current purchase decisions).

can also be used to influence industry norms about what should be available for free and what consumers should expect to pay for.⁸⁸

Even where other social missions are also invoked, the focus of these patent pledges on the public benefits of “open innovation” remains a central and important characteristic of this subset of patent pledges.⁸⁹ In a world in which innovation strategies increasingly involve a combination of open and proprietary uses of intellectual property and the use of open patent strategies for private business purposes, companies have an interest in promoting their own versions of openness.⁹⁰ Patent pledges can be used to shape public views about what constitutes “open innovation,” the desirability of keeping innovation “open” in this way, and the relationship of the patent pledgor to relevant open innovation communities.⁹¹ The pledges provide a mechanism for companies to compete over what “open innovation” means, influencing which patents should be open and for what purposes.⁹²

Google characterizes its pledge as “patents in the service of open source” with the goal of promoting innovation through an open Internet.⁹³ Panasonic talks about the Internet of Things, hoping to encourage other companies to contribute (without cost) their intellectual property to foster development of network services among devices such as Panasonic’s consumer electronics.⁹⁴ IBM sticks more closely to Linux and open-source software that builds on Linux.⁹⁵ Tesla talks about open technology platforms for electric vehicles.⁹⁶ Blockchain emphasizes the power of permissionless innovation, an approach

⁸⁸ See Joachim Henkel et al., *The Emergence of Openness: How and Why Firms Adopt Selective Revealing in Open Innovation*, 43 RES. POL’Y 879, 880 (2014) (“Because Linux is OSS, customers now expected the driver source code to be publicly available. It was this demand pull that led ECMs to rethink the established practice of keeping drivers closed.”).

⁸⁹ While open innovation has many meanings, it is used in this Article to refer generally to a system of intellectual production that relies upon and encourages the sharing and use of knowledge across organizational boundaries. See definition of open innovation, *supra* note 80.

⁹⁰ See Henkel et al., *supra* note 88, at 879–80 (showing how open innovation can be supported through strategic forfeiture of IP rights, and examining how “openness” develops as a new dimension of competition); Joel West, *How Open Is Open Enough? Merging Proprietary and Open Source Platform Strategies*, 32 RES. POL’Y 1259, 1259–60, 1266–78 (2003) (examining hybrid strategies of open and proprietary IP and how choices reflect tensions between adoption and appropriability).

⁹¹ See generally Henkel et al., *supra* note 88.

⁹² See *id.* at 880.

⁹³ *More Patents in the Service of Open Source*, GOOGLE: GOOGLE OPEN SOURCE BLOG (Aug. 8 2013), <https://opensource.googleblog.com/2013/08/more-patents-in-service-of-open-source.html> [<https://perma.cc/KUY5-DH62>].

⁹⁴ See Charlie Osborne, *Panasonic Opens Royalty-Free Portfolio To Boost IoT Development*, ZDNET (Mar. 23, 2015), <http://www.zdnet.com/article/panasonic-opens-royalty-free-portfolio-to-boost-iot-development/> [<https://perma.cc/DLU5-NYLU>].

⁹⁵ See Schultz & Urban, *supra* note 8, at 30–31 (noting that IBM’s pledge is narrowly aimed at open-source software).

⁹⁶ See Musk, *supra* note 38.

compatible with the characteristics of Blockchain technology and the massive disintermediation that it enables.⁹⁷ In addition to competing over control of what “open innovation” means, pledges can also be a form of competition over the attention and support of open-source innovation communities.⁹⁸ In all of these ways, controlling what an “open” system entails could allow a company to shape norms and influence choices in ways that favor its own business strategy—regardless of the impact on social welfare.⁹⁹

Taken together, these defining features of being unilateral promises to the public, free of charge, defensive in nature, and offered in support of a social mission tied to open innovation, make this subset of patent pledges a unique private ordering of patents with the potential to impact innovation.¹⁰⁰ While patent pledges may address impediments that patents can create for at least some systems of open innovation, closer study suggests that the effects of patent pledges on innovation and the consequent impact on social welfare may be more complicated—particularly in areas characterized by platform competition.¹⁰¹ Part III shows how the subset of patent pledges described here form parts of innovation strategies through the use of two industry examples and, in doing so, also examines some of the complexities associated with patent pledge use in the

⁹⁷ See Adam Thierer, *CTFC's Giancarlo on Permissionless Innovation for the Blockchain*, TECHLIBERATION (Apr. 1, 2016), <https://techliberation.com/2016/04/01/cftcs-giancarlo-on-permissionless-innovation-for-the-blockchain/> [<https://perma.cc/BSE5-CCED>].

⁹⁸ See Heidemarie Hanekop & Patrick Feuerstein, *Institutional Foundations of Open Innovation and Field Dynamics in the Software Industry: From Antagonism to Contested Cooperation Between Firms and Open Source Community 1–3* (2014) (unpublished manuscript), http://www.sofi-goettingen.de/fileadmin/Publikationen/Hanekop_SASE_Paper_2014_final.pdf [<https://perma.cc/M8DL-KGEA>].

⁹⁹ See Barnett, *Costs*, *supra* note 2, at 2, 7 (re-examining the “free is good” proposition and suggesting that unpriced distribution of information goods may create social costs). Even if the intent is to promote socially beneficial open innovation, it is unclear whether patent pledges will adequately address some of the risks that patents create for open innovation communities. See Liza S. Vertinsky, *Making Room for Cooperative Innovation*, 41 FLA. ST. U. L. REV. 1067, 1070 (2014) (examining the incentive problems that patents create for some forms of cooperative innovation); Clark D. Asay, *Enabling Patentless Innovation*, 74 MD. L. REV. 431, 448 (2015) (arguing that patents create risks for certain kinds of open innovation communities and that using patent strategies to combat these risks is unlikely to be a viable long term strategy).

¹⁰⁰ Private ordering in this context refers to private actors building in new ways of using, and not using, their patents, through the use of contract and noncontract mechanisms, in an effort to change how patents impact their particular domains of interest. For a discussion of private ordering, see generally Steven L. Schwarcz, *Private Ordering*, 97 NW. U. L. REV. 319 (2002). Patent scholarship is full of examples of the use of private ordering to address limits of patents. See, e.g., F. Scott Kieff & Troy A. Paredes, *Engineering a Deal: Toward a Private Ordering Solution to the Anticommons Problem*, 48 B.C. L. REV. 111, 114 (2007) (proposing a solution to the IP anticommons problem “based on private ordering by market actors within the context of existing laws”); Merges, *supra* note 9, at 1295 (discussing the private preempting of patent rights and the use of collective rights organizations).

¹⁰¹ See *infra* Part IV for a discussion of the policy implications of efforts to promote open innovation.

context of platform competition. Part IV goes on to discuss both the benefits and the particular types of costs that may arise from these types of patent pledges.

III. PATENT PLEDGES AS INNOVATION STRATEGIES

Many of the earliest patent pledges covered software patents relevant to the development and use of open-source software.¹⁰² Patent pledges continue to be popular in the realm of open-source software, often augmenting rights already provided by patent owners via a variety of open-source licenses.¹⁰³ While open-source software remains a focal point for many of the pledges, however, a growing number encompass other emerging technology areas, most of which share in common an industry structure that involves some form of platform competition.¹⁰⁴ After a brief introduction to pledges in the context of platform competition, this Part illustrates the use of the subset of pledges described in Part II as innovation strategies through two industry examples where many of these pledges have been concentrated, clean energy vehicles and cloud computing. The examples illustrate the characteristics of these patent pledges and identify the opportunities that arise for both socially beneficial and socially costly use of patent pledges.

A. Pledges and Platform Competition

Many patent pledges tend to be concentrated in high technology markets characterized by platform competition.¹⁰⁵ It is therefore important to understand what technology platforms are and how patents and patent pledges may impact platform competition when assessing the effects of patent pledges.¹⁰⁶

¹⁰² Contreras, *Patent*, *supra* note 3, at 544–45.

¹⁰³ See Andrew Updegrove, *Patent Pledges and Open Source Software Development*, STANDARDS BLOG (May 5, 2015), <http://www.consortiuminfo.org/standardsblog/article.php?story=20150429163511469> [<https://perma.cc/LTT2-QFSC>] (advocating for use of patent pledges in open-source software context, and suggesting they provide a useful and flexible way of augmenting rights provided under simple, general open-source licenses).

¹⁰⁴ See Contreras, *Patent*, *supra* note 3, at 548–55 (discussing four categories of industries where patent pledges are used).

¹⁰⁵ See Marco Iansiti & Feng Zhu, *Dynamics of Platform Competition: Exploring the Role of Installed Base, Platform Quality and Consumer Expectations* 2 n.1 (ICIS 2007 Proceedings, Paper No. 38, 2007), <https://pdfs.semanticscholar.org/39ad/744a21b09b9145ae7cdca0d7c88abe753e13.pdf> [<https://perma.cc/66KT-39GL>] (defining platform as “a system with well-defined access points and rules on which other parties can build applications or services”).

¹⁰⁶ The social welfare effects of patents and pledges in platform economies are not well understood, although IP scholars interested in the economic organization of innovation have started to explore how they may impact platform competition. See generally Barnett, *Host's*, *supra* note 14, at 1927 (exploring role of patent forfeitures as strategies for committing to openness of a platform, with mixed social welfare effects); Robert P. Merges, *IP Rights and Technological Platforms* (Dec. 1, 2008) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1315522 [<https://perma.cc/3XHN-U5TJ>]

A technology platform can be understood as infrastructure upon which other technologies, products, and services can be built.¹⁰⁷ The platform itself serves no direct purpose for end users other than to enable and support one or more products or services that do serve the needs of end users.¹⁰⁸ For computers, the platform might be the operating system and computer hardware developed to enable software applications.¹⁰⁹ To succeed, a platform needs to attract both developers of products and services and customers.¹¹⁰ Facebook became a social media platform by enabling and enticing application developers to build applications on top of Facebook, and these applications attracted more users.¹¹¹ To entice application developers, the platform must conform to a set of standards that allows the development of products and services that are compatible with the platform.¹¹² These standards, and related information and technology needed to build products and services that work on the platform, can be protected as proprietary, can be made freely and openly available, or platform providers can pursue a hybrid strategy in which some aspects of the platform are open and some closed.¹¹³ A closed platform leaves the platform owner as gatekeeper in control of the applications, products, and/or services that can work

(exploring how IP functions for platform technologies and suggesting the need for rules that allow IP owners to credibly commit to open access).

¹⁰⁷ For a general definition, see, for example, Derek Pilling, *So, You Want To Be a Platform?*, CLOUDAVE (Nov. 25, 2009), <https://www.cloudave.com/1149/so-you-want-to-be-a-platform/> [<https://perma.cc/C753-473P>]. For an analysis of platforms, see generally Julie E. Cohen, *Law for the Platform Economy*, 51 U.C. DAVIS L. REV. (forthcoming 2017), <https://ssrn.com/abstract=2991261> [<https://perma.cc/68LZ-LPYX>].

¹⁰⁸ See Pilling, *supra* note 107.

¹⁰⁹ For a more comprehensive definition, see, for example, TECHOPEDIA, <http://www.techopedia.com/definition/3411/platform> [<https://perma.cc/VKP4-4X94>]; see also Cohen, *supra* note 107.

¹¹⁰ Pilling, *supra* note 107 (describing what makes a successful platform as more than just one which has the most developers; “a successful platform is one that facilitates the most value-creating interactions for the two or more customer groups it serves”). Evans and Schmalensee define an economic catalyst as “[a]n entity that has (a) two or more groups of customers; (b) who need each other in some way; but (c) who can’t capture the value from their mutual attraction on their own; and (d) rely on the catalyst to facilitate value-creating reactions between them.” DAVID S. EVANS & RICHARD SCHMALENSEE, CATALYST CODE 3 (2007); see also, e.g., S. Sriram et al., *Platforms: A Multiplicity of Research Opportunities* 1–2, 7–8 (Ross Sch. of Bus., Working Paper No. 1271, 2014), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2583816 [<https://perma.cc/UW8W-2SYV>] (denoting as one category of platforms “hardware/software” platforms, including computer operating systems, which bring together software developers and users).

¹¹¹ Pilling, *supra* note 107; see Cohen, *supra* note 107, at 17; Mark Neistat, *What Is the 3rd Platform and How Will It Affect Business?*, TECH. FIRST, <https://technologyfirst.org/magazine-articles/124-may-2013/843-mark-neistat-us-signal-company.html> [<https://perma.cc/V25E-8MXY>] (discussing mobile computing and social networking as core parts of the next technology platform that will dominate IT).

¹¹² See West, *supra* note 90, at 1259–60.

¹¹³ See *id.* at 1259–60 (examining hybrid proprietary and open-source strategies used by platform vendors, with competing imperatives for adoption and appropriability).

with the system.¹¹⁴ Apple Inc.'s App Store and Amazon's Cloud Platform are examples of closed platforms. An open technology platform is one that enables third parties to freely build applications and offer products or services that can be used on the platform without the control or approval of the platform owner.¹¹⁵ Rather than controlling development, the owner of the platform creates ways of allowing third parties to interface with and build on the platform.¹¹⁶ The owner of the platform may go even further, making available useful data for third parties to use in external application development.¹¹⁷ OpenStack employs an open platform approach, providing and supporting an open-source cloud computing platform.¹¹⁸ A hybrid strategy involves a mixed level of retained control and open access.¹¹⁹ Microsoft employs a hybrid approach in its cloud computing platform.¹²⁰

When firms compete in platform-based markets, "the ability to create and capture economic value depends heavily on striking an appropriate balance between 'open' and proprietary strategies."¹²¹ Network effects, where the value that consumers and developers place on the network increase as others adopt the platform, require firms to trade off appropriability to encourage platform adoption.¹²² Patent pledges play a role in this balancing act by serving as hybrid options somewhere in between proprietary and completely open patent strategies.¹²³ They can help to promote adoption of a particular technology by

¹¹⁴ See *id.* at 1259.

¹¹⁵ See Douglas Lichtman, *Property Rights in Emerging Platform Technologies*, 29 J. LEGAL STUD. 615, 616 (2000).

¹¹⁶ See *id.*

¹¹⁷ See *id.* (describing Apple's original design "with easy-access hardware ports and an accessible operating system, the purpose being to facilitate third-party development of compatible hardware and software accessories").

¹¹⁸ See Richard Tee & C. Jason Woodard, *Architectural Control and Value Migration in Layered Ecosystems: The Case of Open-Source Cloud Management Platforms 2* (SING. MGMT. UNIV. RESEARCH COLLECTION SCH. OF INFO.SYS., 2013); see also Julie Bort, *The Startups in This Hot Market Are All Vanishing*, BUS. INSIDER (June 3, 2015), <http://www.businessinsider.com/cisco-ibm-buy-openstack-startups-2015-6> [<https://perma.cc/8GNW-5JLM>].

¹¹⁹ See West, *supra* note 90, at 1259, 1279–80.

¹²⁰ See *id.* at 1278.

¹²¹ Tee & Woodard, *supra* note 118, at 2; see also Kevin Boudreau, *Open Platform Strategies and Innovation: Granting Access vs. Devolving Control*, 56 MGMT. SCI. 1849, 1865 (2010); West, *supra* note 90, at 1259.

¹²² West, *supra* note 90, at 1259; see also Barnett, *Host's*, *supra* note 14, at 1865, 1875 ("Platform markets exhibit network effects—that is, the platform's value is an increasing function of the number of users and uses."). Network effects have interesting implications for IP policies. See, e.g., Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CAL. L. REV. 479, 483, 591 (1998) (emphasizing complexity of network effects and challenges of fashioning legal response; examining where and when legal rules should be modified to take into account network effects).

¹²³ See West, *supra* note 90, at 1259–60; see also Contreras, *Patent*, *supra* note 3, at 545 ("Their voluntary commitments thus occupy a largely uncharted middle ground between the

committing the patent holder to zero pricing for patents covering a technology platform.¹²⁴ Where a platform provider forfeits its right to charge licenses for platform technology by relinquishing its intellectual property rights over this technology, it may compel competing stand-alone platform providers to exit the market altogether.¹²⁵ Patent pledges can also impact public expectations about the future adoption of a particular technology path or the future cost of that technology path, with significant effects on competition in markets where there are strong network effects or where technology choices today depend on technology developments in the future.¹²⁶

Where developers and consumers expect others to adopt a particular platform they will adopt it themselves, creating a tipping effect in the industry as expectations become self-fulfilling.¹²⁷ Disentangling those patent pledges that are a natural part of the competitive process from those that are being used to foreclose entry or drive out existing competing platforms in a predatory manner may be difficult. But while the consequences of patent pledges for social welfare in platform competition are uncertain, their ability to impact innovation—for better or for worse—is not.¹²⁸

The following two examples illustrate how pledges are being used as private innovation strategies in two important emerging technology areas, both of which involve platform competition.

full commercial exploitation of patent rights and the abandonment of those rights to the public domain.”).

¹²⁴For a discussion of strategic forfeiture of IP in platform markets, see, for example, Barnett, *Host's*, *supra* note 14, at 1884–89 (showing why platform holders may voluntarily forfeit valuable intellectual assets to encourage adoption and use of their platform).

¹²⁵This example is analyzed in Barnett, *Host's*, *supra* note 14, at 1869.

¹²⁶See Katz & Shapiro, *supra* note 86, at 96, 98, 105–06 (explaining that where demand is a function of expected size of the network, ability to influence expectations about adoption of a technology can lead to a tipping effect, giving this technology a dominant position in the market; where purchase of technology today is influenced by the price of complementary technology in the future, ability to influence expectations of the price of future technology will impact current purchase decisions).

¹²⁷See, e.g., *id.* at 105–06 (exploring the economics of market systems in which network effects are present).

¹²⁸See Barnett, *Host's*, *supra* note 14, at 1925–26; Lemley & McGowan, *supra* note 122, at 506 (“[A] standard-enhancing move in a network market might enhance efficiency on balance, even if it eliminates competition, since consumers of the standard product will benefit from increased adoption of the standard.”). For an argument that patent rights should be stronger where there are emerging platform technologies, see, for example, Lichtman, *supra* note 115, at 630 (arguing broad patent rights serve to enhance coordination between third party developers in ways that address the price externality and result in lower application process).

B. Clean Energy Vehicles

“We believe that Tesla, other companies making electric cars, and the world would all benefit from a common, rapidly-evolving technology platform.”

*–Tesla*¹²⁹

“[W]e believe that when good ideas are shared, great things can happen.”

*–Toyota*¹³⁰

In the summer of 2014, Tesla, the American producer of the first fully electric sports car, made the news with a public announcement from Tesla CEO Elon Musk that “All our Patent Are Belong To You.”¹³¹ In a blog post, Musk announced that Tesla would “not initiate patent lawsuits against anyone who, in good faith, wants to use our technology.”¹³² Tesla’s unilateral public pledge to limit the assertion of its patents without charge was characterized as a commitment to an open-source approach to patents, with open patents used as a mechanism for advancing the development of electric vehicle technology.¹³³ Tesla’s patent pledge is a unilateral promise to the public, with no return obligation on the part of the recipient.¹³⁴ While it is more like an invitation to negotiate for a royalty-free license than a license in itself, the pledge does not contemplate any further negotiation or writing and the expectation seems to be that companies will simply use the patents.¹³⁵ Elon Musk indicates on the Tesla website that “[w]e have had a number of inquiries from other car companies and we’ve told them to go ahead and use them.”¹³⁶ While the original pledge was notably short on details, and one of its key terms—the requirement to act in good faith—perhaps deliberately vague,¹³⁷ Tesla subsequently amended its pledge to formalize the terms and limits of the pledge.¹³⁸

Although the patent pledge may raise questions of legal enforceability, as discussed further in Part IV, the characteristics which make it less like a contract

¹²⁹ Musk, *supra* note 38.

¹³⁰ *Toyota Opens*, *supra* note 44.

¹³¹ Musk, *supra* note 38.

¹³² *Id.*

¹³³ *Id.*

¹³⁴ *See id.*; *see also* Contreras, *Patent*, *supra* note 3, at 545.

¹³⁵ *See* Eric Blattberg, *Here’s What Tesla’s ‘Good Faith’ Patent Stance Actually Means*, VENTUREBEAT (June 14, 2014), <https://venturebeat.com/2014/06/14/heres-what-teslas-good-faith-patent-stance-actually-means/> [<https://perma.cc/R8EB-YUB4>].

