Patent Costs and Unlicensed Use of Patented Inventions

Rebecca S. Eisenberg†

Recent commentators have observed, and sometimes lamented, significant gaps between the formal reach of the patent system and the practical exclusionary effect of patent law. It is costly for technology developers to obtain and assert patents, for technology users to identify the patents they might be infringing and to clear rights, and for the Patent and Trademark Office (PTO) to find patent-defeating prior art. The costs of the patent system provide shelter for infringing behavior that might otherwise lead to either licensing or liability, perhaps mitigating excesses in the patent system while retaining strong rights that motivated owners may enforce. But users who rely upon high information costs and transaction costs to protect themselves from patent assertion run the risk of liability when patents fall into the hands of entrepreneurs who figure out cost-reducing strategies to close the gap between the formal reach of patents and the narrower range of activity that has been effectively controlled by prior owners.

INTRODUCTION

The prevailing metaphor of patents as property[1] may convey an image of exclusive enjoyment that is at odds with actual practice in technology communities. Empirical work suggests that unlicensed use of patented inventions is common in research,[2] although it is formally

† Robert and Barbara Luciano Professor of Law, University of Michigan Law School.

I am grateful to participants in the Licensing of Intellectual Property Symposium at The University of Chicago Law School for helpful comments on an earlier draft.

1 See, for example, F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 Minn L Rev 697, 703 (2001); Frank H. Easterbrook, *Intellectual Property Is Still Property*, 13 Harv J L & Pub Pol 108, 108–09 (1990); Edmund W. Kitch, *Patents: Monopolies or Property Rights?*, 8 Rsrch L & Econ 31, 39–40 (1986). Consider also James Bessen and Michael J. Meurer, *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* 2–28 (Princeton 2008) (arguing that the lack of an effective notice system and higher costs for clearing rights make the patent system function less effectively than other property rights regimes); Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 Tex L Rev 1031, 1032 (2005) (analogizing intellectual property to land limited by the capacity for nonrivalrous consumption, higher costs, and the iterative nature of creation).

2 See, for example, Wesley M. Cohen and John P. Walsh, *Real Impediments to Academic Biomedical Research*, in Adam B. Jaffe, Josh Lerner, and Scott Stern, eds, 8 *Innovation Policy and the Economy* 1, 10–11 (MIT 2008); Joseph Straus, Henrik Holzapfel, and Matthias Lindenmeir, *Genetic Inventions and Patent Law: An Empirical Survey of Selected German R&D Institutions* 26 (Verlag Medien 2004); Dianne Nicol and Jane Nielsen, *Patents and Medical Biotechnology: An Empirical Analysis of Issues Facing the Australian Industry* 252 (University of Tasmania 2003), online at http://www.ipria.org/publications/reports/BiotechReportFinal.pdf (visited Mar 20, 2011). I review this literature in Rebecca S. Eisenberg, *Noncompliance, Nonenforcement,*

subject to remedies for patent infringement.[3] Unlicensed use is likely pervasive in other settings as well, including commercial production.[4]

It is not obvious whether unlicensed use should concern patent policymakers. When patent owners refrain from asserting their rights, perhaps they have no objection to the activity. On the other hand, some unlicensed uses may slip through the system because it is simply too costly for owners and users to identify each other and to sort out their rights. Perhaps the costs that shelter unlicensed use undermine goals of the patent system, such as promoting research and development (R&D)[5] or promoting transactions between inventors and users of inventions.[6] Considered from the benchmarks of perfect compliance and enforcement, unlicensed uses of patented inventions could be viewed as leaks in the system that divert rewards from inventors to free riders[7] or that circumvent private ordering through licensing transactions.[8]

Patent doctrine generally promotes both compliance on the part of users and enforcement on the part of owners. Unlicensed users are subject to infringement remedies,[9] including enhanced damages for willful infringement.[10] The doctrines of laches and estoppel encourage enforcement by limiting the remedies available to patent owners who tolerate unlicensed use.[11] Patent law thus makes it risky for both users and owners to ignore patents.

But high costs make compliance and enforcement imperfect. Users may be unaware of patents, and owners may be unaware of infringing

Nonproblem? Rethinking the Anticommons in Biomedical Research, 45 Houston L Rev 1059, 1063–76 (2008).

3 See *Madey v Duke University*, 307 F3d 1351, 1362–63 (Fed Cir 2002) (holding that use in academic research infringed a patent). But consider *Merck KGaA v Integra Lifesciences I Ltd*, 545 US 193, 206–08 (2005) (holding that use in preclinical drug development research fell within 35 USC § 271(e)(1)'s exemption for "uses reasonably related to the development and submission of information under a Federal law which regulates the manufacture, use, or sale of drugs").

4 See Mark A. Lemley, *Ignoring Patents*, 2008 Mich St L Rev 19, 21–22, citing Iain M. Cockburn and Rebecca Henderson, *Survey Results from the 2003 Intellectual Property Owners Association Survey on Strategic Management of Intellectual Property* D.2 (unpublished survey, Oct 2003), online at http://staging.ipo.org/AM/Template.cfm?/Section=Business_Issues&Template=/CM/ContentDisplay.cfm&ContentID=22949 (visited Sept 3, 2010).

5 See Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in National Bureau of Economic Research, *The Rate and Direction of Inventive Activity: Economic and Social Factors* 609, 618 (Princeton 1962); Mark A. Lemley, *Ex Ante versus Ex Post Justifications for Intellectual Property*, 71 U Chi L Rev 129, 135–38 (2004).

6 See Kieff, 85 Minn L Rev at 710 (cited in note 1); Paul J. Heald, *Optimal Remedies for Patent Infringement: A Transactional Model*, 45 Houston L Rev 1165, 1173–75 (2008).

7 For an argument that some free riding may be consistent with adequate R&D incentives, see Lemley, 83 Tex L Rev at 1046–58 (cited in note 1).

8 See Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J L & Econ 265, 276–78 (1977); Kieff, 85 Minn L Rev at 726 (cited in note 1).

9 35 USC §§ 271, 283–84.

10 See *In re Seagate Technology, LLC*, 497 F3d 1360, 1368 (Fed Cir 2007).

11 See *A.C. Aukerman Co v R.L. Chaides Construction Co*, 960 F2d 1020, 1028 (Fed Cir 1992).

activities. Information costs and transaction costs may dwarf potential gains to users from identifying and clearing rights or to owners from identifying infringers and asserting rights against them.[12] Because the patent system constantly generates new rights of unclear scope and uncertain validity, these costs are not a one-time investment, like running a title search or building a fence, but an ongoing burden. Even conscientious patent searchers who are undeterred by fear of willful infringement liability[13] may face considerable uncertainty about the patent rights surrounding their work. At the same time, they may have little expectation of infringement liability. Patent owners may have reasons to refrain from asserting their patents even when they know about infringing activity. They may welcome unlicensed uses that they hope will enhance the value of their patents. They may have doubts about validity and infringement, lack resources for litigation, or question whether the costs and risks of assertion are justified. They might wait for users to establish a significant commercial presence, or until damages accrue to a level that exceeds litigation costs, before bringing suit. The costliness of enforcement may thus lead both users and owners to ignore patents in many situations. As a result, the nominal reach of the patent system (that is, the scope of issued patent claims) is greater than its actual effective reach (that is, the range of technological activity that is practically controlled by patent owners). At the same time, information costs and transaction costs facing patent examiners may have the opposite effect, enlarging the nominal reach of issued patents beyond the scope of what formal patent law would permit if patentability determinations were costless.

This Article considers the incidence and effects of information costs and transaction costs that cause gaps between the effective reach of the patent system and its nominal reach. Information costs and transaction costs have few defenders and are rarely, if ever, overtly imposed in pursuit of policy goals. They more often arise as byproducts of measures that serve other goals.[14] High litigation costs to enforce patents follow from efforts to improve the record for judicial decisionmaking, for example, while uncertain boundaries of patents follow from flexible rules that are sensitive to context.[15] Nonetheless,

---

12 See John M. Golden, *Principles for Patent Remedies*, 88 Tex L Rev 505, 518–19 (2010).

13 See Alan Devlin, *The Misunderstood Function of Disclosure in Patent Law*, 23 Harv J L & Tech 401, 404 (2010) (noting that willful infringement liability creates perverse incentives to remain ignorant of patents).

14 See, for example, Clarisa Long, *Information Costs in Patent and Copyright*, 90 Va L Rev 465, 479–80 (2004).

15 See, for example, *Festo Corp v Shoketsu Kinzoku Kogyo Kabushiki*, 535 US 722, 732 (2002) ("It is true that the doctrine of equivalents renders the scope of patents less certain. . . . These concerns with the doctrine of equivalents, however, are not new. Each time the court has

adjustments and shifts in these costs can have profound effects that are important for patent reformers to understand.[16] A better understanding of the impact of costs might illuminate the pros and cons of reform proposals. Costs faced by patent applicants and owners tend to restrict the effective reach of the patent system, creating a gap between what is patentable and the effective assertion of patent rights. Patent prosecution costs tend to exclude low-value inventions from the patent system, while patent enforcement costs tend to shelter low-value uses from patent assertion. Costs faced by patent examiners and challengers tend to allow claims to issue and remain in effect that extend beyond what is formally patentable.[17] The result is a proliferation of underenforced rights that lure patent entrepreneurs who can profit by buying up rights and figuring out cost-effective strategies for asserting them.

I. ARE HIGH COSTS A FEATURE OR A BUG?

Patent scholarship has begun to take note of the significant information costs and transaction costs associated with patents and the resulting gap between formal patent rights and their practical exclusionary effects. Some scholars, particularly proponents of patent law reform, lament this state of affairs and suggest measures to bring about a closer correspondence between the patent rights awarded to owners and the behavior of technology users. Others take a more benign view, seeing the high costs that constrain the patent system as a feature that motivates owners to invoke patent rights parsimoniously, thereby mitigating potential excesses noted by patent critics.