¹³⁶ *Elon Musk Says Rivals Are Now Using Tesla Patents*, TESLA: FORUM (Nov. 3, 2014, 3:06 PM), https://forums.tesla.com/nl_BE/forum/forums/elon-musk-says-rivals-are-now-using-tesla-patents [<https://perma.cc/P3X9-5FHB>].

¹³⁷ *See* Musk, *supra* note 38; *see also* Jack Ellis, *Toyota Shows Countrymen that Patent Value Creation Doesn’t Have To Be About Lawsuits*, IAM (Jan. 12, 2015), <http://www.iam-media.com/Blog/Detail.aspx?g=9c6de837-b370-419a-b5fc-9306b4e8338c> [<https://perma.cc/X5GZ-Y3JK>] (“[U]nlike Tesla, Toyota has provided a fair amount of detail on the nuts and bolts of how its programme will actually work.”).

or license are also characteristics which may facilitate the use of pledges to build and support business relationships.¹³⁹ The informal nature of the pledge, a blog post from Tesla's CEO, allows for communication on multiple levels to different constituencies—Tesla's customer base, potential and existing employees, investors—both private and government, industry partners, and competitors.¹⁴⁰ Establishing a good relationship with the public is important to the company, which depends heavily on its brand and its loyal customer and potential customer following to sell its expensive electric sports cars.¹⁴¹ Tesla uses blog posts on a regular basis to communicate with the public in fun and interesting ways, and the patent pledge, "All Our Patent Are Belong To You," takes the form of a meme with appeal to popular culture.¹⁴² The patent pledge advertises Tesla's open-source philosophy and emphasizes its social mission—cleaner cars for a cleaner planet.¹⁴³ The open-source approach has appeal to those customers, investors, and other supporters "who believe that patents are creating more problems than they solve."¹⁴⁴ The appeal to open source is also geared to attract talented engineers.¹⁴⁵

Musk has indicated as part of the patent pledge that Tesla sees talented engineers rather than patents as its scarce resource and hopes that talented engineers will be attracted by this open innovation platform to work on Tesla

¹³⁸ See Legal Notices Page, *Patent Pledge*, TESLA, <https://www.tesla.com/about/legal#patent-pledge> [<https://perma.cc/7LSH-VTVS>].

¹³⁹ See Nils Tracy, *Patent Pledges: Private Tool for the Public Good* 24 (Apr. 2016) (unpublished M.A. thesis, Duke University), <https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/11965/Nils%20Tracy%20Masters%20Project.pdf?sequence=1> [<https://perma.cc/5PH6-NSX2>].

¹⁴⁰ See Musk, *supra* note 38.

¹⁴¹ See *id.*; see also Rutter, *supra* note 84 (discussing importance of customer loyalty for Tesla strategy); Jason E. Stach & Shawn S. Chang, *Maximizing a Patent's Value by Pledging Not To Assert It?*, FINNEGAN (Mar./Apr. 2015), <https://www.finnegan.com/en/insights/maximizing-a-patent-s-value-by-pledging-not-to-assert-it.html> [<https://perma.cc/ZF2Q-N3BM>] (noting positive impact of pledge on stock price and customer reaction).

¹⁴² Patrick George, *Tesla Will 'Open-Source' All Its Patents*, JALOPNIK (June 12, 2014), <http://jalopnik.com/tesla-motors-all-our-patents-are-belong-to-you-1589971589> [<https://perma.cc/9YLN-FNYZ>] ("CEO Elon Musk announced this morning in California that the nascent electric car company will open up all its patents 'for the advancement of electric vehicle technology.' And he did it with a meme, which is awesome."). The pledge is a word play on "All Your Base Are Belong to Us." See *All Your Base Are Belong to Us*, KNOW YOUR MEME, <http://knowyourmeme.com/memes/all-your-base-are-belong-to-us> [<https://perma.cc/954L-MYP8>].

¹⁴³ See Musk, *supra* note 38; see also *About Tesla*, TESLA, <https://www.tesla.com/about> [<https://perma.cc/KB6C-FKG7>] (describing Tesla's mission "to accelerate the world's transition to sustainable energy").

¹⁴⁴ See Musk, *supra* note 38; see also Matthew Rimmer, *Tesla Motors' Open Source Revolution: Intellectual Property and the Carbon Crisis*, MEDIUM (June 15, 2014), <https://medium.com/@DrRimmer/tesla-motors-open-source-revolution-intellectual-property-and-the-carbon-crisis-95259ff867e6> [<https://perma.cc/NYA5-3TK5>] ("Elon Musk's embrace of an open source philosophy will also be powerful in terms of marketing and public relations—both within the industry, and with the wider community.").

¹⁴⁵ See Rimmer, *supra* note 144; see also Musk, *supra* note 38.

technology.¹⁴⁶ The use of pledges to generate popular appeal among employees, customers, and the public at large is a common aspect of many of the pledges made.¹⁴⁷

While the pledge seems designed to build the relationship between the company and its relevant constituents, it is also no doubt intended to influence their expectations about cost and access to Tesla's desired technology platform.¹⁴⁸ Here a platform refers to the infrastructure that is needed to make electric cars work, such as charging stations that are compatible with the electric cars.¹⁴⁹ The ability to influence expectations about whether a particular technology will be adopted as an industry platform and whether this platform will remain open is critical in settings like this where large initial investments by developers are required, network effects are strong, and both customers and suppliers are worried about being locked into a technology choice that later proves undesirable.¹⁵⁰ Tesla's CEO explains the rationale for its patent pledge as a belief that "Tesla, other companies making electric cars, and the world would all benefit from a common, rapidly-evolving technology platform" that Tesla's portfolio of now free patents helps to support.¹⁵¹ Tesla plans to compete with big automobile companies through the collaborative, open development of an electric vehicle platform compatible with—ideally modeled on—Tesla's technology.¹⁵² The patent pledge is most likely designed to impact expectations about whether electric vehicle technology will become the dominant platform for clean energy vehicles, whether the technology that is adopted will be compatible with Tesla's technology choices, and whether the platform will

¹⁴⁶ See Rimmer, *supra* note 144; see also Musk, *supra* note 38.

¹⁴⁷ See, e.g., Contreras, *Patent*, *supra* note 3, at 591 (discussing public relations motivations for patent pledges).

¹⁴⁸ See Blattberg, *supra* note 135; Will Oremus, *Tesla Is Opening Its Patents to All. That's Not as Crazy as It Sounds.*, SLATE: FUTURE TENSE (June 12, 2014, 2:44 PM), http://www.slate.com/blogs/future_tense/2014/06/12/tesla_opens_patents_to_public_what_is_elon_musk_thinking.html [<https://perma.cc/8U3N-TQ43>].

¹⁴⁹ See Blattberg, *supra* note 135; Oremus, *supra* note 148; see also Contreras, *Patent*, *supra* note 3, at 584 ("In Tesla's case, the platform is a national electric vehicle infrastructure including charging stations, parts suppliers, and automobiles, all conforming to Tesla's standards and design choices.").

¹⁵⁰ See Katz & Shapiro, *supra* note 86, at 96 (explaining where demand is a function of expected size of the network, ability to influence expectations about adoption of a technology can lead to a tipping effect, giving this technology a dominant position in the market; where purchase of technology today is influenced by price of complementary technology in the future, ability to influence expectations of the price of future technology will impact current purchase decisions); see Iansiti & Zhu, *supra* note 105, at 2 (discussing study which found "the driver of market dynamics depends critically on . . . the strength of indirect network effects and the consumer discount factor of future applications").

¹⁵¹ Musk, *supra* note 38.

¹⁵² See Blattberg *supra* note 135; see also Contreras, *Patent*, *supra* note 3, at 584.

remain an open access platform.¹⁵³ The patent pledge helps to convince industry participants that Tesla is committed to an industry-wide open platform for electric vehicle technology and that Tesla will offer its own intellectual property contributions to this platform royalty-free.

In addition to infrastructure, cost is a second major barrier that electric cars face, and batteries are a large part of this cost.¹⁵⁴ Tesla invests heavily in improving its battery technology, and in an ambitious move Tesla has undertaken construction of a five billion dollar “gigafactory” to produce battery kits for electric vehicles.¹⁵⁵ Tesla is interested not only in lowering the cost of its cars through cheaper batteries, but also in battery sales as a major source of revenue.¹⁵⁶ This is another reason for its interest in encouraging adoption of its own electric vehicle standards through patent pledges and other means—battery sales are tied to sales of compatible electric vehicles.¹⁵⁷

While many of Tesla’s patents and patent applications concern battery technology,¹⁵⁸ it is also amassing first mover advantages through its construction of the massive state of the art manufacturing facility and considerable know how in battery production, providing it with alternative sources of competitive advantage.¹⁵⁹ Tesla has sought collaboration in battery technology, perhaps to influence adoption of its preferred standards, but its efforts to expand discussions of collaboration with BMW beyond charging

¹⁵³ See Contreras, *Patent*, *supra* note 3, at 584; see also Barnett, *Costs*, *supra* note 2, at 4.

¹⁵⁴ See Mike Ramsey, *Tesla Plans \$5 Billion Battery Factory*, WALL ST. J. (Feb. 26, 2014), <https://www.wsj.com/articles/no-headline-available-1393449665> [<https://perma.cc/33LC-SW6K>].

¹⁵⁵ *Id.* But see David Z. Morris, *Tesla’s Gigafactory Could Be Obsolete Before It Even Opens. Here’s Why*, FORTUNE (Apr. 27, 2015), <http://fortune.com/2015/04/27/gigafactory-obsolete/> [<https://perma.cc/K5BP-DH5U>]; Mike Ramsey, *Will Tesla’s \$5 Billion Gigafactory Make a Battery Nobody Else Wants?*, WALL ST. J. (Apr. 4, 2014, 11:56 AM), <https://blogs.wsj.com/corporate-intelligence/2014/04/04/will-teslas-5-billion-gigafactory-make-a-battery-no-one-else-wants/> [<https://perma.cc/9VT3-9HU4>].

¹⁵⁶ See Ramsey, *supra* note 154; see also Paul Nunes & Joshua Bellin, *Elon Musk’s Patent Decision Reflects Three Strategic Truths*, HARV. BUS. REV. (July 1 2014), <https://hbr.org/2014/07/elon-musks-patent-decision-reflects-three-strategic-truths> [<https://perma.cc/6FTN-MKNL>] (“A strategy of enticing other automakers to adopt Tesla’s standards in order for Tesla to become the supplier of choice for other automakers when it comes to batteries and specialty parts for EVs.”).

¹⁵⁷ See Ramsey, *supra* note 154.

¹⁵⁸ See Fred Lambert, *Tesla Obtains Patent for Charging Metal-Air Battery Technology that Could Enable Longer Range*, ELECTREK (Feb. 13, 2017), <https://electrek.co/2017/02/13/tesla-patent-metal-air-battery/> [<https://perma.cc/XM59-CVLD>]; see also Fred Lambert, *Tesla Attempts To Patent New Method for ‘Charging Batteries Safely’*, ELECTREK (Mar. 23, 2017), <https://electrek.co/2017/03/23/tesla-patent-method-charging-batteries-safely/> [<https://perma.cc/9H96-59KT>].

¹⁵⁹ See Ramsey, *supra* note 154; see also Contreras, *Patent*, *supra* note 3, at 584 (“Though Tesla does not own every aspect of this infrastructure, nationwide adoption of an electric vehicle platform could yield huge dividends to Tesla as a first mover and supplier of vehicles, parts, batteries, charging stations, and the like . . .”).

stations into battery and lightweight-composite technologies do not appear to have fared well,¹⁶⁰ and its battery supply deal with Toyota was not renewed.¹⁶¹ Tesla's patent pledge coincided roughly with the expiration of a battery-supply deal between Tesla and Toyota¹⁶² and disinvestment of Tesla stock by Daimler.¹⁶³ Shifting its attention to consumers, the pledge by Tesla may reflect an effort to encourage public support for Tesla's standard, thus influencing developer expectations about the likelihood that Tesla's standard will become an industry standard.¹⁶⁴ Proterra, a leading manufacturer of electric buses, recently followed in Tesla's shoes and made a promise to make patents relating to its electric vehicle fast charging system freely available with the hope that it would "accelerate widespread EV technology adoption and infrastructure development."¹⁶⁵

Toyota, a competitor with an alternative vision of what clean energy cars should look like, responded to Tesla's efforts with its own patent pledge.¹⁶⁶ Toyota announced its patent pledge covering hydrogen fuel powered vehicles in January 2015 at the large Consumer Electronics Show technology conference.¹⁶⁷ Toyota has been involved in research and development of technologies for clean energy transportation for quite some time, and it has developed both electric cars, such as the hybrid Toyota Prius, as well as a "large portfolio of patents" covering alternative clean vehicle technologies.¹⁶⁸ After an earlier and relatively unsuccessful collaboration with Tesla in electric vehicle

¹⁶⁰ See, e.g., Bob Sorokanich, *BMW Says Musk's Collaboration Talk Is PR Hogwash*, CAR & DRIVER (Dec. 2, 2014), <http://blog.caranddriver.com/bmw-says-musks-collaboration-talk-is-pr-hogwash/> [<https://perma.cc/RPF7-UFH7>].

¹⁶¹ Hiroko Tabuchi, *Seeing Future in Fuel Cells, Toyota Ends Tesla Deal*, N.Y. TIMES (May 12, 2014), <https://www.nytimes.com/2014/05/13/business/energy-environment/seeing-future-in-fuel-cells-toyota-ends-tesla-deal.html> [<https://perma.cc/M7CT-AHPL>].

¹⁶² See *id.*; see also Clifford Atiyeh, *Unplugged: Toyota Axing RAV4 EV, Won't Renew Tesla Deal*, CAR & DRIVER (May 15, 2014, 7:09 PM), <http://blog.caranddriver.com/unplugged-toyota-axing-rav4-ev-wont-renew-tesla-deal/> [<https://perma.cc/2TGX-WJP5>].

¹⁶³ Jens Meiners, *Mercedes-Benz Parent Daimler Divests Itself of Tesla Holdings*, CAR & DRIVER (Oct. 22, 2014, 11:03 AM), <http://blog.caranddriver.com/mercedes-benz-parent-daimler-divests-itself-of-tesla-holdings/> [<https://perma.cc/HY66-7QYU>].

¹⁶⁴ Oremus, *supra* note 148.

¹⁶⁵ Fred Lambert, *Electric Bus Maker Proterra Follows Tesla's Lead and Open-Sources Its Fast-Charging Patents*, ELECTREK (June 28, 2016), <https://electrek.co/2016/06/28/electric-bus-maker-proterra-tesla-lead-open-sources-fast-charging-patents/> [<https://perma.cc/KK4E-8KQ3>].

¹⁶⁶ *Toyota Opens*, *supra* note 44; see also Contreras, *Patent*, *supra* note 3, at 585 ("Toyota's announcement that it would grant royalty-free licenses to nearly 5,700 patents covering automotive hydrogen fuel cells can be viewed as a direct response to Tesla's pledge.").

¹⁶⁷ *Toyota Opens*, *supra* note 44.

¹⁶⁸ Matthew Rimmer, *Toyota v Tesla: Eliminating Patent Trolls To Save the Hydrogen Car*, CRIKEY (Jan. 15, 2015), <https://www.crikey.com.au/2015/01/15/toyota-v-tesla-eliminating-patent-trolls-to-save-the-hydrogen-car/> [<https://perma.cc/J6JZ-GPDG>].

technology,¹⁶⁹ Toyota has focused its recent efforts on developing a hydrogen fuel cell vehicle, the Toyota Mirai.¹⁷⁰ The Mirai is the world's first mass-market hydrogen-powered car.¹⁷¹

The pledge marks a distinct change from Toyota's traditional approach to its intellectual property.¹⁷² The stated rationale for Toyota's pledge was, similar to Tesla's rationale, the need for a common technology platform to support hydrogen-powered electric vehicles.¹⁷³ The biggest challenge to fuel cell cars is the lack of hydrogen filling stations.¹⁷⁴ There are only about a dozen hydrogen fueling stations across the United States.¹⁷⁵ Bob Carter, senior vice president of Toyota automotive operations, explained that the development of the first generation of fuel cell vehicles will require a "concerted effort and unconventional collaboration between automakers, government regulators, academia, and energy providers."¹⁷⁶ The pledge is seemingly intended to encourage adoption of hydrogen fuel cell technology as a platform technology, making it more attractive for producers of hydrogen cars and suppliers of the necessary hydrogen fuel infrastructure to enter the market.¹⁷⁷

In its patent pledge, Toyota promises royalty-free use of approximately 5,680 fuel cell related patents, including critical technologies that were developed for the Toyota Mirai.¹⁷⁸ The patents are "made available to automakers who will produce and sell fuel cell vehicles, as well as to fuel cell

¹⁶⁹ Tabuchi, *supra* note 161.

¹⁷⁰ Drew Harwell, *We Test-Drove the Toyota 'Future' Car that Elon Musk Hates*, WASH. POST (May 11, 2015), https://www.washingtonpost.com/news/the-switch/wp/2015/05/11/we-test-drove-the-toyota-future-car-that-elon-musk-hates/?utm_term=.beb08ebbee88 [<https://perma.cc/VD9Y-AEED>].

¹⁷¹ *Id.*

¹⁷² See *Toyota Opens*, *supra* note 44 ("Toyota has a long history of opening its intellectual properties through collaboration, and was instrumental in facilitating the widespread adoption of hybrid vehicles by licensing related patents. Today's announcement represents the first time that Toyota has made its patents available free of charge and reflects the company's aggressive support for developing a hydrogen-based society."); see also Rimmer, *supra* note 168 ("The announcement by Toyota marks a significant shift in the company's approach to the management and exploitation of intellectual property. The decision shows an engagement with intellectual property, the collaborative common, and the sharing economy.").

¹⁷³ *Toyota Opens*, *supra* note 44.

¹⁷⁴ Kevin Bullis, *Why Toyota and GM Are Pushing Fuel-Cell Cars to Market*, MIT TECH. REV. (July 5, 2013), <https://www.technologyreview.com/s/516711/why-toyota-and-gm-are-pushing-fuel-cell-cars-to-market/> [<https://perma.cc/XT2N-CZTW>] ("Fuel-cell vehicles . . . would require a massive investment in hydrogen filling stations to be practical."); Harwell, *supra* note 170.

¹⁷⁵ Harwell, *supra* note 170.

¹⁷⁶ *Toyota Opens*, *supra* note 44.

¹⁷⁷ Wayne Cunningham, *Toyota Kickstarting Fuel Cell Future with Patent Release*, CNET (Jan. 5, 2015), <https://www.cnet.com/roadshow/news/toyota-kickstarting-fuel-cell-future-with-patent-release/> [<https://perma.cc/K2EQ-BNTY>].

¹⁷⁸ *Toyota Opens*, *supra* note 44.

parts suppliers and energy companies who establish and operate fuelling stations,” and companies that develop and introduce fuel cell buses and industrial equipment.¹⁷⁹ “Requests from parts suppliers and companies looking to adapt fuel cell technology outside of the transportation sector will be evaluated on a case by case basis.”¹⁸⁰ Companies that want to take advantage of the pledge must enter into a written agreement with Toyota.¹⁸¹ “Toyota will request, but will not require,” prospective licensees to provide licenses to “their own fuel cell-related patents with Toyota for similar royalty-free use.”¹⁸²

Under the terms of Toyota’s pledge, the “[p]atents related to fuel cell vehicles will be available” pursuant to “royalty-free licenses until the end of 2020[, and] [p]atents for hydrogen production and supply will remain [available for royalty-free use] for an unlimited duration.”¹⁸³ This means that 5,610 of the 5,680 patents will only be made available until 2020—the period of time that Toyota believes it will take for the first generation of hydrogen vehicles to be available to the mass market.¹⁸⁴ The seventy patents that will be made available indefinitely relate to hydrogen production and supply for filling stations, critical infrastructure if fuel cell vehicles are to succeed.¹⁸⁵ While Toyota’s patent pledge only encompasses fuel cell-related patents wholly owned by Toyota, a small portion of its total patent portfolio of more than 25,000 issued U.S. patents,¹⁸⁶ this number dwarfs Tesla’s entire patent portfolio.¹⁸⁷ If Toyota succeeds in establishing its hydrogen fuel cell technology as an industry standard, it will have significant control over that standard.