James Bessen and Michael Meurer are particularly concerned about the high costs technology users face in determining which patents they may be infringing and in clearing rights. They argue that uncertainty about the validity and boundaries of patents limits the value of patents in promoting R&D and that risks of inadvertent infringement limit the willingness of users to invest in technology.[18] They advocate reforms to fortify the notice function of patents,

considered the doctrine, it has acknowledged this uncertainty as the price of ensuring the appropriate incentives for innovation.").

16 Process-oriented reforms can provoke considerable opposition, as evidenced by reactions of the patent community to proposed reform of continuation practice in the Patent and Trademark Office (PTO). See, for example, Stephen T. Schreiner and Patrick A. Doody, *Patent Continuation Applications: How the PTO's Proposed New Rules Undermine an Important Part of the U.S. Patent System with Hundreds of Years of History*, 88 J PTO Socy 556, 561–65 (2006). See also Liza Vertinsky, *Comparing Alternative Institutional Paths to Patent Reform*, 61 Ala L Rev 501, 514–15 (2010) (discussing the variables that affect the cost of transition to a different legal regime and noting their importance in the patent law context).

17 See Long, 90 Va L Rev at 506 (cited in note 14).

18 Bessen and Meurer, *Patent Failure* at 147–55 (cited in note 1).

thereby increasing rewards to patent holders and improving the function of markets for technology.[19]

Mark Lemley has suggested a number of reforms that would bring the system for identifying and clearing rights in the patent system closer to its counterpart in the real property system. He would accelerate patent prosecution and disclosure to provide greater certainty regarding the scope of patent rights at an earlier stage, fortify incentives to search patents and eliminate the deterrent to patent searching under willful infringement doctrine, and make the terms of licenses more transparent.[20]

John Walsh and Wesley Cohen take a different view. Observing that patent rights have rarely posed an obstacle to the work of research scientists, they characterize unlicensed use as a "working solution" that mitigates the risk of an anticommons impeding scientific progress.[21] They contrast the minimal impact of patents with the more common interruptions of scientific work to negotiate access to proprietary materials or data. They explain the difference in terms of costs to owners: patent enforcement is a costly means of excluding users, while in the case of materials and data, exclusion is cheap and sharing more costly.[22]

Katherine Strandburg offers another explanation for the same observations. She identifies "ignoring patents" as a positive social norm enforced within the community of academic and industrial researchers.[23] She sees this as a successful adaptation of a traditional scientific-community sharing norm to the convergence of academic and industrial research streams, preserving both the benefits of sharing among scientists and the benefits of patents and exclusivity when the same inventions are deployed outside of research settings.[24] Neither Strandburg nor Walsh and Cohen propose reforms to reduce the costs

---

19 Bessen and Meurer note that effective reform will require structural changes that may not be politically feasible today. Id at 25–27.

20 Lemley, 2008 Mich St L Rev at 31–34 (cited in note 4). For an analysis suggesting similar problems in the context of real property, see Stewart E. Sterk, *Property Rules, Liability Rules, and Uncertainty about Property Rights*, 106 Mich L Rev 1285, 1296–97 (2008).

21 See Cohen and Walsh, *Real Impediments* at 12 (cited in note 2); Wesley M. Cohen and John P. Walsh, *Access—or Not—in Academic Biomedical Research*, in Rochelle C. Dreyfuss, Harry Frist, and Diane L. Zimmerman, eds, *Working within the Boundaries of Intellectual Property: Innovation Policy for the Knowledge Society* 3, 16–18 (Oxford 2010).

22 Cohen and Walsh, *Access—or Not* at 18–19 (cited in note 21).

23 Katherine J. Strandburg, *User Innovator Community Norms: At the Boundary between Academic and Industry Research*, 77 Fordham L Rev 2237, 2250 (2009). See also Katherine J. Strandburg, *Norms and the Sharing of Research Materials and Tacit Knowledge*, in Dreyfuss, Frist, and Zimmerman, eds, *Working within the Boundaries of Intellectual Property* 85, 88–92 (cited in note 21).

24 Strandburg, 77 Fordham L Rev at 2252–57 (cited in note 23).

of patent enforcement, although Walsh and Cohen worry that the free flow of knowledge and other research inputs may have incentive-dampening effects.[25] Strandburg suggests that a legal research-use exemption would "stabilize" the "ignore patents" norm while leaving the research community less vulnerable to patent holders outside the community who are indifferent to its norms.[26]

Jonathan Barnett sees limited pursuit and enforcement of formally available patent rights as a possible market response by innovating firms to overpropertization.[27] He explains that effective propertization outcomes are a function not merely of formal legal entitlements and judicial and administrative interpretations of those entitlements, but also of private choices to obtain and enforce available entitlements.[28] When the level of formal entitlements increases to the point that the costs the regime imposes on innovators (both transaction costs and the increased costs of future innovation using proprietary inputs) exceed the benefits it offers them, innovators who are able to coordinate may respond by declining to invest in obtaining and enforcing patents, thereby truncating the effective level of propertization to avoid losses.[29] In other words, widespread underenforcement (and infringement) may be a deliberate, coordinated response by innovators to excessive patent rights in a field that avoids the higher costs of changing the formal regime through legislation.[30]

Paul Heald identifies the primary function of patents as reducing the costs of contracting between inventors and users of inventions, rather than the more conventionally understood function of maintaining

25 Cohen and Walsh, *Real Impediments* at 20–21 (cited in note 2).

26 Strandburg, 77 Fordham L Rev at 2266–67 (cited in note 23).

27 See Jonathan M. Barnett, *Property as Process: How Innovation Markets Select Innovation Regimes*, 119 Yale L J 384, 410–11 (2009).