The confluence of Tesla and Toyota pledges has been compared by commentators to an “open patent war,” with the pledges described as salvos in the competition for alternative clean energy transportation technologies.¹⁸⁸ The competition takes on an international dimension, since the United States was initially a supporter of fuel cell technology but later abandoned it in favor of alternatives such as electric cars and biofuels, with Japan now emerging as a champion of hydrogen fuel cell vehicles.¹⁸⁹ Tesla and Toyota have both

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ *Id.*

¹⁸² *Id.*

¹⁸³ *Id.*

¹⁸⁴ See *Toyota Opens*, *supra* note 44.

¹⁸⁵ See *id.*

¹⁸⁶ *Toyota Profile*, JUSTIA, <http://companyprofiles.justia.com/company/toyota> [<https://perma.cc/8NPB-98T6>].

¹⁸⁷ *Tesla Motors Profile*, JUSTIA, <https://companyprofiles.justia.com/company/tesla-motors> [<https://perma.cc/2WJQ-3JG6>].

¹⁸⁸ Ron Pernick, *Tesla, Toyota, and Open Patents: The Hype and the Hope*, CLEAN EDGE, <https://cleanedge.com/views/Tesla-Toyota-and-Open-Patents-The-Hype-and-the-Hope> [<https://perma.cc/9R3Q-KMSX>].

¹⁸⁹ See Peter Nowak, *Despite What Elon Musk Says, Don’t Count Hydrogen Fuel Cells Out Just Yet*, NATIONAL (Feb. 22, 2017), <https://www.thenational.ae/business/peter-nowak->

received support from their respective governments in their clean energy vehicle development efforts.¹⁹⁰ Both Tesla and Toyota seem to be focusing on the need to support open technology platforms as a necessary part of their business models, and are using patent pledges to assure market participants that their pledged patents will not be used to hinder access to these technology platforms and to encourage adoption and use of the patented technologies.¹⁹¹

While the pledges made by Tesla and Toyota are no doubt designed to promote adoption of preferred clean energy vehicle platforms and to encourage innovation in these platforms,¹⁹² the pledges are also impacting the price of different technologies, expectations about and preferences over alternative technologies, and the attractiveness of competing technologies, in ways that are hard to identify.¹⁹³ The actual effects of the pledges on innovation within the broader market for clean energy cars over time are thus difficult to predict and will depend in part on future decisions made by the holders of the pledged patents.

Ford, one of the largest U.S. automakers with its own hybrid and fully electric vehicles, subsequently entered the patent pledge fray with its own promise to “open” up its electrified vehicle patents, although not without a fee.¹⁹⁴ Ford promised to make a portfolio of its patents relating to electrified vehicle technology available to “competitive automakers to accelerate industry-wide research and development of electrified vehicles.”¹⁹⁵

despite-what-elon-musk-says-don-t-count-hydrogen-fuel-cells-out-just-yet-1.10461
[<https://perma.cc/9XKD-CJWW>].

¹⁹⁰ See, e.g., Jerry Hirsch, *Elon Musk's Growing Empire Is Fueled by \$4.9 Billion in Government Subsidies*, L.A. TIMES (May 30, 2015), <http://www.latimes.com/business/la-fi-hy-musk-subsidies-20150531-story.html> [<https://perma.cc/2E4E-SXGZ>]; Fred Lambert, *White House Unlocks \$4.5 Billion for Electric Vehicle Infrastructure and Announces New EV Programs*, ELECTREK (July 21, 2016), <https://electrek.co/2016/07/21/white-house-unlocks-4-5-billion-for-electric-vehicle-infrastructure-and-announces-new-ev-programs/> [<https://perma.cc/J9G9-4NDL>]; Bertel Schmitt, *Japan's Big Carmakers Gang Up in Support of Hydrogen Fuel Cell Vehicles, at Least Officially*, FORBES (May 19, 2017), <https://www.forbes.com/sites/bertel-schmitt/2017/05/19/japans-big-carmakers-gang-up-in-support-of-hydrogen-at-least-officially/#755bd5891a9d> [<https://perma.cc/QWU8-5QEU>].

¹⁹¹ See Contreras, *Market*, *supra* note 8, at 482 (arguing that pledges are intended to induce the market to invest in and adopt common technology platforms or shared industry standards, and arguing for a new market reliance theory to secure the benefits these pledges offer); see also Barnett, *Costs*, *supra* note 2, at 4.

¹⁹² See Clark D. Asay, *The Informational Effects of Patent Pledges*, in PATENT PLEDGES, *supra* note 8, at 227, 235.

¹⁹³ See Katz & Shapiro, *supra* note 86, at 96; e.g., Stephanie Mlot & Chloe Albanesius, *Ford Opens Electric Vehicle Patents (For a Fee)*, PC MAG. (May 29, 2015), <http://www.pcmag.com/article2/0,2817,2484971,00.asp> [<https://perma.cc/FCG7-Q5YY>].

¹⁹⁴ Mlot & Albanesius, *supra* note 193.

¹⁹⁵ *Ford Opens Portfolio of Patented Technologies to Competitors To Accelerate Industry-Wide Electrified Vehicle Development*, BUS. WIRE (May 28, 2015), <http://www.businesswire.com/news/home/20150527006635/en/Ford-Opens-Portfolio-Patented-Technologies-Competitors-Accelerate#.VYBcBRbs9Hh> [<https://perma.cc/4PWJ-YEF9>].

“Ford has more than 650 electrified vehicle patents and approximately 1,000 pending patent applications on electrified vehicle technology,” with 400 of these applications filed in 2014.¹⁹⁶ Ford is most likely using its patent pledge to focus industry attention on vehicles with moderate hybrid technology (Ford’s hybrid drivetrain technology) rather than “fully-electric or plug-in hybrid cars.”¹⁹⁷ Ford’s use of patent pledges suggests that patent pledges play a role, or at least are believed to play a role, in influencing supplier and consumer decisions about alternative technology standards and platforms.

The common theme running through these uses of patent pledges in the clean energy vehicle industry is the role of pledges as mechanisms to influence the adoption, development, use, and price of a particular technology platform.¹⁹⁸ The growing use of pledges is accompanied by greater use of other defensive patenting practices that potentially impact competition, such as participation by competitors Honda and Hyundai in the IP3 (Industry Patent Purchase Program)¹⁹⁹ and the participation by Ford, Hyundai, Kia, Subaru, Mazda, Nissan and Honda in the LOT Network (in which members agree to license any patent that is transferred to other members in the network).²⁰⁰ The potential social welfare implications of these patent pledge strategies are explored further in Part IV.

¹⁹⁶ *Id.*

¹⁹⁷ Nikki Gordon-Bloomfield, *Ford Pulls a Tesla, Makes Electrified, Electric Vehicle Patents Open—But There’s a Fee This Time*, TRANSPORT EVOLVED (May 28, 2015), <https://transportevolved.com/2015/05/28/ford-pulls-a-tesla-makes-electrified-electric-vehicle-patents-open-but-theres-a-fee-this-time/> [<https://perma.cc/64ZP-DGD8>].

¹⁹⁸ *See, e.g.*, Cunningham, *supra* note 177; Lambert, *supra* note 165.

¹⁹⁹ Jeff John Roberts, *Tech and Auto Firms Join Google-Led Patent Purchase Program*, FORTUNE (May 18, 2016), <http://fortune.com/2016/05/18/patents-ip3/> [<https://perma.cc/5EAG-JVVC>].

²⁰⁰ Carolyn Said, *Tech, Auto Companies Form Nonprofit To Disarm Patent Trolls*, S.F. CHRON. (Feb. 1, 2016), <http://www.govtech.com/budget-finance/Tech-Auto-Companies-Form-Nonprofit-to-Disarm-Patent-Trolls.html> [<https://perma.cc/3TAF-EFJE>] (discussing growing participation of auto companies in LOT network).

C. Patent Pledges in the Cloud

*“As the web becomes something that lives through and on the phone, and software something handled in a cloud, the clear lines that once defined territories and strategies are blurring.”*²⁰¹

*“Things used to be so simple. It was once easy to characterize companies as either open or closed. But the sands are changing”*²⁰²

Cloud computing allows computing resources to be delivered on-demand as a service through the use of shared computer resources accessed over the internet or through mobile devices.²⁰³ The cloud refers to the large data centers that perform computing tasks.²⁰⁴ Cloud computing technologies are altering the ways in which information can be managed, stored, and shared and, in doing so, are changing the dynamics of information and technology markets and the ways in which companies in these markets compete.²⁰⁵ Intellectual property strategies are shifting in response, and patent pledges are being deployed as part of these strategies.²⁰⁶

The basic provision of cloud computing services is dominated by a small number of large firms, with Amazon, Microsoft and Google leading the pack and traditional information technology companies like IBM following

²⁰¹ *Another Game of Thrones*, *ECONOMIST* (Dec. 1, 2012), <https://www.economist.com/news/21567361-google-apple-facebook-and-amazon-are-each-others-throats-all-sorts-ways-another-game> [<https://perma.cc/YLB6-2S9S>].

²⁰² Ben Kepes, *Google Becomes an OpenStack Sponsor. What Is Happening in This World?*, *NETWORK WORLD* (July 16, 2015), <http://www.networkworld.com/article/2948978/cloud-computing/google-signs-up-as-openstack-corporate-sponsor-what-is-happening-in-this-world.html> [<https://perma.cc/P798-RZ6K>].

²⁰³ See PETER MELL & TIMOTHY GRANCE, NAT’L INST. OF STANDARDS & TECH., SPECIAL PUB. 800-145, *THE NIST DEFINITION OF CLOUD COMPUTING* (2011), <http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf> [<https://perma.cc/S6ET-7YMD>]; *Cloud Computing: Clash of the Clouds*, *ECONOMIST* (Oct. 15, 2009), <http://www.economist.com/node/14637206> [<https://perma.cc/V6MB-XWNH>]. The U.S. National Institute of Standards and Technology (NIST) defines cloud computing as “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.” MELL & GRANCE, *supra*, at 2.

²⁰⁴ *Cloud Computing: Clash of the Clouds*, *supra* note 203.

²⁰⁵ See *id.* For an overview of the impact of cloud computing, see generally *Highs and Lows: As IT Gets Cloudier, the Economics of the Business Will Change*, *ECONOMIST* (Oct. 23, 2008), <http://www.economist.com/node/12411838> [<https://perma.cc/4QWZ-9RYU>].

²⁰⁶ Quentin Hardy, *Cloud Computing Is Forcing a Reconsideration of Intellectual Property*, *N.Y. TIMES: BITS* (Oct. 11, 2014), <https://bits.blogs.nytimes.com/2014/10/11/cloud-computing-is-forcing-a-rethink-of-intellectual-property/> [<https://perma.cc/7Q6G-LRV2>].

behind.²⁰⁷ These competitors are interested in having their own respective approaches to cloud computing serve as the industry standard and they are using intellectual property strategies to assist in this goal.²⁰⁸ Their strategies vary, however, both in terms of the extent to which they rely upon open platforms and in the features of their platform that are open versus proprietary.²⁰⁹ An open cloud platform is one that features interoperability and data portability for users, and provides the information needed for developers to freely design applications for the system, with some industry debate over whether open also implies open source.²¹⁰ IBM and Google pursue a relatively open cloud computing strategy.²¹¹ A closed system limits the movement of customers and their data and keeps application programming interfaces and related intellectual property proprietary.²¹² Amazon pursues a proprietary cloud strategy.²¹³ In addition to choices over open, closed, or hybrid clouds, these competitors also diverge in their choices of public, private, or hybrid cloud offerings.²¹⁴ A public cloud involves pooled, shared computing resources that are accessed over the internet; a private cloud is operated within a single customer's firewall and under its own control; and hybrid clouds allow a mix of public and private cloud computing.²¹⁵ Amazon and Google focus primarily on public clouds, while Microsoft and IBM offer hybrid clouds.

Amazon has by far the largest share of the cloud computing market, benefiting from a first mover advantage, strong economies of scale, and strong

²⁰⁷ See Barb Darrow, *Amazon Still Leads Cloud Rankings, but Competition Is Coming on Strong*, FORTUNE (June 15, 2017), <http://fortune.com/2017/06/15/gartner-cloud-rankings/> [<https://perma.cc/XPK7-86LE>].

²⁰⁸ See Eric Jhonsa, *As Amazon, Microsoft, and Google Keep Taking Cloud Share, Rivals Are Learning To Specialize*, STREET (June 19, 2017), <http://realmoney.thestreet.com/articles/06/19/2017/amazon-microsoft-and-google-keep-taking-cloud-share-rivals-are-learning-specialize> [<https://perma.cc/5WUF-WPCX>].

²⁰⁹ See generally Matt Weinberger, *Google Just Made a Move To Leapfrog Microsoft and Amazon in the Cloud Wars*, BUS. INSIDER (July 16, 2015), <http://www.businessinsider.com/google-joins-openstack-foundation-2015-7> [<https://perma.cc/A7TB-VE8L>] (describing competition between Amazon, Google, and Microsoft to get their respective cloud computing platforms into big businesses).

²¹⁰ Alex Williams, *What Is an Open Cloud and What Isn't?*, TECHCRUNCH (Aug. 30, 2012), <https://techcrunch.com/2012/08/30/what-is-an-open-cloud-and-what-is-not/> [<https://perma.cc/5XDE-P67M>].

²¹¹ See Weinberger, *supra* note 209; see also Lichtman, *supra* note 115, at 616.

²¹² See Liza Vertinsky, *The Role of Patent Pledges in the Cloud*, in PATENT PLEDGES, *supra* note 8, at 260, 262.

²¹³ See Brandon Butler, *Sizzling Open vs. Proprietary Debate Heats Up the Cloud*, NETWORK WORLD (Apr. 18, 2012), <http://www.techadvisor.co.uk/feature/internet/sizzling-open-vs-proprietary-debate-heats-up-cloud-3352247/> [<https://perma.cc/5QC8-5VBV>]; Kurt Marko, *Proprietary vs. Open Source Clouds: Why Can't We All Just Get Along?*, FORBES (June 18, 2014), <https://www.forbes.com/sites/kurtmarko/2014/06/18/enterprise-cloud-prop-v-opensource/#598d127e6ec1> [<https://perma.cc/WJH2-AEQ2>].

²¹⁴ Weinberger, *supra* note 209.

²¹⁵ See Tee & Woodard, *supra* note 118, at 10; see also Weinberger, *supra* note 209.

network effects.²¹⁶ As Amazon attracts more customers, the costs of providing public cloud services fall and the attractiveness of the Amazon cloud platform to application developers increases.²¹⁷ As the number of applications for the Amazon platform increases, the attractiveness of the platform to customers also increases. Not surprisingly, given Amazon's already substantial market share and ability to leverage network effects and scale economies, Amazon has not been interested in opening up its patent portfolio or its platform. Instead, Amazon's intellectual property strategies appear to be designed to maintain its cloud computing platform as a proprietary system that limits interoperability with other platforms.²¹⁸ Amazon is alone among the market leaders in its focus on closed cloud platforms, and is the only one of the market leaders not to make patent pledges.²¹⁹

In contrast to Amazon's proprietary cloud platform, Microsoft, Google, and IBM are proponents of hybrid and open cloud platforms.²²⁰ They appear to be using patent pledges strategically to influence the attractiveness of their platforms for both developers of applications and customers, to encourage the use of complementary proprietary products, and to control the nature and type of openness of dominant cloud technologies.²²¹ The different ways in which each of these three companies earn their revenue influence the types of technologies that they would like to have freely available and those areas that they would prefer to keep as proprietary, and these differences are reflected in their patent pledges.

Microsoft is now in fierce competition with Amazon and Google to capture cloud computing customers for its hybrid cloud platform Azure.²²² In its pursuit of customers and developers, it is moving away from its traditional proprietary strategies to engage in open-source licensing and patent pledges.²²³

²¹⁶ See Matt Weinberger, *The Cloud Wars Explained: Why Nobody Can Catch Up with Amazon*, BUS. INSIDE (Nov. 7, 2015), <http://www.businessinsider.com/why-amazon-is-so-hard-to-topple-in-the-cloud-and-where-everybody-else-falls-2015-10> [<https://perma.cc/6T94-5KUN>].

²¹⁷ See Barnett, *Host's*, *supra* note 14, at 1865; see also Lemley & McGowan, *supra* note 122, at 494.

²¹⁸ Vertinsky, *supra* note 212, at 264–65.

²¹⁹ See *id.* at 262–64.

²²⁰ See Antone Gonsalves, *IBM Makes OpenStack the Cloud Platform To Beat*, READWRITE (Mar. 5, 2013), <https://readwrite.com/2013/03/05/ibm-makes-openstack-the-cloud-platform-to-beat/> [<https://perma.cc/SH4C-LBLF>].

²²¹ See *id.*

²²² See Barb Darrow, *Microsoft Hands Out More Free Cloud Stuff To Woo Startups*, FORTUNE (June 16, 2015), <http://fortune.com/2015/06/16/microsoft-hands-out-more-free-cloud-stuff-to-woo-startups/> [<https://perma.cc/EG8W-KJE3>] (describing how Microsoft is offering \$120,000 in free cloud services to startups, following in the footsteps of Amazon and Google which also provide cloud credits for startups).

²²³ See Brandon Butler, *Cloud Computing Showdown: Amazon vs. Rackspace vs. Microsoft vs. Google*, COMPUTERWORLD UK (Dec. 4, 2012), <https://www.computerworlduk.com/it-vendors/cloud-computing-showdown-amazon-vs-rackspace-vs-microsoft-vs-google-3414732/> [<https://perma.cc/6FQL-DGG8>]. Microsoft's interest in interoperability has not

The move away from proprietary strategies is limited, however. Microsoft's patent pledges have taken the form of relatively narrow, unilateral promises to limit the assertion of Microsoft patents against developers and customers who implement Microsoft approved specifications.²²⁴ These pledges are designed to facilitate and encourage the implementation and use of the identified specifications.²²⁵ Given its continuing interest in sales of proprietary software, Microsoft's patent pledges are likely informed by its interest both in lowering the cost of things that are complementary to software sales and in allowing interoperability between its software and different technologies.²²⁶ The pledges are carefully crafted to focus on allowing interoperability with certain Microsoft products.²²⁷

While IBM and Google have both advocated for "open" approaches to cloud computing, their approaches appear to diverge in the nature of the openness that they advocate for, the open-source technologies and standards they promote, and the parts of the cloud platform they would like to keep as proprietary.²²⁸ The competition over alternative visions of "open" is evident in their patent pledge strategies. IBM's earliest patent pledges were designed to protect and promote the development and use of a specific type of open-source software—the Linux operating system.²²⁹ IBM's more recent patent strategies have

stopped it from bringing patent infringement suits against other cloud computing companies, such as one brought against Salesforce.com for Microsoft patents relating to cloud and web functionality. *See generally* Florian Mueller, *The OIN Gave Salesforce.com Four Patents To Assert Against Microsoft*, FOSS PATENTS (May 31, 2011), <http://www.fosspatents.com/2011/05/oin-gave-salesforcecom-four-patents-to.html> [<https://perma.cc/XYP5-KFH7>]. Interestingly, in that case the Open Innovation Network (OIN) assigned four patents to Salesforce.com, not an OIN member, to assert offensively against Microsoft—raising questions about how closely OIN sticks to its announced mission of protecting open-source software.

²²⁴ *See Patent Promises and Patents*, MICROSOFT, <https://msdn.microsoft.com/en-us/open-specifications/dn750984> [<https://perma.cc/VHU9-9AMR>]; *see also* Andy Updegrave, *Microsoft Releases New "Open Specifications Promise" on 35 Web Services Specifications*, CONSORTIUMINFO.ORG: STANDARDS BLOG (Sept. 12, 2006), <http://www.consortiuminfo.org/standardsblog/article.php?story=20060912140103877> [<https://perma.cc/HYZ4-SDV2>].

²²⁵ *See* Updegrave, *supra* note 224.

²²⁶ *See* Ed Bott, *Apple, Google, Microsoft: Where Does the Money Come From?*, ZDNET: THE ED BOTT REPORT (Feb. 6, 2014), <http://www.zdnet.com/article/apple-google-microsoft-where-does-the-money-come-from/> [<https://perma.cc/74JT-EFL2>]. *See* Butler, *supra* note 223. To illustrate, take Microsoft's recent partnership with Google to allow Microsoft customers to move Windows applications to Google's cloud, thus making its applications more attractive to customers. *See* Julie Bort, *Microsoft's Brilliant Move To Make Money from Archival Google*, BUS. INSIDER (Dec. 8, 2014), <http://www.businessinsider.com/microsoft-will-let-customers-run-its-software-on-googles-cloud-2014-12> [<https://perma.cc/4E59-NHUZ>].

²²⁷ *See* Butler, *supra* note 223; *see also* Contreras, *Patent*, *supra* note 3, at 580, 582–83.