28 See id at 434.

29 Barnett identifies historical examples in patent pools and other arrangements for mutual forbearance from enforcement of intellectual property rights relating to automotive technology, semiconductors, information technology, and biotechnology. Id at 434–37.

30 In addition to the costs of coordination and lobbying to achieve legislative change, legislative change to reverse propertization could potentially expose the government to liability in takings actions. Id at 420 n 82, citing Congressional Budget Office, *Cost Estimate: S 1145, Patent Reform Act of 2007* (Feb 18, 2008), online at http://cbo.gov/ftpdocs/89xx/doc8981/s1145.pdf (visited Sept 3, 2010). Legal scholars are not in agreement on the application of the Takings Clause to patents. Compare Thomas F. Cotter, *Do Federal Uses of Intellectual Property Implicate the Fifth Amendment?*, 50 U Fla L Rev 529, 529–32 (1998) (reviewing cases and finding a "muddle"), with Adam Mossoff, *Patents as Constitutional Private Property: The Historical Protection of Patents under the Takings Clause*, 87 BU L Rev 689, 690–91 (2007) (arguing that nineteenth-century courts embraced patents as constitutional property protected under the Takings Clause).

incentives to invent.[31] Recognizing that transaction costs might still make it cheaper in some cases for users to pursue independent invention rather than find a patented invention and negotiate a license ex ante, he argues that infringement remedies should not be set so high as to promote wasteful transacting.[32] He would not exempt unlicensed users from infringement liability, but would reduce the level of remedies when, based upon a number of cost factors, unlicensed use followed by an "involuntary transaction" through infringement liability appears less costly than ex ante transacting.[33]

None of these scholars offers a full-throated defense of a patent system characterized by information costs and transaction costs that lead to pervasive noncompliance and nonenforcement. Some argue that noncompliance and nonenforcement have fortuitous benefits that offset potential problems in a world of perfect enforcement of existing patent rights. If existing rights, fully enforced, would be excessive, perhaps information costs and transaction costs that shelter some unlicensed uses from patent assertion bring the system closer to achieving efficient outcomes. Indeed, perhaps we should sometimes understand noncompliance and nonenforcement as deliberate, coordinated behavior by technologists to avoid both the costs of unduly robust patent rights and the costs of formal rule changes. But it hardly seems likely that such a system is optimal. Perhaps we could do better by dialing down both the level of formal protection and associated transaction costs, bringing patent law on the books into closer conformity with a level of protection that users would respect and that owners would enforce. But changing the rules is also costly, and an optimal patent regime may be an elusive goal.

II. PATENT-OWNER COSTS AS SCREENS

Scholars have attributed at least one useful function to costs associated with patents. Some scholars have noted that imposing fees as a condition for acquiring or maintaining patents can serve a screening function, causing owners to weed out the least valuable

---

31 See Heald, 45 Houston L Rev at 1166–68 (cited in note 6). Heald sees information costs and transaction costs as essential to justifying intellectual property; without these costs, we could rely upon contracts to pay for innovation. See id at 1166.

32 Id at 1172 ("Draconian penalties would most likely stimulate excessive searching for rights holders by potential users and would induce users to enter into unnecessary precautionary licenses or not innovate at all.").

33 For an earlier argument that researchers should be allowed to use patented inventions in biomedical research without ex ante permission, but subject to an ex post reach-through royalty remedy based on the ultimate commercial success of resulting products, see Janice M. Mueller, *No "Dilettante Affair": Rethinking the Experimental Use Exception to Patent Infringement for Biomedical Research Patents*, 76 Wash L Rev 1, 54–58 (2001).

patents through self-selection.[34] Many patent owners allow their rights to lapse by declining to pay maintenance fees,[35] presumably abandoning those patents that they believe are worth less than the amount of the fees.[36]

Jonathan Masur and David Fagundes take this insight further, finding a "costly screen"—the initial prosecution costs and filing fees to obtain patents—that discourages patent seekers from acquiring low-value rights.[37] They predict that prosecution costs will be especially high for patents of questionable validity and for patents in heavily patented fields, because these patents are more likely to face Patent and Trademark Office (PTO) rejections that are costly to overcome.[38] This feature aligns private cost-avoidance incentives with the public interest by making it more costly to obtain patents that threaten to impose high social costs.[39] They stop short of characterizing this cost structure as a deliberate policy choice, but speculate that the current costly screen for obtaining patents could not have survived for so long if it did not promote societal well-being.[40]

A similar costly-screen analysis could be applied further down the road to the costs that owners incur in monitoring and enforcing against infringement. Patent owners who face high monitoring and

---

34 See, for example, Kimberly A. Moore, *Worthless Patents*, 20 Berkeley Tech L J 1521, 1530–49 (2005); Jean O. Lanjouw, Ariel Pakes, and Jonathan Putnam, *How to Count Patents and Value Intellectual Property: Uses of Patent Renewal and Application Data*, 46 J Indust Econ 405, 428 (1998).

35 In order to maintain a patent in effect, it is necessary to pay increasing maintenance fees to the PTO that are due 3.5 years, 7.5 years, and 11.5 years after issuance of the patent. 35 USC § 41(b). For large firms these fees are currently set at $980, $2,480, and $4,410, respectively. See PTO, *Fee Schedule*, online at http://www.uspto.gov/web/offices/ac/qs/ope/fee2009september15.htm (visited Dec 21, 2011).

36 Scholars have examined data on maintenance fee payments to make inferences about patent value. See Bessen and Meurer, *Patent Failure* at 99–104 (cited in note 1) (reviewing the literature); Jonathan A. Barney, *A Study of Patent Mortality Rates: Using Statistical Analysis to Rate and Value Patent Assets*, 30 AIPLA Q J 317, 320 (2002) (presenting a twofold approach to predicting the future value of an individual patent based on a statistical survey of historical maintenance fee records and a comparative ranking of existing patents based on their likelihood of high or low maintenance rates); sources cited in note 34.

37 Jonathan S. Masur and David Fagundes, *Costly Intellectual Property* *16–17 (unpublished manuscript, Feb 2010), online at http://ssrn.com/abstract=1441987 (visited Sept 3, 2010). They estimate the average costs of obtaining a patent to be approximately $22,000.

38 Id at *17.

39 Id at *18. Masur and Fagundes note that even if patent applicants could overcome initial rejections, higher prosecution costs select against such patents because some patent applicants might abandon their claims rather than incur those costs.

40 Id at *53–54. Other scholars take a different view of the political economy of patent law. Consider F.M. Scherer, *The Political Economy of Patent Policy Reform in the United States*, 7 J Telecom & High Tech L 167, 179–207 (2009) (reviewing changes in the patent system in the 1970s and 1980s and concluding that while some were well grounded in objective analyses of the problems at hand and what could be accomplished, others were not).

enforcement costs will presumably seek to economize on those costs, not only by selecting their most valuable patents for enforcement, but also by enforcing them only against infringers whose activities are valuable enough to justify the cost.[41] High costs might thus lead owners to ignore the activities of low-value infringers, such as researchers, while asserting patents against firms that are benefitting commercially from the technology.

Unlike the relatively uniform costs for patent prosecution and maintenance fees, monitoring and enforcement costs allow owners considerable flexibility in choosing how far to assert patents. Owners who decide not to prosecute a patent application or not to maintain a patent in force thereby forfeit their rights entirely, but assertion costs provide a more sensitive screen that allows owners to enforce selectively over time, on a case-by-case basis, according to their perceptions of value. The effect may be similar to a de minimis exception to infringement liability, with patent owners rather than courts deciding which uses are de minimis. Such a de facto limitation may soften the impact of a strong, unitary patent system in areas where strong rights are not justified without the need for explicit tailoring of the patent laws to provide different levels of protection in different contexts. As a consequence, owners who favor strong patent rights (such as pharmaceutical firms) may have an easier time maintaining political support for such rights without provoking objections from infringers (such as universities) who might complain to policymakers if they were targets of patent enforcement.

Although costly screens may arise through happenstance, they may sometimes be adjusted to make assertion more or less costly (and thus more or less likely) in certain contexts. Burdens of proof may be on plaintiffs or defendants. Preliminary relief might be readily available or limited to extraordinary circumstances.[42] The sheriff may lend owners or users a hand or leave them to fend for themselves.

---

41 Determining the value of an infringer's activities is another information cost problem for owners, who may not know the value to the infringer of using the patented technology rather than an alternative. But owners can make broad distinctions between commercial and academic users, or between profitable and unprofitable firms.

42 For example, the Drug Price Competition and Patent Term Restoration Act of 1984 ("Hatch-Waxman Act"), Pub L No 98-417, 98 Stat 1585, codified as amended in various sections of Titles 15, 21, 35, and 42, lowers information costs and assertion costs for owners of drug patents facing possible infringement by generic competitors. The Hatch-Waxman Act requires firms that seek regulatory approval for generic versions of patented products to give notice to patent owners, thereby relieving owners of the cost burden of monitoring potential infringers. See 21 USC § 355(j). The Hatch-Waxman Act also defers regulatory approval of generic products during the patent term and provides for an automatic thirty-month stay of regulatory approval during litigation of infringement claims, thereby relieving patent owners of the cost of

III. NON-OWNER COSTS AS EXPANDERS

The literature on patent costs as screens highlights the impact of costs on the behavior of patent applicants and owners. But the patent system also imposes costs on other actors who make decisions about patents, including the PTO and potential infringers. These costs may also cause the effective reach of the patent system to depart from the formal rights that it provides. But while owner costs tend to shrink the effective reach of the patent system, non-owner costs tend to enlarge it beyond its formal limits.