²²⁸ *See* Vertinsky, *supra* note 212, at 266.

²²⁹ *See* Merges, *supra* note 106. "In the same year that it made its unilateral patent pledge, IBM was also a founding member of Open Invention Network (OIN), a defensive patent pool intended to protect Linux and Linux-related open-source software through

expanded to include protection and encouragement of the development and use of a cloud open-source operating system called OpenStack.²³⁰ OpenStack is an open-source cloud operating system that supports the building and management of cloud computing platforms.²³¹ It was started in 2010 as a joint project between Rackspace Hosting and NASA, and it is now managed by OpenStack Foundation, an open-source cloud computing community with over 189 organizations and over 9,100 individual participants.²³² OpenStack offers an alternative open-source platform to compete with proprietary platforms such as that used by Amazon Web Services.²³³ After considering alternative ways of handling patents, the OpenStack Foundation decided to require contributing members to OpenStack to agree to the terms of the Apache 2.0 open-source license, a decision it has since revisited but not changed.²³⁴ IBM is building its cloud computing offerings to work in conjunction with OpenStack and would no doubt like to position OpenStack as the industry standard.²³⁵ OpenStack has been heavily supported not just by IBM, but also by other large corporate players that have vested interests in the broad adoption and use of OpenStack.²³⁶

Google derives a large share of its revenue from advertising in a variety of ways that utilize the Internet, and therefore stands to benefit from expanding the use of the Internet by facilitating access and keeping the cost of information

defensive cross-licensing.” Vertinsky, *supra* note 212, at 268 (citing OPEN INVENTION NETWORK, <http://www.openinventionnetwork.com> [<https://perma.cc/F5N2-N6AV>]).

²³⁰ See Angel Diaz & Chris Ferris, *IBM’s Open Cloud Architecture*, IBM: DEVELOPER WORKS, <http://www.ibm.com/developerworks/cloud/library/cl-open-architecture/> [<https://perma.cc/A35K-N2F7>]. IBM’s SmartCloud, which is a collection of cloud computing technologies and services for building and using private, public, and hybrid clouds, as well as IBM’s other cloud computing technologies, are built around OpenStack. See Eric Knorr, *What IBM’s Embrace of OpenStack Really Means*, INFOWORLD (Mar. 11, 2013), <http://www.infoworld.com/article/2613858/cloud-computing/what-ibm-s-embrace-of-openstack-really-means.html?page=2> [<https://perma.cc/Z9AN-JL4G>] (“IBM becomes new de facto leader of OpenStack project after announcing all its cloud products will be built around core OpenStack bits.”).

²³¹ See Tee & Woodard, *supra* note 118, at 11; see also *What Is Open Stack?*, OPENSOURCE, <http://opensource.com/resources/what-is-openstack> [<https://perma.cc/T82G-7FGJ>].

²³² See Diaz & Ferris, *supra* note 230; see also Tee & Woodard, *supra* note 118, at 11.

²³³ See Tee & Woodard, *supra* note 118, at 11.

²³⁴ See *OpenStack Community Q&A*, OPENSTACK, <https://www.openstack.org/projects/openstack-faq/> [<https://perma.cc/7WJX-TYWE>]; see also Jodi Smith, *The OpenStack Foundation Lumbers Toward a Stronger IP Policy*, MIRANTIS: MIRANTIS BLOG (Jan. 19, 2015), <https://www.mirantis.com/blog/openstack-foundation-lumbers-toward-stronger-ip-policy/> [<https://perma.cc/H83Z-EMQG>].

²³⁵ See Diaz & Ferris, *supra* note 230. IBM’s SmartCloud, which is a collection of cloud computing technologies and services for building and using private, public, and hybrid clouds, as well as IBM’s other cloud computing technologies, are built around OpenStack. See Knorr, *supra* note 230 (“IBM becomes new de facto leader of OpenStack project after announcing all its cloud products will be built around core OpenStack bits”).

²³⁶ See Serder Yegulalp, *4 Reasons Why Google Joined OpenStack*, INFOWORLD (July 17, 2015), <https://www.infoworld.com/article/2948901/openstack/4-reasons-google-joined-openstack.html> [<https://perma.cc/QRG7-5BJP>].

low.²³⁷ While Google has diversified its efforts to include revenues from areas such as cloud platform technologies, investing heavily in its own proprietary Google Cloud Platform and a suite of cloud applications, it continues to be very interested in ensuring open access to the Internet to support its cloud based offerings as well.²³⁸ Google's patent pledges reflect this vision of and concentration on an open Internet.²³⁹ Google made its first patent pledge in March 2013 when it announced the "Open Patent Non-assertion Pledge."²⁴⁰ Pursuant to this pledge, Google promises not to sue any user, distributor or developer of free software or open-source software on specified patents unless Google is attacked first.²⁴¹ Also according to the terms of this pledge, Google will require any subsequent assignee of the pledged patents to agree to abide by the pledge.²⁴² Google's first patent pledge included ten patents relating to MapReduce and Hadoop programming models that have applications in cloud computing environments.²⁴³ One of the patents in this group was a controversial patent that covered parallel processing in tools like Hadoop used by many products and services in the area of big data.²⁴⁴ Google subsequently expanded its "Open Patent Non-Assertion Pledge" to include seventy-nine additional patents covering essential elements of big data important to cloud computing,²⁴⁵ followed soon after by another 152 patents relating to technologies that facilitate

²³⁷ See *Highs and Lows*, *supra* note 205 ("[A]most everything [Google] does—building huge data centres, fighting copyright restrictions, digitising the world's libraries, developing a new browser and, most recently, even helping to launch satellites—is aimed at increasing the use of the internet.").

²³⁸ See Conner Forrest, *Four Ways Google Makes Money Outside of Advertising*, TECHREPUBLIC (Jan. 16, 2015), <http://www.techrepublic.com/article/four-ways-google-makes-money-outside-of-advertising/> [https://perma.cc/SP5S-CLPP].

²³⁹ See, e.g., Duane Valz, *Taking a Stand on Open Source and Patents*, GOOGLE: OPEN SOURCE BLOG (Mar. 28, 2013), <https://opensource.googleblog.com/2013/03/taking-stand-on-open-source-and-patents.html> [https://perma.cc/3NTG-NWH2].

²⁴⁰ *Open Patent Non-Assertion Pledge*, GOOGLE, <http://www.google.com/patents/opnpledge/pledge/> [https://perma.cc/9DZG-4HDG]; see Daniel Naezer, *Google Makes Open Patent Non-Assertion Pledge and Proposes New Licensing Models*, ELECTRONIC FRONTIER FOUND. (Mar. 28, 2013), <https://www.eff.org/deeplinks/2013/03/google-makes-open-patent-non-assertion-pledge> [https://perma.cc/DYL7-BU35].

²⁴¹ *Open Patent Non-Assertion Pledge*, *supra* note 240.

²⁴² *Id.*

²⁴³ See, e.g., Jeff Roberts, *Google Donates Patents To Protect Cloud Software from Lawsuits*, GIGAOM (Mar. 23, 2013), <https://gigaom.com/2013/03/28/google-donates-patents-to-protect-cloud-software-from-lawsuits/> [https://perma.cc/6LFH-7YVS].

²⁴⁴ Barb Darrow, *The Week in Cloud: AWS Goes Mobile; Google Vows Patent Pledge; Cloud Wars Rage On*, GIGAOM (Mar. 31, 2013), <https://gigaom.com/2013/03/31/the-week-in-cloud-aws-goes-mobile-google-vows-patent-pledge-cloud-wars-rage-on/> [https://perma.cc/GTG4-PR5H].

²⁴⁵ See, e.g., Frederic Lardinois, *Google Adds 79 Cloud and Big Data Patents to Its Open Patent Non-Assertion Pledge*, TECHCRUNCH (Aug. 8, 2013), <http://techcrunch.com/2013/08/08/google-adds-79-new-cloud-and-big-data-patents-to-its-open-patent-non-assertion-pledge/> [https://perma.cc/Y5FX-F49R].

speed and security on the web and 5 patents relating to MapReduce data-processing technology.²⁴⁶

While Google advocates for an open innovation ecosystem, its patent pledges are notably limited in both scope and the number of patents included. The pledges are limited to use of open-source software and do not extend to any proprietary software or hardware used in combination with open-source software.²⁴⁷ Google's patent filings have increased exponentially over the last ten years and Google is now one of the top winners of U.S. software patents and the owner of more than 51,000 patents.²⁴⁸ This means only a very small fraction of the patents in Google's rapidly growing patent portfolio are included. Moreover, the pledges include a defensive termination provision that sweeps broadly to cover not only Google and its affiliates, but also third parties using Google's products and services.²⁴⁹ The pattern of Google's patenting and pledging behavior suggest a strategy that makes some aspects of software and cloud computing open while leaving others proprietary.

The use, and nonuse, of patents in the cloud computing market is designed to impact the choices that customers make over what cloud computing platform or service to select, the choices that application developers make, as well as the choices made by actual and potential competitors in the cloud computing and related markets.²⁵⁰ Patent pledges are playing an important, but poorly understood role in this industry, refashioning the relationships between patents, competition, and innovation in ways that may bring costs as well as benefits.²⁵¹

²⁴⁶ Google Developers, Announcement of Expansion of Open Patent Non-Assertion Pledge, GOOGLE+ (Aug. 26, 2014), <https://plus.google.com/+GoogleDevelopers/posts/eJFWj3VNG1L> [<https://perma.cc/TH58-JCMC>].

²⁴⁷ *Open Patent Non-Assertion Pledge*, *supra* note 240.

²⁴⁸ See, e.g., Antonio Regalado, *Google's Growing Patent Stockpile*, MIT TECH. REV.: BUS. IMPACT (Nov. 29, 2013), <https://www.technologyreview.com/s/521946/google-growing-patent-stockpile/> [<https://perma.cc/YJ2R-W2YN>].

²⁴⁹ *Open Patent Non-Assertion Pledge*, *supra* note 240.

²⁵⁰ Vertinsky, *supra* note 212, at 275.

²⁵¹ For a detailed look at the role of patent pledges in the cloud, see generally *id.* at 260–76.

IV. BENEFITS AND COSTS OF PATENT PLEDGES

“The promise given was a necessity of the past: the word broken is a necessity of the present.”
-Niccolo Machiavelli²⁵²

Part IV begins with a brief overview of benefits that patent pledges offer, many of which have been highlighted in the existing literature on patent pledges, and then turns to focus on the relatively neglected potential costs of patent pledges. While the unique characteristics of patent pledges provide advantages to the private actors who make them, there is no guarantee that the use of patent pledges will also lead to improvements in social welfare.²⁵³ The private and unilateral nature of the pledge allows the patent pledgor to craft the terms of the pledge with private rather than public interests in mind.²⁵⁴ The decentralized nature of pledges allows for tailoring of pledges to individual contexts and needs in ways that may or may not promote broader systems of open innovation.²⁵⁵ Questions about the legal enforceability of patent pledges and the relationship between the pledged restrictions and the patent may further limit the social benefits and increase the social costs associated with their use.²⁵⁶ Given the variety of different ways in which patent pledges may be made, and the variety of motivations for their use, there are currently no good legal mechanisms for sorting out beneficial from costly uses *ex ante*, and constraining the latter. Here I identify four types of benefits that patent pledges offer and three types of costs that patent pledges could pose. In Part IV, I suggest a way of mitigating these costs while preserving socially beneficial uses of patent pledges.

A. *Benefits of Patent Pledges*

As noted in the introduction, patent pledges have been widely celebrated as mechanisms for opening up the patent system.²⁵⁷ They have been described as mechanisms for mitigating some of the costs of a patent system overly focused

²⁵² JAMES WOOD, *DICTIONARY OF QUOTATIONS FROM ANCIENT AND MODERN, ENGLISH AND FOREIGN SOURCES* 449 (1899).

²⁵³ For a discussion of the disconnect between the private benefits accruing to patent holders and public benefits from the patent grant, see generally Ted Sichelman, *Purging Patent Law of “Private Law” Remedies*, 92 *TEX. L. REV.* 517 (2014) (discussing the disconnect between the private benefits accruing to patent holders and public benefits from the patent grant).

²⁵⁴ See Tracy, *supra* note 139, at 20.

²⁵⁵ See *id.* at 20.

²⁵⁶ See *id.* at 3–5, 24–28; see also Contreras, *Market*, *supra* note 8, at 482 (“Despite the increasing prevalence of patent pledges and their importance to the economy, current legal theories do not adequately support the enforcement of these promises.”).

²⁵⁷ See generally Chien, *Opening*, *supra* note 2 (discussing the role of patent pledges in making it easier to share technology, allowing patent owners to rebalance the patent system; suggests reorienting the patent system to better support open innovation models).

on exclusion by introducing elements more consistent with collaboration and knowledge sharing.²⁵⁸ The benefits of nonassertion agreements and offers of royalty-free cross-licenses, of which patent pledges are a subset, are recognized in the DOJ and FTC reports and guidelines addressing antitrust considerations in intellectual property arrangements.²⁵⁹ The specific benefits of pledges fall into four main categories: (1) providing a private mechanism for patent sharing not available under the statutory scheme; (2) reducing transaction costs; (3) encouraging technology adoption and use, particularly in the presence of network effects; and (4) reduced patent litigation risks.

1. *Mechanism for Patent Sharing*

Patent pledges provide a relatively low cost, easy way of opening up patents for interested parties to use them, creating a private mechanism for sharing in the absence of a statutory sharing mechanism from within patent law.²⁶⁰ They can be seen as just one of the many ways in which private ordering is used to address patent barriers and encourage open innovation.²⁶¹

2. *Lowers Transaction Costs*

Patent pledges have the potential to reduce transaction costs, as well as the overall cost of developing technologies that are covered by pledged patent rights. They can reduce transaction costs for the patent owner by providing a low cost way of making patents widely accessible to the public.²⁶² They reduce transaction costs for interested users of the patented technology by dispensing with the need to identify whether a license is needed and removing the need to negotiate a license.²⁶³ The diverse, decentralized, and informal ways in which patent pledges can be made allow them to function as flexible and cheap forms of communication, further lowering transaction costs.²⁶⁴ The communication may involve intentions to support open-source projects, interest in collaboration, or a willingness to allow patented technology to become part of an open technology platform. The reduction of high transaction costs associated with negotiating bilateral and multilateral licenses might allow productive technology partnerships to form in areas where they otherwise might not.

²⁵⁸ See Tracy, *supra* note 139, at 3–5 (discussing the benefits of patent pledges).

²⁵⁹ See, e.g., DOJ & FTC, ENFORCEMENT, *supra* note 20, at 57–61, 88–91.

²⁶⁰ See Chien, *Opening*, *supra* note 2, at 840–45.

²⁶¹ See *id.*

²⁶² *Id.* at 841.

²⁶³ See *id.*

²⁶⁴ See *id.* at 800, 841.

3. *Facilitates Adoption and Use of New Technologies*

Patent pledges can be used to encourage the adoption of new technologies, particularly those that bring with them social welfare benefits, such as the adoption of green technologies or the development of, and access to, technologies used to produce essential health products.²⁶⁵ This was the idea behind the formation of the (now defunct) Eco-Patent Commons, a patent community in which companies pledged their patents to further environmentally friendly technologies.²⁶⁶ Nonassertion provisions have been used to provide access to patented research tools that are important in biomedical research.²⁶⁷ The pledges allow patent owners to make credible commitments to keep their technology open, allowing both the patent owner and potential adopters of the technology to benefit.²⁶⁸ Patent pledges and other defensive patenting strategies have played an important role in the growth of open-source software communities by providing protection against infringement suits to open-source developers and users.²⁶⁹ Many of the participants in open-source projects would not be able to absorb the costs needed to defend themselves against patent suits or the costs of acquiring their own defensive patent portfolio.²⁷⁰

4. *Reducing Patent Litigation Risks*

The defensive aspect of the pledges can be used to provide some protection to open-source projects, although it likely will have limited impact on the behavior of patent assertion entities. The basic idea behind defensive patent licensing is to build up a patent portfolio in order to deter offensive patent suits.²⁷¹ This strategy can be effective in deterring litigation in situations where the firms involved are practicing entities that might suffer from a return lawsuit.²⁷² The development of the LOT Network offers a further innovation designed to reduce the threat from patent assertion entities by requiring

²⁶⁵ Contreras, *Patent*, *supra* note 3, at 552–55.

²⁶⁶ See ECO-PATENT COMMONS, <https://ecopatentcommons.org/> [<https://perma.cc/J5U6-X2HS>] (discussing mission to manage patents pledged for unencumbered use by companies and IP rights holders to make it easier and faster to innovate and implement technologies that improve and protect the environment). *But see Eco-Patent Commons Statement*, E-PC, https://ecopatentcommons.org/sites/default/files/docs/eco-patent_commons_executive_board_statement.pdf [<https://perma.cc/J5U6-X2HS>] (unfortunately the Eco-Patent Commons ceased active operation in May 2016 due to a lack of new members interested in joining).

²⁶⁷ See Anatole Krattiger, *The Use of Nonassertion Covenants: A Tool To Facilitate Humanitarian Licensing, Manage Liability, and Foster Global Access*, in 1 INTELLECTUAL PROPERTY MANAGEMENT IN HEALTH AND AGRICULTURAL INNOVATION 739, 741 (Anatole Krattiger et al. eds., 2007).

²⁶⁸ See Contreras, *Market*, *supra* note 8, at 481–82.

²⁶⁹ See Contreras, *Patent*, *supra* note 3, at 585–86.

²⁷⁰ See *id.*

²⁷¹ *Id.* at 6–7.

²⁷² *Id.*

members of the network to license their patents to other members upon transfer of a patent to a patent assertion entity.²⁷³ Pledges appeal to the open-source community and can be used to encourage open-source innovation projects that might otherwise not survive.

B. *Costs of Patent Pledges*

While patent pledges offer not only private but also social benefits, this Article points out that they can also be used in ways that generate social costs. It identifies three types of costs that patent pledges can create for social welfare: (1) costs arising from patent hold-up; (2) foreclosure of alternative technology paths; and (3) use of pledges to create barriers to entry, particularly for startup companies pursuing divergent technology paths. These costs arise where patent holders exploit limitations in the legal framework governing patent pledges along with private information about their intellectual property and business strategies to act opportunistically. Opportunistic behavior in this context refers to behavior that, although technically legal, is designed to secure unintended benefits from the legal system in socially costly ways.²⁷⁴

1. *Patent Hold-Up*

Patent pledges create hold-up risks when the pledges encourage users of patented technology to make technology-specific investments while the patent holder retains the ability to assert patents that cover either (a) these technology choices, or (b) essential complementary technologies once investments have been sunk.²⁷⁵ The investments that patent pledges encourage can take a variety of forms, including product design choices, customer time spent learning how to use a particular technology, and time spent by the user or a manufacturer customizing the product or service.²⁷⁶ Patent hold-up may come in the form of direct increases in cost, such as the charging of a fee for a product or service that was formerly available for free, or in the form of indirect increases in costs, such as increased disclosure of consumer data or increased advertising.²⁷⁷ This

²⁷³ See Schulman, *supra* note 8; see also SEDDON, *supra* note 7.

²⁷⁴ This definition of opportunism is based on that developed by Henry Smith in his work on the role of equity in the law. See, e.g., Smith, *Equity*, *supra* note 24, at 8–9.

²⁷⁵ See Contreras, *Market*, *supra* note 8, at 489. Patent hold-up occurs when a patent owner takes advantage of the reduced flexibility a company has after it has adopted patented technology to extract more than reasonable royalties. See, e.g., Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007) (studying problems of patent hold-up that can occur when a patent covers one component or feature of a complex product).

²⁷⁶ Contreras, *Market*, *supra* note 8, at 489.