A. PTO Costs

The PTO incurs costs in examining patent applications for patentability and additional costs in making and defending final rejections.[43] Resource constraints motivate it to economize on these costs.[44] But while patent seekers' cost-avoidance strategies operate as a screen to limit patent rights, cost avoidance by the PTO is more likely to have the opposite effect. Although the PTO can err on the side of rejecting allowable claims as well as on the side of allowing unpatentable claims, rejections are generally more costly for the PTO than allowances.[45] Rejections require written justification, including citations to supporting prior art,[46] and final rejections may

seeking preliminary relief in the courts. See 21 USC § 355(q)(1)(G); Eisenberg, 45 Houston L Rev at 1089 (cited in note 2).

43 See Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 Nw U L Rev 1495, 1499 (2001).

44 Mark Lemley estimates that patent examiners have an average of eighteen hours to spend on a patent application,

> including the time spent reading the application, reading the submitted prior art, searching for and reading prior art in databases accessible to the PTO, comparing that prior art to the application, writing an office action, reading and responding to the response to office action, iterating the last two steps at least one and often more times, conducting an interview with the applicant, and ensuring that the diagrams and claims are in form for allowance.

Id at 1496 n 3. For a description of the patent examination process, see John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U Ill L Rev 305, 312–16.

45 See R. Polk Wagner, *Understanding Patent-Quality Mechanisms*, 157 U Pa L Rev 2135, 2153 (2009); Stuart Minor Benjamin and Arti K. Rai, *Who's Afraid of the APA? What the Patent System Can Learn from Administrative Law*, 95 Georgetown L J 269, 316–17 (2007); Mark A. Lemley and Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 BU L Rev 63, 75 (2004). Examiners may also boost their compensation by granting patents quickly. See Gajan Retnasaba, *Why It Is Easier to Get a Patent in September* *12–18 (unpublished manuscript, May 2008), online at http://ssrn.com/abstract=1121132 (visited Sept 3, 2010).

46 See PTO, *Manual of Patent Examining Procedures* § 706 (Sept 2007), online at http://www.uspto.gov/web/offices/pac/mpep/mpep_e8r6_0700.pdf (visited Oct 16, 2010).

Although patent applicants have an obligation to disclose prior art that they know about, 35 CFR § 1.56, they have no obligation to conduct a prior art search, and may be well advised not to do so. Conducting a prior art search not only increases the risk of rejection, but it also increases the

lead to costly appeals.[47] PTO costs thus tend to enlarge what is actually patented beyond what the law, if perfectly applied, would permit.[48]

Courts have sometimes adjusted the cost burden examiners face in rejecting claims. For example, the Court of Appeals for the Federal Circuit has increased examiner costs through exacting evidentiary standards to document the basis for rejections in the prior art,[49] reversing rejections based upon the combined teachings in multiple references unless the examiner can show an explicit "teaching, suggestion, or motivation" (TSM) to make the combination.[50] The Supreme Court mitigated this cost burden in *KSR International v Teleflex*,[51] rejecting rigid application of the TSM test and inviting resort to relatively low-cost "common sense" in evaluating the obviousness of an invention.[52]

The accuracy of patentability determinations often turns on an examiner's willingness to incur costs searching for prior art. Under complex statutory provisions, an invention is unpatentable if it is anticipated or made obvious by the prior art, broadly defined to include prior patents or printed publications anywhere in the world; certain co-pending patent applications; prior public use, sale, knowledge or invention by others in this country; and prior invention by another patent applicant in any WTO member country.[53] The more prior art before the examiner, the more narrowly the inventor must claim the invention to avoid rejection. Some prior art categories (for example,

---

risk of future findings of inequitable conduct for failure to disclose a reference that a court deems material to patentability. Thomas, 2001 U Ill L Rev at 314–15 (cited in note 44).

47 See 35 USC § 134. Mark Lemley and Bhaven Sampat found in a recent study that although 86.5 percent of the first office actions by the PTO on patent applications were nonfinal rejections, relatively few of these rejections became final. Instead, 73.1 percent of the patents that issue never receive a final rejection. Mark A. Lemley and Bhaven Sampat, *Examining Patent Examination*, 2010 Stan Tech L Rev 2, 3–5, online at http://stlr.stanford.edu/2010/05/examining-patent-examination (visited Sept 3, 2010).

48 Consider Barnett, 119 Yale L J at 399 figure 2 (cited in note 27) (picturing "Patented assets" as a subset entirely contained within the larger set of "Patentable assets").