²⁷⁷ See Hoofnagle & Whittington, *supra* note 2, at 624–26 (discussing psychological and behavioral economics research showing biasing effects of free offers, emphasizing the personal information transactions that make many “free” internet services costly); see also Jorge L. Contreras, *Equity, Antitrust, and the Reemergence of the Patent Unenforceability*

patent pledge hold-up problem is a variant of the widely discussed and studied hold-up problems that arise when the holder of a patent covering a component of a much bigger product, a necessary complementary good, or a standard can act opportunistically once investments have been sunk to exploit the reduced flexibility of the technology user and extract more than a reasonable royalty for the patent.²⁷⁸ As discussed in this literature, patent hold-up can negatively impact cumulative innovation, distort competition, and lead to inefficient technology choices, as well as inflating the price of products and services covered by the patent for end users.²⁷⁹

The most direct way in which pledges can create hold-up costs is through limits in the term or number of patents that are included in a patent pledge. Where the pledge encourages adoption of an emerging technology, these limits create opportunities for asserting either the same patents or related patents covering the patented technology in the future once investments in the technology have been sunk. In the context of the clean energy vehicle pledges discussed in Part III, this risk of hold-up has yet to be realized since the pledges are relatively recent and the pledge makers are still focused on encouraging adoption of their competing clean energy technologies. Toyota's pledge of its hydrogen fuel technology patents has a term that expires in 2020, for example.²⁸⁰ This leaves Toyota free to assert any unexpired patents, or new ones that it subsequently obtains, for licensing or litigation purposes once its hydrogen fuel cell vehicle technology has been adopted. Tesla's patent pledge does not include a term limit,²⁸¹ and the informal nature of the pledge leaves open the possibility it could be revoked in the future once Tesla's electric

Remedy, ANTITRUST SOURCE 1–2 (Oct. 2011) [hereinafter Contreras, *Equity*], http://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?article=1187&context=facsch_lawrev [<https://perma.cc/T5ZU-KT9C>] (discussing hold-up, which occurs where patent holders offer standards for free and then once users are locked in, begin seeking royalties).

²⁷⁸ See, e.g., Robert P. Merges & Jeffery M. Kuhn, *An Estoppel Doctrine for Patented Standards*, 97 CAL. L. REV. 1, 10–13 (2009) (examining patent hold-up problems in contexts of standards); see also Thomas Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. CORP. L. 1151, 1160 (2009) (providing broad view of patent hold up as opportunistic behavior resulting in static and dynamic inefficiency); Lemley & Shapiro, *supra* note 275, at 1993 (discussing how patent hold-up and threat of injunction can influence royalties, “especially if the patented technology covers one component of a complex product”).

²⁷⁹ See Joseph Farrell et al., *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L.J. 603, 608, 614–15 (2007) (exploring some of the social costs from patent hold-up, including negative impact on cumulative innovation, the burden of excessive royalties, and negative impacts on the competitive process for selecting technologies); see also DOJ & FTC, ENFORCEMENT, *supra* note 20, at 35 n.11, 36 & n.17.

²⁸⁰ Jack Ellis, *Toyota Shows Countrymen that Patent Value Creation Doesn't Have To Be About Lawsuits*, IAM (Jan. 12, 2015), <http://www.iam-media.com/Blog/Detail.aspx?g=9c6de837-b370-419a-b5fc-9306b4e8338c> [<https://perma.cc/X5GZ-Y3JK>].

²⁸¹ See generally Musk, *supra* note 38 (lacking any description of a time limit to the use of Tesla's patent pledges).

vehicle technology has been adopted—at least with respect to potential technology developers or users who have not already relied upon the pledge.

In the cloud computing context and, more generally, in internet based computing platforms, variants of patent pledge hold-up are already occurring in ways that generate large but hidden costs for consumers and other industry stakeholders. Patent pledges, along with other complementary zero-pricing strategies, are used by some of the largest providers of cloud and mobile device platforms, including Google, IBM, and even Microsoft (although not Amazon) to promote the open and “free” nature of their preferred computing platforms. Yet customers of “free” computing platforms are, sometimes unknowingly, authorizing platform providers to access, use, and transfer their data for advertising purposes, and these information costs often increase over time as customers become locked into existing technology choices.²⁸² The platform providers are able to increase the “price” of their free technologies over time, after consumers have invested in the platform, with the price increase taking the indirect form of greater attention and information costs for consumers.²⁸³ Platform providers in two-sided markets also engage in hold-up by increasing the cost to developers of accessing the platform once the platform has attracted a large enough customer base, raising the costs of application development in ways that ultimately impact costs to consumers.²⁸⁴

Even if the party making the patent pledge has no intention of acting opportunistically, under the current state of the law it is unclear whether the pledge is enforceable, what the consequences are if it simply disappears from the company’s website, and whether the pledge will follow the pledged patents if they are transferred to another entity through sale, donation, or bankruptcy.²⁸⁵

²⁸² See, e.g., Hoofnagle & Whittington, *supra* note 2, at 610–11 (emphasizing the personal information transactions that make many “free” internet services costly); William Jeremy Robison, Note, *Free at What Cost?: Cloud Computing Privacy Under the Stored Communications Act*, 98 GEO. L.J. 1195, 1220 (2010) (discussing the exchange of “free” cloud computing services for data access and use, with significant costs to customers in terms of lost privacy).

²⁸³ See Newman, *supra* note 2, at 165–72, 174 (discussing the attention and information costs associated with free internet platforms as part of broader argument for broader antitrust role within zero-price markets); see also Jeremy Singer-Vine & Anton Troianovski, *How Kid Apps Are Data Magnets*, WALL ST. J. (June 27, 2013), <https://www.wsj.com/articles/SB10001424127887324520904578553662943430052> [<https://perma.cc/TVN8-9X4H>] (describing how a Wall Street Journal examination of forty free child-friendly apps on Google’s Android and Apple Inc.’s iOS systems found many were collecting and sharing information about the users).

²⁸⁴ See generally Benjamin Edelman & Damien Geradin, *Android and Competition Law: Exploring and Assessing Google’s Practices in Mobile*, 12 EUR. COMPETITION J. 159 (2016) (describing how Google’s Android platform came to have a dominant market position, how it was offered to hardware manufacturers for free, and how “Google’s Android-related contract provisions harm competition to the detriment of developers of competing apps and services, as well as to the detriment of consumers”).

²⁸⁵ See, e.g., Contreras, *Market*, *supra* note 8, at 482 (suggesting the need for additional legal tools to ensure that patent pledges are enforceable on subsequent purchasers of patents);

This creates future risks of patent hold-up that are hard for a patent pledgor to eliminate. While under current leadership Tesla is extremely unlikely to engage in patent hold-up, for example, changes in the financial position of the company or its leadership could result in a subsequent change in patent strategy or divestiture of patent assets. The growth of the secondary market for patents, including a number of recent multimillion-dollar acquisitions of patent portfolios through merger, sale, or as part of bankruptcy proceedings, makes the limitations of pledges in the event of transfer a very real concern.²⁸⁶ The development of the License on Transfer (LOT) Network, which requires members to cross-license their patents to other members upon transfer of the patents to a patent assertion entity,²⁸⁷ is evidence of the fear that companies have of how patents may be used against them in the event of transfer. As of January 2017 the LOT Network had over 100 members, including Google (the founder of the Network), Uber, Ford, GM, and SAP, and included more than half a million patent assets.²⁸⁸ Recent data gathered by the LOT Network showed that since the inception of the Network members have divested themselves of over 42,000 patent assets, some of which have ended up in the hands of patent assertion entities, indicating just how real the possibility of transfer is.²⁸⁹ The secondary market for patents in emerging technology areas, including new

Contreras, *Patent*, *supra* note 3, at 598–600; Jay P. Kesan & Carol M. Hayes, *FRAND's Forever: Standards, Patent Transfers, and Licensing Commitments*, 89 IND. L.J. 231, 261–85 (2014) (examining the limits of contract, patent, and antitrust laws in addressing problems of enforcing FRAND commitments after patent transfer).

²⁸⁶ For an overview of the changes in the secondary market for patents and how it played out for Kodak, see Mark Harris, *The Lowballing of Kodak's Patent Portfolio*, IEEE SPECTRUM (Jan. 31, 2014), <http://spectrum.ieee.org/at-work/innovation/the-lowballing-of-kodaks-patent-portfolio> [<https://perma.cc/PYH3-B4VB>]. For just a few of the strategic acquisitions of patent portfolios taking place, see, for example, Matt Buchanan, *Google's Twelve-Billion Dollar Regret*, NEW YORKER (Jan. 29, 2014), <http://www.newyorker.com/tech/elements/googles-twelve-billion-dollar-regret> [<https://perma.cc/F5BP-ML47>] (discussing Google's purchase of Motorola Mobility and its patent portfolio relating to smart phones for \$12.5 billion, and current selling of it and parts of its patent portfolio to Chinese computer company Lenovo); Andrew Chung, *RPX Buys Apple-Backed Rockstar Patents for \$900 Million*, REUTERS (Dec. 23, 2014), <http://www.reuters.com/article/2014/12/23/us-rpx-rockstar-ip-idUSKBN0K11AI20141223> [<https://perma.cc/PMB8-9LK2>] (detailing the sale of the more than 4,000 patents owned by Rockstar Consortium, which was formed from the \$4.5 billion purchase of 6,000 Nortel Network Corp. patents in 2011 following its bankruptcy); Steve Lohr, *On Google, FTC Set Rules of War Over Patents*, N.Y. TIMES (Jan. 4, 2013), <http://www.nytimes.com/2013/01/05/technology/in-google-patent-case-ftc-set-rules-of-engagement-for-battles.html> [<https://perma.cc/85WA-J2XW>] (discussing Google's purchase of Motorola, including patents that had been pledged to license on reasonable terms).

²⁸⁷ BELCHER & CASEY, *supra* note 5, at 14.

²⁸⁸ See SEDDON, *supra* note 7.

²⁸⁹ See Jack Ellis, *LOT Network Can Look Back on a Bumper 2016 Thanks to Asian Subscriptions*, IAM: BLOG (Dec. 16, 2016), <http://www.iam-media.com/blog/detail.aspx?g=263b3cc1-0052-4b2e-9385-09e483945dd5> [<https://perma.cc/H424-WKNW>] (looking at data on third party assignment of patents by LOT members).

automotive and cloud computing technologies, is particularly active, with growing interest in such patents from patent assertion entities.²⁹⁰

Patent pledges can also be used in ways that enable patent pledgors to extract supranormal profits from the users of complementary technology.²⁹¹ Where there are two or more technologies connected by an interface, for example, and their value standing alone is much less than their value when used together, a company that produces all of the components may seek to price one or some of the components at zero if they have a competitive advantage in selling, or extracting value from, the related component.²⁹² This creates opportunities to extract supranormal profits and can be used to foreclose competitors in the market for the zero-priced component(s).²⁹³

Google's cloud computing strategies appear to have elements that resemble this type of pricing strategy at work.²⁹⁴ Google derives much of its revenue from proprietary rights in search algorithms and ad products that benefit from a large volume of Internet users.²⁹⁵ Not surprisingly, Google's patent pledges and emphasis on open source are directed at technologies that facilitate free access to and use of the Internet, including the Android open-source operating system for mobile technologies.²⁹⁶ The fact that Google's search engine and the Android platform are made freely available to consumers has encouraged broad adoption of these technologies by both consumers and application developers.²⁹⁷ Post-adoption, consumers and developers face a variety of switching costs that limit their willingness and ability to switch to another platform.²⁹⁸ As its market dominance has grown, Google has been accused of exploiting its dominant position in Internet search to favor its own applications

²⁹⁰ See Toshio Nakajima, *IP Threats and Collaboration in the Auto Industry*, IPWATCHDOG (Feb. 17, 2016), <http://www.ipwatchdog.com/2016/02/17/ip-threats-and-collaboration-in-the-auto-industry/id=66188/> [<https://perma.cc/27EU-KMN7>] (discussing the growing threats of patent trolls in the automotive industry); Simon Phipps, *Patent Trolls Target Their Next Victim: Cloud Computing*, INFOWORLD (Jan. 13, 2014), <http://www.infoworld.com/article/2609559/open-source-software/patent-trolls-target-their-next-victim--cloud-computing.html> [<https://perma.cc/BZ74-KYUA>] (discussing the growing risk of patent troll threats in cloud computing).

²⁹¹ See Barnett, *Host's*, *supra* note 14, at 1869.

²⁹² DOJ & FTC, ENFORCEMENT, *supra* note 20, at 48 n.83; Farrell et al., *supra* note 279, at 642; Newman, *supra* note 2, at 155.

²⁹³ Barnett, *Host's*, *supra* note 14, at 1869.

²⁹⁴ See Newman, *supra* note 2, at 155.

²⁹⁵ See Jonathan Rosenberg, *The Meaning of Open*, GOOGLE: OFFICIAL BLOG (Dec. 21, 2009), <http://googleblog.blogspot.com/2009/12/meaning-of-open.html> [<https://perma.cc/ARR6-XMVU>] (“While we are committed to opening the code for our developer tools, not all Google products are open source. Our goal is to keep the Internet open, which promotes choice and competition and keeps users and developers from getting locked in. In many cases, most notably our search and ads products, opening up the code would not contribute to these goals and would actually hurt users.”).

²⁹⁶ See *id.*

²⁹⁷ Barnett, *Costs*, *supra* note 2, at 4–5.

²⁹⁸ Merges & Kuhn, *supra* note 278, at 6.

and to extract higher prices from advertisers and from manufacturers that want to install Google applications.²⁹⁹ Consumers are drawn to the free search technologies, but they end up paying a high price in terms of the information and attention they provide, advertisers pay a premium for access to this attention and information, and competitors complain of discrimination.³⁰⁰

Although in a world of perfect information and perfect rationality the potential users of the pledged technology should be able to anticipate the risks inherent in adopting pledged technology and limit their reliance accordingly, complete internalization of this risk is unlikely to occur for a variety of reasons. The patent holder may have private information about its future technology plans and patenting behavior that allow for patent hold-up in ways that consumers and intermediate producers cannot anticipate. Early adopters of the technology may not bear the full cost or even the brunt of the cost of patent hold-up or other opportunistic actions in the future, and economies of scale and network effects will push follow-on users to adopt the same technology. Information asymmetries between the pledgor and potential users of the technology, the relative concentration of benefits accruing to the patent holder and decentralized nature of the costs that might accrue to the public, combined with limited public information about alternative innovation pathways and the future costs of their current technology choices, will make it difficult for consumers and developers to predict and adjust to the costs of patent hold-up in advance. Moreover, it has been well documented that the allure of “free” impacts consumer choice in ways that do not always align with the value they derive from alternatives.³⁰¹ Free pricing distorts consumer decision-making in ways that may not be economically efficient, leaving them potentially worse off as they choose goods with hidden costs, adopt inferior technology, or make irrecoverable investments in technology choices based on short-term benefits from zero-pricing.³⁰²

²⁹⁹ See, e.g., Thomas Catan & Amir Efrati, *FTC Sharpens Google Probe*, WALL ST. J. (Aug. 11, 2011), <https://www.wsj.com/articles/SB10001424053111904823804576500544082214566> [<https://perma.cc/J2C5-N6S9>] (discussing an FTC probe examining whether Google uses its dominant position to engage in practices such as giving preferential placement to its own goods and services in search results and unfairly using information collected by rivals); Brody Mullins et al., *Inside the U.S. Antitrust Probe of Google*, WALL ST. J. (Mar. 19, 2015), <https://www.wsj.com/articles/inside-the-u-s-antitrust-probe-of-google-1426793274> [<https://perma.cc/D3LW-36G5>].

³⁰⁰ See, e.g., Rolfe Winkler, *Mobile Alters Landscape Where Google Operates*, WALL ST. J. (Mar. 26, 2015), <https://www.wsj.com/articles/mobile-is-altering-the-landscape-where-google-operates-1427414659> [<https://perma.cc/A883-K8DT>] (examining some of the costs associated with Google’s search dominance). See generally Barnett, *Costs*, *supra* note 2.

³⁰¹ See, e.g., Gal & Rubinfeld, *supra* note 2, at 528 (discussing the salience of free pricing and the ways in which it can distort consumer behavior); Newman, *supra* note 2, at 179–80.

³⁰² See Gal & Rubinfeld, *supra* note 2, at 528.

2. Foreclosure of Competing Technologies

Patent hold-up is not the only source of costs from opportunistic use of patent pledges. Obtaining and making available patents in one area may be used strategically to foreclose alternative technology paths, standards, or platforms. By making patents covering a particular technology freely available, the cost of using this technology drops and the attractiveness of adopting this technology increases, often resulting in a decline in the profitability, and even the sustainability, of competing technologies.³⁰³

While there may be short-term social welfare gains in the form of reduced deadweight loss from making a nonrivalrous good and the patents that may cover it freely available, in the long run this strategic forfeiture of patent rights can result in reduced competition and the foreclosure of alternative, potentially superior, technologies.³⁰⁴

One of the earliest examples of patent pledges involved IBM's efforts to encourage adoption of Linux, an open-source operating system for personal computers, servers, and many other hardware platforms.³⁰⁵ By 2005 IBM claimed to have spent over \$1 billion in Linux development, culminating in one of its most visible contributions, the pledge to make 500 Linux-related patents freely available to the Linux community.³⁰⁶ While IBM's patent pledges technically cover development and use of all open-source software that meets the Open Source Initiative definition of open source, the types of patents that it makes available and the definition of open-source software it provides are designed to promote Linux based software.³⁰⁷ Linux has relied for its success on the substantial corporate backing and patent pledge protection it received from companies such as IBM, and the success of Linux may well have come at the expense of viable alternative open-source operating systems that lack the same subsidies and protective patent umbrellas.³⁰⁸ It likely also crowded out

³⁰³ See Barnett, *Host's*, *supra* note 14, at 1896; Gal & Rubinfeld, *supra* note 2, at 523.

³⁰⁴ See, e.g., Barnett, *Costs*, *supra* note 2, at 7 (discussing ways in which zero-pricing may distort technology and content markets).

³⁰⁵ West, *supra* note 90, at 1268; see also *IBM Pledges 500 U.S. Patents to Open Source in Support of Innovation and Open Standards*, IBM (Jan. 11, 2005), <https://www-03.ibm.com/press/us/en/pressrelease/7473.wss> [<https://perma.cc/BZ37-WRPA>] [hereinafter *IBM Pledges*].

³⁰⁶ *IBM Statement of Non-Assertion of Named Patents Against OSS*, IBM, <https://www.ibm.com/ibm/licensing/patents/pledgedpatents.pdf> [<https://perma.cc/VM2W-5RTW>]; David B. Yoffie & Mary Kwak, *With Friends Like These: The Art of Managing Complementors*, HARV. BUS. REV. (Sept. 2006), <https://hbr.org/2006/09/with-friends-like-these-the-art-of-managing-complementors> [<https://perma.cc/8BH8-2ADJ>].

³⁰⁷ See *IBM Pledges*, *supra* note 305.

³⁰⁸ See, e.g., Christopher Tozzi, *Open Source History: Why Did Linux Succeed*, VAR GUY (Aug. 23, 2016), <http://thevarguy.com/open-source-application-software-companies/050415/open-source-history-why-did-linux-succeed> [<https://perma.cc/GF7Z-5VHM>] (exploring why Linux succeeded whereas other similar attempts to build a free or open-source Unix-like operating system kernel did not survive).

alternative operating systems that could not compete in a zero-price environment.³⁰⁹

The strategic value of “free” patents, as well as the potential costs from their use, are particularly high in industries characterized by network effects and/or scale economies.³¹⁰ Network effects refer to situations in which a good or service becomes more valuable the greater the number of consumers of that good or service.³¹¹ Economies of scale mean that the per unit price of making a good or providing a service falls as the production volume increases.³¹² Where there are economies of scale or network effects in the market, lowering the cost of the technology or otherwise making the technology choice more attractive to users can lead to large gains for the technology owner. Platforms tend to have both network effects and economies of scale. Companies stand to make large gains from lowering their prices to below a profitable level in order to attract users and developers, thus lowering costs and attracting even more users, and in the process driving competitors who cannot offer such low prices out of the market.³¹³

In this context of platform competition there may be cost savings and value gains from having a single platform, but there are also significant potential social welfare costs. The highest quality platform may not be the one that is adopted, or the platform may fail to adapt to changing opportunities and conditions over time, participants may lose interest in innovating in platform technologies if the margins are too low, and there is no guarantee that the prices will stay low for long in a highly concentrated market.³¹⁴

One area of particular concern for social welfare is the impact of free patents and related free pricing strategies on competition. Open patent wars can sometimes take on characteristics similar to predatory pricing schemes in the sense that patented technologies are offered royalty-free with the hope that competing technologies will remain more expensive, and thus less attractive, and ultimately unsustainable.³¹⁵ Patent pledges can be used to signal that a

³⁰⁹ See Gal & Rubinfeld, *supra* note 2, at 558 (discussing case of *Wallace v. IBM*, where the issue was whether provision of free software violated antitrust laws and the concern was that plaintiff could not compete with Linux).

³¹⁰ See Barnett, *Host's*, *supra* note 14, at 1874–78 (showing how strategic forfeiture of patent rights functions as a strategy for increasing market share in platform markets).

³¹¹ *Id.* at 1865. Telephones are a good example of network goods, since the more people who use phones, the more valuable a phone is to you. *Id.*

³¹² See Lemley & McGowan, *supra* note 122, at 494.

³¹³ Under antitrust law, a single firm may be found to engage in illegal predatory pricing if it offers a product at artificially low prices, the low prices force competitors out of the market, and then the company raises its prices above competitive market levels. See, e.g., U.S. DEP'T OF JUSTICE, COMPETITION AND MONOPOLY: SINGLE-FIRM CONDUCT UNDER SECTION 2 OF THE SHERMAN ACT 49 (2008), https://www.justice.gov/sites/default/files/atr/legacy/2008/09/12/236681_chapter4.pdf [<https://perma.cc/GW4Y-MEEX>].

³¹⁴ See, e.g., Barnett, *Host's*, *supra* note 14, at 1869.

³¹⁵ See Matt Wienberger, *The Dark Side of the Cloud Price Wars Between Amazon, Google, and Microsoft*, IT NEWS (July 18, 2014), <https://www.itnews.com/article/2458446/>

particular technology platform will be lower cost and, because of the low cost, will have more users and therefore more developers, possibly resulting in the tipping of the market towards this platform choice and the demise of alternatives.³¹⁶ Where there are switching costs, the ability of new platforms to enter and existing platforms to compete may be diminished.³¹⁷

Some of these costs have emerged in the context of patent pledges covering internet based computing technologies. One example is Microsoft's provision of a free browser, a move seemingly designed to increase barriers to entry in the market for PC-based operating systems and, arguably, to foreclose a competing browser, Netscape Navigator.³¹⁸ Netscape, which did not have any robust ways of extracting revenue through complementary goods, could not compete with Microsoft's zero-pricing strategy for its browser.³¹⁹ Microsoft's zero-pricing strategy, among other practices, became the subject of an antitrust law suit brought by the Department of Justice.³²⁰ Google's strategy of promoting Android as the dominant open-source mobile device operation system also illustrates how promises to make intellectual property and the underlying technology free can potentially have exclusionary effects on competitor technologies.³²¹ Android is an open-source operating system that "sits between hardware, applications, and [end] users."³²² Google has from the start promoted Android as "the first truly open and comprehensive platform for mobile devices" and has offered Android to hardware manufacturers, and anybody else, for a zero-price and on open-source terms, and this open strategy accounts at least in part for Android's market dominance.³²³ Google has also invested significant resources in acquiring patents to create a defensive patent portfolio designed to

cloud-computing/amazon-google-microsoft-cloud-price-wars-hurt-everyone.html [https://perma.cc/94ST-DN3K] (discussing impact of price wars between large players in cloud computing on competition, with a no-win situation for small players; arguing that different infrastructure clouds have different strengths and cater to different markets, but that consumers are only paying attention to price).

³¹⁶ See Merges, *supra* note 106.

³¹⁷ See *id.*

³¹⁸ See Gal & Rubinfeld, *supra* note 2, at 541.

³¹⁹ See Barnett, *Costs*, *supra* note 2, at 6–7 (examining Microsoft's bundling of its operating system with a free browser, Internet Explorer, and the resulting negative impact on Netscape's Navigator).

³²⁰ See Steve Lohr & Joel Brinkley, *Pricing at Issue as U.S. Finishes Microsoft Case*, N.Y. TIMES (Jan. 6, 1999), <http://www.nytimes.com/1999/01/06/business/pricing-at-issue-as-us-finishes-microsoft-case.html> [https://perma.cc/L9WF-K336] ("Microsoft decided to give away its browser software only to thwart the threat to its dominance posed by its main rivals in Internet software."). See generally Thomas W. Hazlett, *Microsoft's Internet Exploration: Predatory or Competitive*, 9 CORNELL J.L. & PUB. POL'Y 29 (1999) (analyzing the case brought by the Department of Justice against Microsoft based on charges of predatory pricing and related actions).

³²¹ See Edelman & Geradin, *supra* note 284, at 2–3; see also Gal & Rubinfeld, *supra* note 2, at 542–44.

³²² See Edelman & Geradin, *supra* note 284, at 4.

³²³ See *id.* at 1, 4.

protect Android and has pledged many of its own patents to protecting Google open-source initiatives such as Android.³²⁴ Most Android devices are provided to consumers with Google Mobile Service (GMS) included, but including GMS entails moving from open-source Android to proprietary Google Play Service and underlying proprietary application programming interfaces (APIs).³²⁵

Manufacturers must enter into separate licenses to offer their devices bundled with GMS or the Google applications it includes, and these agreements include a number of restrictive terms that have the potential effect of limiting entry by competitors seeking to offer competing products and services, such as a competing search engine or competing applications.³²⁶

Offering Android devices without GMS has proven to be unsuccessful, as illustrated by the failure of mobile software firm Cyanogen with its “Google-free” Android approach.³²⁷ Only Amazon has been ultimately successful in developing its own competing applications on Android (an “Android fork”), and only with difficulty and great expense.³²⁸ Google’s free internet search technologies and Android operating system have thus brought with them a variety of hidden costs and constraints on competition that have been the subject of competitor complaints and FTC investigations.³²⁹

In addition to foreclosing direct competitors, strategies involving the free pricing of patents and other intellectual property rights can negatively impact investments in complementary products and services.³³⁰ The ability to make some aspects of a technology system free while recouping money from other aspects can result in pricing of technologies that does not reflect their comparative values, as well as distorting incentives to invest in those technologies that are offered at a zero-price, with long-term consequences for

³²⁴ See Andrew Martonik, *Google Pledges To Only Use Open-Source Related Patents Defensively*, ANDROID CENT. (Mar. 28, 2013), <http://www.androidcentral.com/google-pledges-only-use-open-source-related-patents-defensively> [<https://perma.cc/KQ5N-XUVB>]; see also *Patents in the Service of Open Source*, GOOGLE, <https://www.google.com/patents/opnpledge/> [<https://perma.cc/MWP2-EGCF>].

³²⁵ See Edelman & Geradin, *supra* note 284, at 5.

³²⁶ *Id.* at 3–6.

³²⁷ See Geoffrey A. Fowler, *Amazon Fire Phone Review: Full of Gimmicks, Lacking Basics*, WALL ST. J. (July 23, 2014), <http://www.wsj.com/articles/amazon-fire-phone-review-full-of-gimmicks-lacking-basics-1406077565> [<https://perma.cc/4L5M-EM5G>]; see also Edelman & Geradin, *supra* note 284, at 11–12 (discussing the Cyanogen example).

³²⁸ See Ron Amadeo, *Google’s Iron Grip on Android: Controlling Open Source by Any Means Necessary*, ARS TECHNICA (Oct. 20, 2013), <https://arstechnica.com/gadgets/2013/10/googles-iron-grip-on-android-controlling-open-source-by-any-means-necessary/> [<https://perma.cc/YWF4-GB9J>] (discussing Amazon’s efforts to compete with its own applications for Android).

³²⁹ See Press Release, Fed. Trade Comm’n, *Google Agrees To Change Its Business Practices To Resolve FTC Competition Concerns in the Markets for Devices Like Smart Phones, Games and Tablets*, and in Online Search (Jan. 3, 2013), <https://www.ftc.gov/news-events/press-releases/2013/01/google-agrees-change-its-business-practices-resolve-ftc> [<https://perma.cc/RRH6-AWMJ>].

³³⁰ See Barnett, *Costs*, *supra* note 2, at 18.

the evolution of this technology.³³¹ The cost of zero-pricing on the quality of products has been documented in the on-line content industry, where efforts by large internet companies to make on-line content and mobile applications available for free have undermined the ability of high-quality content and application providers to compete.³³² A related concern is that patent pledges could be used to promote open-source innovation systems that are not robust to market incentives, resulting in the selection of a system that will beat the proprietary alternative in the short run but will not be preferable or sustainable in the long run.³³³

3. *Barriers to Entry*

Patent pledges might also create entry barriers for startup companies that want to develop technology paths or engage in innovation strategies that diverge from those of interest to existing industry incumbents. The use of patent pledges can create barriers to entry by (a) decreasing the funding that can be procured and the revenue that can be gained from individual patents, (b) increasing the number of patents needed to compete, and (c) creating norms and expectations that certain types of technology should be available for a zero-price.

First, patent pledges and other defensive patent strategies are altering the functions that patents play in ways that may negatively impact the funding available to startup companies.³³⁴ Patents have traditionally been an important way for startup companies to attract venture capital funding³³⁵ and can also be

³³¹ See Dietrich Volrath, *There's No Limit to Google's Market Power*, N.Y. TIMES (Apr. 29, 2016), <https://www.nytimes.com/roomfordebate/2016/04/28/is-google-a-harmful-monopoly/theres-no-limit-to-googles-market-power> [<https://perma.cc/V5GH-6SYZ>] (arguing that Google's dominance allows it to charge more to advertisers, who pass along costs to consumers, resulting in deadweight loss).

³³² See Barnett, *Costs*, *supra* note 2, at 11–18.

³³³ See Gal & Rubinfeld, *supra* note 2, at 534; see also Merges, *supra* note 106. I examine risks of the unraveling of cooperation in cooperative systems of intellectual production in Vertinsky, *supra* note 99, at 1095–96; see also Simon Gächter et al., *Initiating Private-Collective Innovation: The Fragility of Knowledge Sharing*, 39 RES. POL'Y 893, 900 (2010) (illustrating the fragility of knowledge sharing in systems characterized by a mixed private and open system of innovation).

³³⁴ See Todd Hixon, *For Most Small Companies Patents Are Just About Worthless*, FORBES (Oct. 4, 2013), <https://www.forbes.com/sites/toddhixon/2013/10/04/for-most-small-companies-patents-are-just-about-worthless/> [<https://perma.cc/VBV8-Y3J2>] (arguing that patents are worth much more as part of large portfolios that only big companies can afford).

³³⁵ See Stuart J.H. Graham & Ted Sichelman, *Why Do Start-Ups Patent?*, 23 BERKELEY TECH. L.J. 1063, 1067–68, 1083 (2008) (describing how startup companies obtain patents for a variety of reasons, including to prevent competitors from copying their innovation, to enhance their reputation, and to secure investment); see also Robin Feldman, *Patent Demands & Startup Companies: The View from the Venture Capital Community*, 16 YALE L.J. & TECH. 236, 281 (2014) (examining how funding decisions of venture capitalists are impacted by changing patent markets); Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24

used as ways of securing loans.³³⁶ Patent pledges and related strategies involving strategic forfeiture of intellectual property could lower valuations and lead to less funding for emerging companies. In addition, the defensive nature of patent pledges may make it more difficult and more costly for entrants to use patents to limit imitation or to engage in licensing, since any enforcement of their patents against large companies engaged in defensive patenting practices will result in loss of protection from patent pledges and a potential infringement claim.³³⁷

Second, companies may require larger patent portfolios in order to compete. Patents increasingly seem to have more value as part of patent portfolios than they do standing alone.³³⁸ With a large patent portfolio, the likelihood that a competitor infringes one of your patents is high and the cost to them of figuring out whether they will is also high, thus creating a defensive shield for you.³³⁹ Large companies can use patent portfolios to enter into reciprocal cross-licensing agreements with each other, either explicitly or implicitly through the use of reciprocal threats.³⁴⁰ They can also use their large patent portfolios and the threat of counter-suit to discourage patent challenges and deter patent infringement suits from small competitors.³⁴¹ The growth of defensive patenting may give rise to the reverse of patent hold-up, creating problems of patent hold-out that may be particularly detrimental to smaller companies.³⁴²

BERKELEY TECH. L.J. 1255, 1298 (2009) (describing how startups obtain patents to improve chances of securing investment).

³³⁶ See Yael V. Hochberg et al., *Patent Collateral, Investor Commitment, and the Market for Venture Lending 2* (Nat'l Bureau of Econ. Research, Working Paper No. w20587), <https://ssrn.com/abstract=2510594> [<https://perma.cc/6TM3-3YL2>] (“Of 1,519 such startups with patents at risk for use in lending, 36 percent used patents to secure loans by 2008”); see also William Mann, *Creditor Rights and Innovation: Evidence from Patent Collateral 23* (Anderson Sch. of Mgmt. UCLA, Working Paper), <https://ssrn.com/abstract=2356015> [<https://perma.cc/4LXK-MLTQ>] (showing that strong creditor rights to patents facilitate financing of innovation).

³³⁷ See Graham & Sichelman, *supra* note 335, at 1074–77 (discussing the importance of patents as a way of limiting imitation for startups and the growing strategic use of patents for purposes such as cross-licensing, and the challenges that this type of portfolio licensing may impose on young companies).

³³⁸ See Hixon, *supra* note 334.

³³⁹ See *id.*

³⁴⁰ See *id.*; see also Wen Wen et al., *Patent Commons, Thickets, and Open Source Software Entry by Start-Up Firms*, QUESTROMWORLD 4 (July 2013), http://questromworld.bu.edu/platformstrategy/files/2013/06/platform2013_submission_21.pdf [<https://perma.cc/V47V-SY4R>] (“Unlike large firms, start-ups usually lack the R&D capabilities and financial resources required to expand their own patent portfolios, so it is difficult for them to navigate patent thickets using other approaches such as cross-licensing agreements.”).

³⁴¹ See Hixon, *supra* note 334.

³⁴² See Colleen V. Chien, *Holding Up and Holding Out*, 21 MICH. TELECOMM. & TECH. L. REV. 1, 20 (2014) (discussing both the problem of patent hold-up and the problem of patent hold-out, the latter arising when a patent user routinely ignores patents and resists demands to pay for the patented technology because the risk of successful litigation is small).

In addition, patent pledges may increase the need for defensive patent portfolios as a way of encouraging technology adoption, adding to the cost of entry for competing technologies.³⁴³ Patent pledges provide protection to users of particular technology paths, creating a defensive umbrella for these users.³⁴⁴ This is the strategy that IBM has used first to establish Linux as an industry-standard operating system and now to attract developers and users to OpenStack, an open-source cloud operating system. A potential entrant interested in pursuing a divergent technology may be unable to encourage adoption of this technology without the protection that a defensive patent portfolio affords.³⁴⁵ Microsoft now explicitly promises to defend users of its Azure cloud-computing platform, including the open-source software sold on Azure, and has also offered customers who face infringement suits for the use of Azure the aid of 10,000 Microsoft patents to use in their defense.³⁴⁶

But obtaining a patent portfolio, particularly one that will then be made available for free, could be prohibitively expensive for a startup company. The entry barriers will be most important for startup companies interested in offering competing stand-alone technology platforms, since making large patent portfolios available for free can be an important but also costly way of tipping the market towards adoption of the patent holder's preferred platform.³⁴⁷

Patent pledges may also be used to set norms and expectations about the price of intellectual content and technologies. The competition over definitions of "open" through the use of pledges, as discussed in Part II, is used to shape the structure of emerging markets by setting consumer expectations about what technologies they pay for and what technologies they can expect to get for free. This can foreclose the development of new technologies where people are primed to expect such technologies for free.³⁴⁸ Consumers expect mobile phone applications to have a zero-price, for example, making it difficult for developers of applications that charge a fee to survive even where the information and

³⁴³ See Wen et al., *supra* note 340, at 5.

³⁴⁴ See OPEN SOURCE DEV. LABS, INC., UNDERSTANDING PATENT PLEDGES: AN OVERVIEW OF LEGAL CONSIDERATIONS I (2006), http://patentcommons.org/publications/OSDL_Whitepaper_Final_final_4-12-06.pdf [<https://perma.cc/J6B9-C8JF>].

³⁴⁵ See Wen et al., *supra* note 340, at 5.

³⁴⁶ See, e.g., Matt Day, *Microsoft To Defend Cloud-Computing Customers from Patent Trolls*, SEATTLE TIMES (Feb. 8, 2017), <http://www.seattletimes.com/business/microsoft/microsoft-to-defend-cloud-computing-customers-from-patent-trolls/> [<https://perma.cc/K9PF-KGLT>] (discussing Microsoft's pledge to defend users of its Azure cloud-computing platform).

³⁴⁷ See Barnett, *Host's*, *supra* note 14, at 1869. For an empirical study that tries to sort out some of the entry effects of patent pools that make patents freely available for a particular market, see generally Wen et al., *supra* note 340.

³⁴⁸ Gal & Rubinfeld, *supra* note 2, at 534 ("[T]he more consumers are accustomed to receiving goods for free, the more they tend to expect to get other products of a similar kind (e.g., online services) for free and the higher the entry barriers into related markets.").

attention costs of zero-priced applications are much higher than the fee.³⁴⁹ This zero-pricing norm deters entry by developers of new applications that do not have other ways of making money from their applications.³⁵⁰ More generally, larger established companies can afford to engage in strategies that sacrifice revenues to encourage adoption of their technology, and often benefit from free patents and lower priced technologies through higher prices in complementary products, allowing them to flourish on a platform of “free” patents while discouraging entry and limiting competition.³⁵¹ Market data shows a clear pairing of zero-priced bundling strategies and market concentration in “commodified” content markets, for example.³⁵²

In summary, while patent pledges can be used in ways that improve social welfare, they can also be exploited in ways that are socially costly. These costs include paying higher prices for complementary goods, paying future high prices for currently free technology, and foreclosure of alternative technologies. Disentangling those patent pledges that are a natural part of platform competition from those that resemble anticompetitive predatory pricing strategies may be difficult without careful attention to the market context and the conduct of patent pledgors over time. Limitations in the existing legal framework, the ability of market participants to vary their behavior in response to rule changes, and limitations in the information available to regulators, make it difficult to sort the beneficial uses from the socially costly uses in advance through careful rule design.³⁵³ The danger of opportunistic use of pledges undermines the benefits that might otherwise be obtained from some types of patent pledges by reducing the level of trust needed to make them work and by increasing the uncertainty that the pledges will be honored. This results in an additional layer of costs, as some socially beneficial uses of patent pledges may be foregone.

Thus, while patent pledges do offer new and beneficial ways of patent sharing, this Part IV has shown that there are also potential costs associated with the opportunistic use of patent pledges that should not be ignored. Part V shows how patent pledges may fall through the cracks of the existing legal framework in ways that allow for opportunistic use of patent pledges. It then suggests ways

³⁴⁹ Edgar Cervantes, *Free Apps Can Cost More than You Think: Here's Why*, ANDROID AUTHORITY (Mar. 15, 2016), <http://www.androidauthority.com/why-free-apps-are-not-really-free-679660/> [<https://perma.cc/Z7Q3-2727>] (discussing costs of free apps, including advertising and drain on battery power).

³⁵⁰ Gal & Rubinfeld, *supra* note 2, at 534; Ellis Hamburger, *Consumers Pay the Hidden Costs for the 'Free' App Ecosystem*, VERGE (Jan. 7, 2013), <https://www.theverge.com/2013/1/7/3835724/the-price-of-apps> [<https://perma.cc/66RF-M2H6>].

³⁵¹ See Barnett, *Costs*, *supra* note 2, at 20.

³⁵² See *id.* at 20 (showing how commodification of content may promote concentration).

³⁵³ See Geoffrey A. Manne, *The Market Realities that Undermine the Antitrust Case Against Google*, INT'LCTR. FOR LAW & ECON., <http://laweconcenter.org/component/content/article/94-the-market-realities-that-undermine-the-antitrust-case-against-google.html> [<https://perma.cc/76WJ-H9VS>]; see also Barnett, *Costs*, *supra* note 2, at 20.

in which equity can be used within patent law to specifically target and deter opportunistic uses of pledges in order to reap the benefits and mitigate the costs of patent pledges. The need to sort beneficial from socially costly uses of pledges drives the proposal for greater use of equity made in Part V.

V. IMPLICATIONS FOR PATENT POLICY

“All promise outruns performance.”
—Ralph Waldo Emerson³⁵⁴

Patent pledges are part of a growing trend toward private tailoring of patent rights designed to accommodate changing paradigms of innovation and changes in patterns of patent use in ways that are not adequately addressed within the existing legal framework.³⁵⁵ Part IV illustrated some of the ways in which patent pledges seemingly directed at promoting open and collaborative innovation might also create opportunities for exploiting proprietary positions and foreclosing competition—even if they were not initially made with the intent to do so. This concluding section considers the implications of patent pledges for patent law and policy. It begins with the limits of the current law to respond to the risks and protect the benefits offered by patent pledges and then considers ways of responding to the limits in order to mitigate socially costly use of patent pledges.