49 See, for example, *In re Lee*, 277 F3d 1338, 1342–44 (Fed Cir 2002):

> The agency tribunal must set forth its findings and the grounds thereof, as supported by the agency record, and explain its application of the law to the found facts. . . . It must be based on objective evidence of record. . . . Deferential judicial review under the Administrative Procedure Act does not relieve the agency of its obligation to develop an evidentiary basis for its findings. To the contrary, the Administrative Procedure Act reinforces this obligation.

50 See, for example, *In re Zurko*, 258 F3d 1379, 1385 (Fed Cir 2001):

> [T]he deficiencies of the cited references cannot be remedied by the Board's general conclusions about what is "basic knowledge" or "common sense" to one of ordinary skill in the art. . . . This assessment of basic knowledge and common sense was not based on any evidence in the record and, therefore, lacks substantial evidence support.

51 550 US 398 (2007).

52 Id at 403 ("Rigid preventative rules that deny recourse to common sense are neither necessary under, nor consistent with, this Court's case law.").

53 35 USC §§ 102–03.

patents and printed publications) may be found in reasonably accessible electronic databases, but others (for example, prior use, sale, knowledge, or invention) may require more costly investigations into laboratory records, personal knowledge, or commercial practices that are not in searchable documents. Even documentary references may be difficult to search if they are in a language that the searcher does not understand. It is always possible to search further, particularly for nondocumentary prior art.

In practice, examiners focus their prior art searches primarily on issued US patents,[54] leading them to allow claims that a more comprehensive prior art search would reveal to be invalid.[55] These patents will remain in effect, and presumptively valid,[56] until a challenger proves invalidity by clear and convincing evidence.[57]

Mark Lemley has argued that more extensive prior art searching at the examination stage is unlikely to be cost-effective given that most issued patents are never licensed or enforced.[58] Rather than conducting a thorough prior art search for every patent application, it might be more efficient to focus resources on the small fraction of issued patents whose validity matters, as revealed over time through assertion. But the effect of economizing on costs in this fashion is to shift the cost burden forward in time and onto other actors, including technology users and courts.[59]

B. User Costs

Technology users are also motivated to economize on information costs and transaction costs, both in searching for patents they might be infringing[60] and in responding to assertions of patents against them. They are more willing to incur these costs when the values at stake are high than when they are low. Users will weigh the costs of searching for relevant patents, evaluating their validity, and clearing

54 See Thomas, 2001 U Ill L Rev at 318 (cited in note 44).

55 Previously issued patents are a particularly poor measure of the prior art in fields that are relatively new to the patent system, such as information technology and business methods, making it especially difficult for the PTO to make cost-effective assessments of patentability in these fields.

56 See 35 USC § 282.

57 *Hybritech Inc v Monoclonal Antibodies, Inc*, 802 F2d 1367, 1375 (Fed Cir 1986).

58 See Lemley, 95 Nw U L Rev at 1514 (cited in note 43) ("[T]he fundamental fact remains that litigation of a few patents is a far more efficient way of determining validity than giving a detailed ex ante examination of all patents.").

59 Id at 1527.

60 Apart from avoiding search costs, awareness of patents may subject users to enhanced damages for willful infringement. See Thomas, 2001 U Ill L Rev at 314–15 (cited in note 44); text accompanying note 10.

necessary rights against the risks of being a target of patent assertion. Owners are less likely to find it cost-effective to sue low-value users, and users know that. Pharmaceutical firms are thus willing to invest considerable resources in identifying and clearing patent rights when preparing to launch valuable new drugs, while academic researchers whose work is far removed from commercial applications are unlikely to perform patent searches and pursue owners for licenses.[61] User costs and owner costs thus align to shelter low-value uses from the effective reach of patents.

The effects of costs on high-value users are more ambiguous. Patent owners are more likely to seek out such users, relieving them of the burden of search costs. Many commercial operating firms receive frequent demand letters from patent owners.[62] One might expect that at the point of patent assertion only high-value patents and uses would be involved, but many operating firms receive demand letters that they suspect are frivolous. Owners may not know how much value a user is deriving from using the invention rather than a noninfringing alternative, and users may not know whether an owner would incur the costs of a lawsuit. It is costly to determine which of these patents is valid and infringed.

A user could respond to a demand letter by ignoring it, pursuing license negotiations, obtaining an opinion letter from counsel, waiting to be sued, or bringing a declaratory judgment action. Licensing will sometimes be the cheapest option, but the higher the owner's demand, the more it is worth spending to search obscure prior art that the examiner overlooked.

Technology users confront the same complex rules about patent-defeating prior art as examiners, but may have greater incentives to incur search costs. The value of patent-defeating prior art to a user of patented technology depends on how costly it is to deal with the patent. If the patent owner is offering a license on reasonable terms, or if the patent is narrow and easily avoided by switching to a noninfringing alternative, users may not find it worthwhile to invest in searching for patent-defeating prior art. But for broad patents offered at a high price, the value of invalidation is high, justifying greater investments in prior art searching. The effect is a high-cost safety valve that makes high-value patents (or patents whose enforcement imposes high costs

---

61 See Rebecca S. Eisenberg, *Bargaining over the Transfer of Proprietary Research Tools: Is This Market Failing or Emerging?*, in Rochelle Cooper Dreyfuss, Diane Leenheer Zimmerman, and Harry First, eds, *Expanding the Boundaries of Intellectual Property: Innovation Policy for the Knowledge Society* 223, 225, 231 (Oxford 2001).