A. Revealing Limits in the Law

“It is easy to make promises - it is hard work to keep them.”
—Boris Johnson³⁵⁶

Although often brief and simply written, patent pledges raise complicated legal issues regarding the interpretation, scope, and enforceability of the pledges.³⁵⁷ Patent pledges do not fall neatly under any single body of law, and

³⁵⁴ WOOD, *supra* note 252, at 10.

³⁵⁵ See, e.g., DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT 5 (2009) (arguing that the patent system needs to respond to the differences in how innovation works across industries); Chien, *Why*, *supra* note 2; *Time To Fix Patents*, ECONOMIST (Aug. 8, 2015), <https://www.economist.com/news/leaders/21660522-ideas-fuel-economy-todays-patent-systems-are-rotten-way-rewarding-them-time-fix> [<https://perma.cc/LW4M-95SC>] (“Ideas fuel the economy. Today’s patent systems are a rotten way of rewarding them.”). *But see* Mark A. Lemley, *The Surprising Resilience of the Patent System*, 95 TEX. L. REV. 1, 14 (2016) (arguing that scholars find both weaker and stronger patent protections worrisome as trends have changed in the past thirty years).

³⁵⁶ Hélène Mulholland, *Boris Johnson Admits He Has Fallen Short on Election Promises*, GUARDIAN (Mar. 14 2012), <https://www.theguardian.com/politics/2012/mar/14/boris-johnson-london-mayor-election> [<https://perma.cc/VVC8-LHNF>].

³⁵⁷ See Contreras, *Market*, *supra* note 8, at 482–85 (arguing that current legal theories do not support the enforcement of pledges, and suggesting a market reliance theory as a new

questions about whether and how to regulate what are essentially promises to make limited licenses available for free are not easily answered.

At first glance, the pledges might seem to fall within the ambit of contract law, since they are private promises intended to induce actions by at least some of the recipients of the promise. Most of the patent pledges, however, especially those made outside of a formal standard-setting process, lack the elements of mutuality and bargained-for exchange required to form a legally binding contract.³⁵⁸ They are unilateral promises made to the public at large, with no return obligation and often with no further communication with or even knowledge of those who may avail themselves of the benefits of the pledge.³⁵⁹ In addition, many of the patent pledges include vague and ambiguous language and leave out important details about the scope and duration of the promise, providing an additional barrier to any contract claim.³⁶⁰

The legal doctrines most helpful to someone who wants to rely upon the promises are those of promissory estoppel and equitable estoppel, both equitable doctrines that allow some consideration of the context within which the promises were made and relied upon.³⁶¹ Promissory estoppel and equitable estoppel lend themselves to situations in which a promise is made, but not fulfilled, to the detriment of the recipient(s) of the promise.³⁶²

Promissory estoppel theories offer an alternative to the bargained-for-exchange paradigm that lies at the heart of contract law, focusing instead on a reliance-inducing promise.³⁶³ Patent pledges are promises designed to encourage the public to make investments and decisions based on the promise, and the pledgors no doubt intend to encourage that reliance.³⁶⁴ Allowing the patent pledgor to go back on the pledge could harm the parties who relied on the pledge.³⁶⁵ Equitable estoppel theories, in contrast to promissory estoppel, focus on deceptive conduct by the promisor.³⁶⁶ While these equitable doctrines capture aspects of at least some patent pledges, their reach is inadequate and their successful application unpredictable.³⁶⁷ The current estoppel doctrines in both contract law and patent law are limited to promises made by the promisor to a particular actor or group of actors in a defined relationship with the

theory of enforcement). *See generally* Kesan & Hayes, *supra* note 285 (pointing out the limits of patent, contract, and antitrust law for FRAND commitments).

³⁵⁸ Contreras, *Market*, *supra* note 8, at 503, 508, 514.

³⁵⁹ *See id.* at 497, 503, 513, 517.

³⁶⁰ *Id.* at 514–16 (providing an in-depth analysis of the limits of contract law to provide an effective enforcement structure for patent pledges).

³⁶¹ *See id.* at 517–23 (providing detailed analysis of both promissory estoppel and equitable estoppel claims as applied to patent pledges); *see also* Merges & Kuhn, *supra* note 278, at 21–22.

³⁶² *See* Contreras, *Market*, *supra* note 8, at 518.

³⁶³ *Id.*

³⁶⁴ *Id.*

³⁶⁵ *Id.* at 521.

³⁶⁶ *Id.*

³⁶⁷ *See id.* at 522–23.

promisor, and it is hard to extend these theories in their current forms to situations where either the relationship or the promise elements or both are attenuated.³⁶⁸ The need to prove actual, reasonable reliance is a further hurdle in bringing either a promissory estoppel or an equitable estoppel claim.³⁶⁹ In addition to challenges in satisfying the elements for a contract, promissory estoppel, or equitable estoppel claim, there are two additional reasons to look elsewhere for ways of regulating patent pledges.

First, the costs discussed in Part IV involve risks to social welfare rather than simply focusing on harms to the individual parties involved, suggesting the need for alternative ways of intervening in and regulating patent pledges that take the public interest into account. Second, the focus of these doctrines on a specific bargain between parties does not adequately capture the indirect costs associated with opportunistic use of pledges, some of which were discussed in Part IV.

The potential consequences of patent pledges for competition could bring them within the ambit of antitrust law, but current antitrust law is not equipped to address the challenges that patent pledges raise for competition and innovation.³⁷⁰ The limits of antitrust law to address some of the negative effects of zero-pricing strategies, including zero-pricing of intellectual property, on competition have already been noted in the literature.³⁷¹ Zero-pricing of goods and services leads to problems in defining markets and identifying anticompetitive harms. In addition, even without the difficulties that a zero-price strategy creates for antitrust analysis, the requirements for bringing an antitrust claim will be too hard to satisfy in the patent pledge context.³⁷² In order to bring an antitrust claim against a company that has made a patent pledge that could negatively impact competition, it is necessary to show either coordination among competitors or some conduct that approaches monopolization.³⁷³ Offers to make patents freely available, whether in the context of community licensing approaches such as open-source software licenses³⁷⁴ or open patent agreements,³⁷⁵ or even more so where the pledgor is an individual entity making the offer to the public at large, generally lack the traditional elements that form the basis for antitrust claims.

³⁶⁸ See Merges & Kuhn, *supra* note 278, at 21.

³⁶⁹ See *id.* at 40–41; see also Contreras, *Market*, *supra* note 8, at 519–20.

³⁷⁰ See Contreras, *Market*, *supra* note 8, at 523–27.

³⁷¹ See, e.g., Gal & Rubinfeld, *supra* note 2, at 533–40 (examining the ways in which zero-pricing of goods can have anticompetitive effects).

³⁷² See Contreras, *Market*, *supra* note 8, at 523–27.

³⁷³ See *id.* at 523–33.

³⁷⁴ See, e.g., Heidi S. Bond, Note, *What's So Great About Nothing? The GNU General Public License and the Zero-Price-Fixing Problem*, 104 MICH. L. REV. 547, 554–55 (2005) (arguing that arrangements such as the open-source software GNU General Public License, which requires that sublicenses be granted at no charge, is a permissible price restraint because there is a commitment that future distributions be available without charge).

³⁷⁵ See, e.g., Callahan & Schultz, *supra* note 8, at 152 (arguing that both defensive patent aggregators and open patent agreements should survive antitrust scrutiny).

Where antitrust policymakers have paid attention to patent pledges, they have confined their intervention to situations of patent hold-up or potential patent hold-up in the context of industry wide formal standard-setting processes.³⁷⁶ They have intervened where a party fails to honor its obligations to license on fair, reasonable, and nondiscriminatory (FRAND) terms or should have made a FRAND pledge but fails to do so and subsequently seeks to extract exorbitant rents on a patent essential to the use of the adopted standard.³⁷⁷ Even in this limited context, antitrust scrutiny has mostly focused on high-profile examples of patent hold-up, such as Motorola Mobility's assertion of patents covering standards essential to mobile communication technologies against Microsoft and Apple, with Google joining the fight after acquiring Motorola Mobility.³⁷⁸

Antitrust authorities have been careful to limit their intervention in response to patent pledges to situations of patent hold-up using standard-essential patents subject to FRAND obligations.³⁷⁹ Moreover, some antitrust authorities have expressed concern about the applicability of antitrust to address even these instances of patent hold-up, suggesting that contract and patent law are better suited to the job.³⁸⁰ Concerns associated with the use of antitrust laws in these

³⁷⁶ See DOJ & FTC, ENFORCEMENT, *supra* note 20, at 35–40. Antitrust enforcers have also been active in policing strategic patent acquisitions by coalitions of market competitors, but typically the focus is on potential patent hold-up problems for standards covered by these patents. For a summary of some of the antitrust issues involved in strategic patent acquisitions, see, for example, Ilene Gotts & Scott Scher, *The Particular Antitrust Concerns with Patent Acquisitions*, 8 COMPETITION L. INT'L 19, 25–26 (2012).

³⁷⁷ See Christopher B. Hockett & Rosanna G. Lipscomb, *Best FRANDs Forever? Standard-Setting Antitrust Enforcement in the United States and the European Union*, 23 ANTITRUST 19, 19–21 (2009); see also DOJ & PTO, *supra* note 17, at 7.

³⁷⁸ See Contreras, *Market*, *supra* note 8, at 588–89. The FTC charged Google with violating antitrust laws by seeking injunctions and exclusion orders against allegedly willing licensees for infringement of standard-essential patents where the patents were subject to FRAND commitments. See *Motorola Mobility LLC*, 156 F.T.C. 147 (2013). The matter was resolved in favor of the alleged infringers through a consent order by the FTC. For the FTC's rationale as well as a description of its limited focus on standard essential patents, see Letter from Fed. Trade Comm'n to Commenters in the Matter of Motorola Mobility LLC and Google Inc. 3 (July 23, 2013), <https://www.ftc.gov/sites/default/files/documents/cases/2013/07/130724googlemotorolaletter.pdf> [<https://perma.cc/Q7TS-HBK7>] (“Commission action in the instant case is limited to conduct in the standard-setting context, which has been a focus of Commission enforcement activity for many years because of the significant risks and benefits to competition inherent in the standard-setting process.”).

³⁷⁹ See, e.g., Koren W. Wong-Ervin, Fed. Trade Comm'n, *The Proper Role of Antitrust in Addressing Patent Hold-Up*, 11 ANTITRUST L. 11, 13 (2013), https://www.ftc.gov/system/files/attachments/key-speeches-presentations/wong-ervin_-_proper_role_of_antitrust_in_addressing_patent_hold.pdf [<https://perma.cc/G9ZW-H3L8>] (“For example, Commissioner Wright has stated that ‘antitrust laws are not well suited to govern contract disputes between private parties in light of remedies available under contract or patent law.’”).

³⁸⁰ See *id.*; see also MAUREEN K. OHLHAUSEN, STATEMENT OF COMMISSIONER MAUREEN K. OHLHAUSEN IN THE MATTER OF ROBERT BOSCH GMBH 2–3 (2012),

settings include increasing the likelihood of reverse hold-up by firms using standard essential patents, reducing the flexibility of private parties in setting royalties, discouraging participation in standard setting, and reducing incentives to make innovations that may become integrated into standards.³⁸¹

Antitrust agencies have also explored alternative intellectual property arrangements, such as covenants not to sue and cross-licensing arrangements, in the context of agency guidelines, and these guidelines encompass unilateral offers of royalty-free cross-licensing or patent nonassertion.³⁸² As discussed in Part II, however, patent pledges have a unique combination of characteristics that may not have been contemplated when these agency guidelines were developed, and the guidelines say little about the use, or misuse, of patent pledges.

In sum, antitrust authorities most likely lack both the ability, given the existing law, and the willingness to move beyond these situations of coordinated action among competitors to regulate the subtle ways in which companies making unilateral patent pledges might be negatively impacting competition. This limited reach of antitrust law may indeed be one of the attractions of decentralized forms of patent pledges for the companies that are making them.

This leaves patent law as a way of responding to the challenges that patent pledges may create. But patent law in its current form does not provide an effective way of regulating and enforcing patent pledges and lacks the tools for discriminating between socially beneficial uses of pledges and socially costly uses of pledges. Patent law is designed to provide the patent owner with the right to exclude others from use of patented technology. Statutory and common law have both evolved around this model of the exclusive rights of the patent holder, using appropriability to reward discovery with the underlying goal of promoting innovation. Patent holders control third party uses of their patents through licensing and assignment of rights to specified users. Patent pledges seek to turn

https://www.ftc.gov/sites/default/files/documents/public_statements/statement-commissioner-maureen-ohlhausen/121126boschohlhausenstatement.pdf [<https://perma.cc/EU23-38K3>].

³⁸¹ See Wong-Ervin, *supra* note 379, at 13 (“The costs of deterring participation in SSOs include: SSOs selecting inferior technology; market fragmentation between competing technologies; the risk of undermining the very purpose of SSOs, which among other things, facilitate compatibility and interoperability, reduce consumer costs, and advance innovation; and the risk that non-SEPs may be used to hold-up SEP owners.”); see also MAUREEN K. OHLHAUSEN, DISSENTING STATEMENT OF COMMISSIONER MAUREEN K. OHLHAUSEN IN THE MATTER OF MOTOROLA MOBILITY LLC AND GOOGLE INC. 2–3 (2013), https://www.ftc.gov/sites/default/files/documents/public_statements/statement-commissioner-maureen-ohlhausen/130103googlemotorolaohlhausenstmt.pdf [<https://perma.cc/D22C-NM46>].

³⁸² See generally DOJ & FTC, ENFORCEMENT, *supra* note 20 (examining variety of intellectual property practices and their likely impact on competition); see also Richard J. Gilbert, Deputy Assistant Attorney Gen., U.S. Dep’t of Justice, The 1995 Antitrust Guidelines for the Licensing of Intellectual Property: New Signposts for the Intersection of Intellectual Property and the Antitrust Laws 5 (Apr. 6, 1995), <https://www.justice.gov/atr/file/519116/download> [<https://perma.cc/XXQ4-RJPV>] (providing guidelines for analyzing the antitrust effects of different IP arrangements).

this statutory model of exclusion on its head, focusing instead on privately tailored means for providing generalized access to patents. Each pledge provides an individually tailored way of encouraging generalized access, varying both in the specificity of the terms and in the scope of the promise. Patent pledges must rely on existing law for their enforcement, but there are no mechanisms within patent law for recognizing and enforcing these kinds of generalized promises to share. Equitable defenses to patent infringement claims such as laches and equitable estoppel, at least in their current forms, rely too heavily on proof of a direct relationship or communication between the patent holder and the infringer upon which the infringer reasonably relied. Of even more concern, patent law does not provide a mechanism for ensuring that the patent pledge will follow the patent if it is assigned to a new owner or pulled into a bankruptcy proceeding.³⁸³ Indeed, patent law does not even provide a mechanism for keeping track of which patent pledges have been made or an effective way of putting the public on notice where patents have been encumbered by patent pledges.³⁸⁴

B. *Expanding Role of Equity in Response*

“[A]nd this is the office of equity, to support and protect the common law from shifts and crafty contrivances against the justice of the law.”
-Justice Story³⁸⁵

Patent pledges rest on an unstable legal footing, and the lack of legal tools for regulating how patent pledges are used, and potentially misused, creates opportunities for some patent holders to exploit patent pledges in ways that create social costs. The ability to respond to these potential costs *ex ante*, through a change in statutory law, is limited by—among other things—the difficulty of predicting in advance when, where, and how pledges will be used in ways that create social costs. In this concluding Part I suggest that the greater use of equitable modes of decision-making within patent law can be used to curtail the costs of opportunism discussed in Part IV without the need to anticipate the forms and consequences of patent pledges in advance or the need to amend patent laws. I propose a very specific use of equity, one that is narrowly tailored to a specific problem—the exploitation of limitations in the

³⁸³ See, e.g., Contreras, *Market*, *supra* note 8, at 482 (suggesting the need for additional legal tools to ensure that patent pledges are enforceable on subsequent purchasers of patents); Contreras, *Patent*, *supra* note 3, at 598–600; Kesan & Hayes, *supra* note 285, at 286 (pointing out the limits of existing laws in ensuring that FRAND commitments run with the patent).

³⁸⁴ Contreras, *Patent*, *supra* note 3, at 517–19.

³⁸⁵ ALASTAIR HUDSON, *EQUITY AND TRUSTS* 13 (9th ed. 2017).

legal framework governing patent pledges along with private information to act opportunistically in ways that generate social costs.

While equity evades precise definition, it can be understood at a broad level as “the means by which a system of law balances out the need for certainty in rule-making with the need to achieve fair results in individual circumstances . . . equity ‘mitigates the rigor of the common law’ so that the letter of the law is not applied in so strict a way that it may cause injustice in individual cases.”³⁸⁶ The role of equity in U.S. law has a long and complex history,³⁸⁷ and the merits and function(s) of equity are subject to debate, but at a practical level equity provides courts with a set of principles, procedures, and remedies designed to mitigate harsh or unfair effects resulting from the strict application of any particular legal rule. As the Supreme Court has recently reaffirmed in the case of *eBay v. MercExchange*, traditional principles of equity apply to patent disputes just as they do to other legal disputes.³⁸⁸

Courts employ a number of equitable doctrines in patent law disputes, and it is these doctrines that I draw on in fashioning a response to the potential costs that patent pledges could be used to create.

In Part IV I identified three types of costs that arise largely from opportunistic behavior by private patent holders who exploit the limitations of the legal framework in ways that are difficult to predict and address through rule change—enhanced opportunities for patent hold-up, foreclosure of alternative technology paths, and use of pledges to create entry barriers.

These costs disturb the stable relationships that patent pledges might otherwise support between patent owners and users of the patented inventions.

In this Part V I borrow from other areas of law in which such opportunism occurs to apply Professor Henry Smith’s “safety valve” theory of equity to patent law. I use this theoretical framework to show how equitable modes of decision-making within patent law can be used to mitigate some of the potential costs of pledges while preserving their benefits. I begin by summarizing this “safety valve” theory of equity and then show how this approach could be fashioned into a response to potential costs of patent pledges.

1. *Smith’s “Safety Valve” Theory of Equity*

Professor Smith has described equity as a “private law solution to opportunism.”³⁸⁹ He defines opportunism as “behavior that is technically legal but done with a view to securing unintended benefits from the system, and these benefits are usually smaller than the costs they impose on others.”³⁹⁰ It encompasses “behavior that is undesirable but that cannot be cost-effectively

³⁸⁶ *See id.* at 4.

³⁸⁷ For a historical overview of equity, see, for example, Howard L. Oleck, *Historical Nature of Equity Jurisprudence*, *FORDHAM L. REV.* 23 (1951).

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

³⁸⁹ Smith, *Economic*, *supra* note 20, at 17; *see also* Smith, *Equity*, *supra* note 24, at 19.

³⁹⁰ Smith, *Economic*, *supra* note 20, at 9–10.

captured—defined, detected, and deterred—by explicit *ex ante* rulemaking.³⁹¹ Opportunities for this kind of opportunism are created, Professor Smith argues, through exploitation of the modular nature of property rights—or in this case, patent rights—by actors who have too much information that they use to get around the intentions of existing rules.³⁹² Equitable modes of decision-making within the law are ideally suited, he suggests, to deal with this kind of opportunism and can be used to increase the stability and effectiveness of legal rules.³⁹³ The use of equitable decision-making by courts can strengthen the operation of law by acting as “a second-order safety valve” to address “hard-to-foresee problems that disturb the stable relationships between activities” where law fails owing to its generality.³⁹⁴

In practice, equitable decision-making by the court takes the form of applying a set of legal principles that supplement rules of law where application of the rules leads to outcomes that are harsh and unfair. Equity provides courts with a mechanism for applying these principles to determine the effects of a legal claim in situations where the strict application of the rules of law would lead to injustice. Using the functional account of equity described above, this approach allows courts to address the types of opportunistic behavior that cannot be easily addressed in advance through law or contract. “Not coincidentally, [opportunism] often violates moral norms, which are incorporated into the *ex post* principles that deal with opportunism.”³⁹⁵ Many of the principles take the form of simple maxims that deal with the conduct of parties, once that conduct has occurred, within the specific context of the conduct.³⁹⁶ These maxims include the following, selected here for their potential relevance to the challenges that patent pledges pose: (a) equity follows the law—it applies only where application of legal rules is inadequate; (b) equity acts in personam, not in rem; (c) equity will not allow a wrongdoer to profit from his or her own wrong; (d) equity regards substance rather than form; (e) equity imputes an intent to fulfill an obligation; (f) he or she who seeks equity must do equity; and (g) he or she who comes into equity must come with clean hands.³⁹⁷ These

³⁹¹ *Id.* at 9.

³⁹² *Id.* at 13; *see also* Smith, *Equity*, *supra* note 24, at 17.

³⁹³ *See* Smith, *Economic*, *supra* note 20, at 17.

³⁹⁴ Henry E. Smith, *Fusing the Equitable Function in Private Law*, in PRIVATE LAW IN THE 21ST CENTURY 173, 175 (Kit Barker et al. eds., 2017) [hereinafter Smith, *Fusing*].

³⁹⁵ *See* Smith, *Economic*, *supra* note 20, at 9.

³⁹⁶ *See id.* at 19–34.

³⁹⁷ Smith discusses 16 different maxims: (1) equity follows the law—it applies only where application of legal rules is inadequate; (2) equity will not suffer a wrong to be without a remedy; (3) equity acts in personam, not in rem; (4) equity will not allow a wrongdoer to profit from his own wrong; (5) equity is equality; (6) equity regards as done that which ought to be done; (7) equity regards substance rather than form; (8) she who seeks equity must do equity; (9) he who comes into equity must come with clean hands; (10) equity aids the vigilant and diligent; (11) equity abhors a forfeiture; (12) equity delights to do justice and not by halves; (13) equity imputes an intent to fulfill an obligation; (14) between equal

principles, and the remedies that can follow, can be used to address behavior *ex post* where it undermines the intended effect of legal rules that have, of necessity, been designed *ex ante*.³⁹⁸ Knowing that equity would operate after the fact would influence the choices that actors make beforehand as well as mitigating the costs associated with opportunistic behavior when it occurs.

2. Application to Patent Law

Professor Smith's functional approach to equity as a second-order safety valve for law has direct application to the potential problems that patent pledges can create given the incomplete legal framework that governs them. Patent pledges are privately tailored promises to the public. They take a variety of different forms and encourage a variety of different actions on the part of entities and individuals. The forms that they take and the ways in which they are, or might be, used opportunistically are hard for rule makers to predict and address *ex ante*. Legitimate uses of patent pledges as normal parts of competition or to encourage adoption of socially beneficial technologies may be impossible to define and disentangle from opportunistic uses that entail social costs without reference to actual intent, conduct, and context. In contrast to the challenges of *ex ante* rule design, it will be much less difficult to spot and address opportunistic uses, and abuses, of patent pledges after the conduct has occurred. The context in which patent pledges are made, as well as the context surrounding subsequent uses of the patented technology and patents, will be important in evaluating whether the patent pledge has been used in ways that implicate equitable intervention in a later patent infringement or related legal claim. The knowledge that courts will be able to spot and react to bad behavior will have the effect of deterring at least some of this behavior *ex ante*. Reduction in the risks associated with patent pledges will increase the benefits from non-opportunistic uses of patent pledges.

Whether the actions of the patent holder are inconsistent with reasonable interpretations of the pledge and reasonable beliefs about the subsequent use of technology covered by the patent(s) owned by the pledgor can provide a starting point for courts charged with enforcing patents that were the subject of patent pledges. The pledges themselves often utilize language drawn from equitable concepts, particularly the use of "good faith" and reliance on justifications of fairness, in place of precise terms and conditions.

Judges should be able to draw on corresponding equitable modes of decision-making to ensure that good faith and fairness governs the interpretation and enforcement of these promises. Going back to the maxims listed above, equity fills in the gaps in the law, applying—as is the case with patent pledges—

equities the law will prevail; (15) between equal equities the first in order of time shall prevail; and (16) equity will not aid a volunteer. *See id.*

³⁹⁸ *See* Smith, Economic, *supra* note 20, at 6–7. See, for example, the discussion of the interaction between equity and property law as a way of lending stability to property law in Smith, *Fusing*, *supra* note 394, at 181.

where application of the legal rules is inadequate. It takes the conduct and the specific context within which such conduct occurs into account (acting in personam) to ensure that the wrongdoer does not profit and comes with clean hands. It pays attention to the substance rather than the form of the promise and imputes intent to fulfill the reasonable obligations attached to the promise, supporting relationships that rely on trust and reputation. The ability to take intent into account has the additional benefit of allowing judges to distinguish between practices that may have legitimate objectives, such as market penetration, and practices that have anticompetitive objectives, such as predatory foreclosure of competing technologies.³⁹⁹

The use of equitable principles to police opportunism in the use of patent pledges does not require significant changes to existing patent law doctrine. The general principles of equity apply to patent law just as they do to other bodies of law.⁴⁰⁰ Moreover, patent law already explicitly incorporates a variety of equitable doctrines that provide courts with limited discretion to interject external standards of fairness and the public interest into their deliberations. Equity enters into patent cases in at least two main ways: (a) determinations of equitable remedies, or remedies that are not money damages, such as injunctive relief, and (b) equitable defenses, such as equitable estoppel, laches, patent misuse, and inequitable conduct or the broader concept of unclean hands.⁴⁰¹ This range of opportunities for equitable decision-making within patent law means that instead of introducing entirely new concepts into patent law, courts can draw expansively on existing equitable doctrines to mitigate the three types of costs discussed above—patent hold-up, foreclosure of alternative technology paths, and strategic use of pledges to deter entry. The array of equity tools allows courts to tailor their response to the nature of the costly behavior, and, where necessary, to incorporate considerations of the public interest into their decision-making. Below I provide a few examples of how equitable doctrines might be used to respond to these three types of costly behaviors.

First, with regard to problems of patent hold-up, the costs arise when technology choices are made by the public or some subgroup based on reasonable assumptions that the patent pledgor will not enforce its patents or some specified subgroup of its patents against these users for their particular uses, there are sunk costs associated with changing their technology choice, and the patent owner exploits these sunk costs to extract more than reasonable royalties from the technology users either directly or indirectly through

³⁹⁹ See Gal & Rubinfeld, *supra* note 2, at 548 (discussing the need to focus on intent in evaluating certain kinds of free pricing behavior to determine whether the reason for the behavior was legitimate, such as market penetration, or anticompetitive, such as to drive out competition).

⁴⁰⁰ In the Supreme Court case *eBay v. MercExchange* the Court instructs “that patent law is not an island, but rather is part of the broader law of equity and its remedies.” T. Leigh Anenson & Gideon Mark, *Inequitable Conduct in Retrospective: Understanding Unclean Hands in Patent Remedies*, 62 AM. U. L. REV. 1441, 1442 (2013).

⁴⁰¹ See generally *id.* (discussing inequitable conduct defense in patent remedies).

increased costs to manufacturers who supply the patented technology.⁴⁰² I suggest that patent pledges that promise to keep particular technology paths open should be enforced in a manner consistent with the spirit of these promises, and in ways that protect reasonable reliance interests of the recipients of the patent pledge, through an expansion of the doctrine of equitable estoppel. Under existing doctrine, to establish equitable estoppel as a defense to patent infringement, the alleged infringer must show: (a) misleading statements or conduct, (b) action in reasonable reliance on those statements or such conduct, and (c) resulting prejudice to the alleged infringer.⁴⁰³ The missing link in the patent pledge context is the first element, which would seem to require a direct relationship between the pledgor and the party relying on the pledge, misleading conduct or statements directed at the alleged infringer. To be useful in the patent pledge context, the pledge itself, made to the public at large, would have to be sufficient as the misleading statement or conduct, and the requirement of a direct relationship would have to be relaxed.

Concerns about market reliance on promises to make patents covering standards available have already led to several proposals for broadening estoppel concepts in patent law. Professors Merges and Kuhn propose an estoppel doctrine for standards, extending equitable estoppel to protect the reliance interests of the public in the use of patented industry standards.⁴⁰⁴

Professor Contreras focuses on promissory estoppel rather than equitable estoppel, proposing a fraud-on-the-market theory for justifying the equitable doctrine of patent unenforceability as a remedy for deceptive conduct in the context of standard setting.⁴⁰⁵ Under this proposal, knowing that the market will rely on the promise is enough to establish the link between the pledgor and the potential infringer.⁴⁰⁶ In contrast to these specific proposals for modifying equitable and promissory estoppel to encompass attenuated forms of reasonable reliance, the approach to equity I advocate in this Article would allow courts to focus on the behavior of the patent pledgor, examining whether the promisor was behaving opportunistically in ways that unfairly exploit the public. Construing equitable estoppel in this way, courts would have the ability to refuse to allow a patent pledgor to take a later position with regards to patent enforcement that is inconsistent with their earlier position regarding open innovation and use of shared technology where there is public harm in doing so.

Areas where broader use of equitable estoppel may be particularly useful in addressing costs of hold-up include situations where patent pledgors are acting to support de facto standards in ways that create the potential for patent hold-up once the standards are adopted. By promoting adoption of a particular

⁴⁰² See Contreras, *Equity*, *supra* note 277, at 12.

⁴⁰³ See, e.g., *A.C. Aukerman Co. v. R.L. Chaides Constr. Co.*, 960 F.2d 1020, 1028 (Fed. Cir. 1992).

⁴⁰⁴ See Merges & Kuhn, *supra* note 278, at 21–27 (examining patent hold-up problems in contexts of standards).

⁴⁰⁵ See Contreras, *Market*, *supra* note 8, at 538–55.

⁴⁰⁶ *Id.* at 542–43.

technology as an industry standard, patent pledges provide mechanisms for creating or reinforcing de facto standards. The pledges operate as private efforts to engage in standardization outside of a formal standard-setting process, and therefore outside of a system that includes industry participation and procedural safeguards. The same considerations that are informing FTC, DOJ, and USPTO guidelines regarding the enforcement of FRAND patents should be used in this context of de facto standard setting, but courts need to rely on broader concepts of equitable estoppel to constrain behavior where formal membership rules and agreements are absent. Choices between standards become even more complicated, and important, in situations of platform competition. Many of the most significant patent pledges, judged in terms of potential industry impact, involve pledges that influence the development and adoption of a platform technology as an industry standard.⁴⁰⁷

In the context of the examples discussed in Part III, consider a hypothetical in which a manufacturer of hydrogen-fueled cars that has made a collection of patents available to encourage adoption of its hydrogen car technology later approaches a car maker who has adopted this patented technology and asserts several closely related patents in the same family as pledged patents that cover slight improvements on the existing technology. Under an expanded doctrine of equitable estoppel, courts would be able to consider: (a) whether the hydrogen car manufacturer's initial pledge was made in such a way as to mislead the public about continued free access to the patented technology, including not just pledged patents but also any other patents owned by the hydrogen car manufacturer that are needed to use the technology, (b) whether adopters made investments in reasonable reliance on the pledge—directly or indirectly through market adoption of the technology as a standard by those relying on the pledge, and (c) the extent of harm to adopters from allowing the hydrogen car manufacturer to enforce its patents. Courts could use these considerations to determine whether the patents can be enforced against the technology adopters and, if so, whether injunctive relief should be available.

As a second hypothetical example, suppose that Tesla's or Toyota's pledged patents are later acquired by a patent assertion entity that seeks to enforce the patent against adopters of the pledged patented technology. Antitrust law has been used quite effectively to address the problem of successors to patents pledged as part of standard setting. Starting with a case brought in 2008 against Negotiated Data Solutions, LLC, the Federal Trade Commission has applied Section 5 of the FTC Act, which protects against "unfair methods of competition," to limit the assertion of patents licensed for use as part of industry standards by a subsequent owner of the patents seeking to renege on the license.⁴⁰⁸ Antitrust law may not be as effective in addressing the problem of

⁴⁰⁷ See Contreras, *Market*, *supra* note 8, at 486–90.

⁴⁰⁸ See, e.g., *In the Matter of Negotiated Data Solutions LLC*, FED. TRADE COMM'N, <https://www.ftc.gov/enforcement/cases-proceedings/051-0094/negotiated-data-solutions-llc-matter> [<https://perma.cc/X324-EQP7>] (last updated Sept. 23, 2008); see also FED. TRADE

successors outside of formal standard setting, however, particularly where the patent pledge has questionable legal enforceability to start with and where the impact on competition is less clear. In these cases, parties may need to rely on equitable estoppel as well. While equitable estoppel might apply to limit the original pledgor's enforcement of its patents, it is important to the technology adopters that this doctrine extend to subsequent acquirers of the pledged patent(s). In prior cases the courts have been willing to extend the defense of equitable estoppel to assignees of a patent, holding that conduct by prior owners can give rise to an equitable estoppel defense.⁴⁰⁹ In a recent case the Federal Circuit allowed equitable estoppel as a defense to an assignee nonpracticing entity where the prior patent owner had a business relationship with the alleged infringer.⁴¹⁰

These decisions are consistent with the use of equity to limit opportunistic patent use by the assignees of pledged patents,⁴¹¹ but the doctrine needs to stretch further to encompass situations in which the only relationship between the prior patent owner and the patent users is the patent pledge.

Second, with respect to foreclosure of competing technologies, courts need to be wary of intervening in legitimate competition, including competitive lowering of price, but at the same time need the tools to respond to conditions that harm competition. While it may be difficult to disentangle legitimate competition from anticompetitive behavior, courts should have the ability to examine the intent and the effects of patent pledges *ex post*, seeking to identify areas where patents may be used in nontraditional ways to thwart competition among alternative systems of open innovation. As a starting point, equitable estoppel should apply broadly to ensure that where a technology provider achieves market dominance by promising to make its patents covering this technology available for free, its promises are rigorously enforced and follow

COMM'N, STATEMENT OF THE FEDERAL TRADE COMMISSION IN THE MATTER OF NEGOTIATED DATA SOLUTIONS LLC, https://www.ftc.gov/sites/default/files/documents/cases/2008/01/080122_statement.pdf [<https://perma.cc/JD5U-RLSK>] (complaint alleged that N-Data reneged on a prior licensing commitment to a standard-setting body and was therefore able to increase the price of a widely used technology by consumers, FTC held that this was conduct in violation of Section 5 of the FTC Act); Contreras, *Patent*, *supra* note 3, at 598–99.

⁴⁰⁹ See, e.g., *High Point Sarl v. Sprint Nextel Corp.*, 817 F.3d 1325, 1326, 1331 (Fed. Cir. 2016). Equitable estoppel is “a license to use the invention that extends throughout the life of the patent.” *SCA Hygiene Prods. Aktiebolag v. First Quality Baby Prods., LLC*, 807 F.3d 1311, 1332 (Fed. Cir. 2015) (en banc). “That effect can arise when a predecessor’s conduct is imputed to its successors-in-interest.” *High Point Sarl*, 817 F.3d at 1331; see also *Radio Sys. Corp. v. Lalor*, 709 F.3d 1124, 1131 (Fed. Cir. 2013) (“Our precedent confirms that equitable estoppel applies to successors-in-interest where privity has been established.” (citing *Jamesbury Corp. v. Litton Indus. Prods., Inc.*, 839 F.2d 1544, 1555 (Fed. Cir. 1988))).

⁴¹⁰ See, e.g., *High Point Sarl*, 817 F.3d at 1331.

⁴¹¹ While equitable estoppel seems like a better fit for the types of patent hold-up problems that patent pledges might give rise to, an analogy can also be drawn between what could be viewed as a form of patent pledge estoppel and file wrapper estoppel, which prevents the patentee from reclaiming content they have given up during prosecution of the patent.

the patents in the event they are assigned to new owners. This would limit the predatory pricing aspects of patent pledges by restricting the ability of the patent pledgor to enforce its patents, or perhaps even subsequent patents within the same family or covering the same technology, after driving competition out of the market.

Where it is clear that the patent pledge is being used solely or primarily to drive a competing technology out of the market, the patent pledgor's ability to extract rents from patents covering complementary goods or services should also be subject to scrutiny by the courts, with the public interest in access weighing against injunctions and limiting monetary damages. Here, avenues for finding patent misuse out of strategic patent nonuse may be used to create the appropriate balance between respecting private orderings and promoting competition. Findings of patent misuse could limit the defensive aspect of patent pledges by making them unenforceable even against those bringing a return patent suit. This would require an expansion of the patent misuse doctrine, which recent Federal Circuit decisions have construed narrowly,⁴¹² to encompass situations in which the patentee is extracting market benefits beyond the scope of the patent in ways other than through restricting access to that patent.

Drawing again from the cases discussed in Part III, suppose, for example, that a dominant cloud computing platform provider makes patent pledges covering a particular cloud technology available royalty-free in order to foreclose competition by smaller cloud computing providers that rely on charging for use of their proprietary cloud technology. By lowering the price of competing technology to zero, this large industry incumbent could drive smaller competitors out of the market. This would leave the large incumbent with the chance to increase prices for cloud computing technology later and with the ability to recoup costs through charging relatively higher prices for applications that work with the "free" cloud platform. In this example courts should be able to use an expanded approach to patent misuse to respond to what is essentially predatory patent pricing by limiting the pledgor's ability to directly or indirectly increase the price of its cloud technology later. They should also be able to take the incumbent's efforts to deter competition into account when determining injunctive relief and monetary damages for enforcement of the incumbent's patents covering complementary goods or services.

The third type of cost is where patent pledges are used deliberately to create entry barriers for competing technologies. This analysis overlaps with the use

⁴¹² See, e.g., *Princo Corp. v. Int'l Trade Comm'n*, 616 F.3d 1318, 1329 (Fed. Cir. 2010) (en banc) (holding that a patent pool created by two companies that suppressed one of the two competing patented technologies did not constitute patent misuse, because a claim of patent misuse must show that the "conduct in question restricts the use of that patent and does so in one of the specific ways that have been held to be outside the otherwise broad scope of the patent grant"); see also Dennis Crouch, *Federal Circuit Holds-Line on Patent Misuse Defense*, PATENTLY-O (Aug. 30, 2010), <https://patentlyo.com/patent/2010/08/federal-circuit-holds-line-on-patent-misuse-defense.html> [<https://perma.cc/E4N6-7GZY>].

of pledges to foreclose competing technologies discussed above, but focuses on the negative impact on potential entrants rather than existing competitors. Some uses of pledges may create entry barriers inadvertently, but here I focus on deliberate efforts to discourage entry through the use of patent pledges. Patent pledges can be used to privilege some technology platforms over others. By promoting the protections made available to users of Linux, for example, IBM could make it more difficult for alternative competing open-source providers to flourish. Google could use its market power to shape notions of what types of technology should be free and what proprietary, potentially limiting entry of companies in areas where they would have to combat norms and expectations of free access to charge for their new technologies. Ford may seek to lower the cost of existing technology for hybrid cars enough to deter consumers from exploring new clean technologies.

Courts will have limited (if any) options to intervene in patent pledge decisions simply on the grounds that the pledges create entry barriers, but they may have the ability to apply equitable doctrines to limit the availability of injunctive relief and interject additional reasonableness considerations into monetary damages calculations where pledges are used strategically to deter entry. The courts could ensure that the spirit of promises to make technology platforms available for free are preserved, and they could also limit the bite of the defensive aspects of pledges where they are used to discourage alternative technologies.

VI. CONCLUSION

“There’s no such thing as a free lunch.”

*—Milton Friedman*⁴¹³

Patent owners, including some of the world’s largest patent holders and most innovative companies, are pledging to share their patents for free. These patent pledgors are making unilateral promises not to assert their patents in a variety of ways that are promoted as mechanisms for supporting socially beneficial open innovation. While patent pledges may indeed provide useful mechanisms for addressing challenges that patents create for open systems of innovation, this Article has shown that they are not always welfare promoting. Costs arise where patent holders exploit limitations in the legal framework governing patent pledges along with private information about their intellectual property and business strategies to act opportunistically.

The Article has shown that patent pledges can create hidden costs for innovation that the law is not currently equipped to deal with, and has suggested the difficulties of responding to these costs through *ex ante* rule change. While

⁴¹³ FRIEDMAN, *supra* note 26.

the Article concludes that there's no such thing as a free patent,⁴¹⁴ however, it also suggests a way of mitigating the costs. As patent pledges, along with other arrangements involving a private reordering of patent rights, continue to increase in size and scope, equitable doctrines that are narrowly tailored to address opportunism can and should be used as mechanisms for mitigating costs and protecting the public interest. Broader use of existing equitable doctrines within patent law to address the opportunistic use of patent pledges can provide courts with limited flexibility to respond to the ways in which opportunistic uses of patent pledges may create individual unfairness or harm the public interest. In this way we can reap the benefits and limit the costs of "free" patents.

⁴¹⁴This is a play on Friedman's well-known statement that "there's no such thing as a free lunch." *See id.*