62 See Michael J. Meurer, *Controlling Opportunistic and Anti-competitive Intellectual Property Litigation*, 44 BC L Rev 509, 517 (2003).

on users) more vulnerable to validity challenges while leaving lower value patents (or patents licensed at lower rates) less exposed.[63] The owner has some power to promote or discourage resort to this safety valve through its license terms: the higher the cost of a license, the more users will be willing to invest in prior art searching and the greater the risk of invalidation.

Owners and users may also draw inferences about each other's perceptions of value from observing willingness or reluctance to incur costs in asserting or clearing rights. Patent owners decide how much to spend monitoring infringements and asserting their rights, thereby signaling how valuable they consider their patents to be. Users give signals about the value that they place on technology through their responses to assertions of rights and through their own investments in patent searching and clearing rights. These signals may help owners and users to decide when bargaining over licenses is worthwhile.[64]

IV. PARTNERS, STRANGERS, AND PATENT ENTREPRENEURS

An important function of patents is to facilitate transactions in technology that would be difficult to arrange if the parties had to rely upon trade secrecy as a default regime.[65] By providing enforceable rights that survive after disclosure, patents make it less risky for owners to reveal technology to potential licensees in the course of bargaining.[66] Patents also facilitate R&D specialization in lieu of vertical integration by giving specialized firms rights that establish their bargaining positions in negotiating the terms of collaborations.[67]

Information costs and transaction costs are unlikely to interfere with the use of patents to facilitate these transactions. Parties that want to transfer technology or perform collaborative R&D have already overcome information costs to find each other and have decided that potential gains justify the costs of bargaining over license terms. Information and transaction costs that may be obstacles to deals between strangers either are sunk costs or are relatively low in the case of parties already in a bargaining relationship. Patent rights, whether existing or prospective, may help the parties to establish trust

63 Of course, it is possible that an exhaustive search for prior art will be unavailing. Technology users may have a better sense than examiners of whether a claimed invention was already practiced in the technological community prior to the inventor's activities, making it more likely that nondocumentary prior art will be uncovered after issuance than during prosecution.

64 It is also possible that owners and users will deploy these signals in a misleading fashion for tactical reasons in bargaining.

65 See Nancy T. Gallini, *The Economics of Patents: Lessons from Recent U.S. Patent Reform*, 16 J Econ Persp 131, 141–44 (2002) (reviewing the literature).

66 Id at 132.

67 Id at 141.

and provide a default regime in the event that negotiations fail but the parties are motivated to reach agreement by the promise of gains.

Information costs and transaction costs are likely to loom larger when owners and users are strangers who would not seek each other out in the absence of patents. Strangers need to make more of an effort to identify and find each other. It is costly to identify unknown rights and to monitor the behavior of strangers. Users who are already using technology without any help from the owner may be particularly reluctant to incur these costs. In cases of independent invention, they may resent having to pay for the technology.

Perhaps a system that makes patents more effective between technology partners and less effective between strangers promotes fairness. Some scholars have questioned the fairness of infringement remedies against independent inventors. As noted above, Paul Heald has argued for a reduced remedy when the costs of independent invention are lower than the costs that would be incurred in searching for the patent and negotiating a license.[68] Samson Vermont goes further, arguing that independent invention should be a defense to patent infringement.[69] Mark Lemley cautions that a formal defense for independent inventors may sometimes diminish incentives to commercialize new technologies.[70]

To the extent that information costs and transaction costs are higher between strangers than they are between parties in an ongoing relationship involving technology transfer, they make the patent system less effective against independent inventors. Motivated owners who overcome these costs may still obtain infringement remedies, but they are less likely to enforce their rights when they find it more costly to do so. The effect is to limit patent enforcement without any change in substantive law in favor of independent inventors.

Of course, high information and transaction costs shelter from likely patent assertion not only independent inventors, but also free riders who, although aware of the patent, avoid detection. The doctrine of willful infringement already puts these free riders at risk of enhanced damages liability if they are discovered.[71] Christopher Cotropia and Mark Lemley have found that copying is rarely alleged and

---

68 Heald, 45 Houston L Rev at 1187–91 (cited in note 6). See also notes 31–33 and accompanying text.

69 Compare Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 Mich L Rev 475, 484–92 (2006) (arguing that independent invention should be a defense to patent infringement), with Heald, 45 Houston L Rev at 1187 (cited in note 6) (arguing for a limited remedy when independent invention is more cost-effective than transacting).

70 Mark A. Lemley, *Should Patent Infringement Require Proof of Copying?*, 105 Mich L Rev 1525, 1532 (2007).

71 See note 10 and accompanying text.

even more rarely proven in litigated cases,[72] but this could be because patent infringement is a strict liability offense for which such allegations and proof are unnecessary.[73] It is possible, but seems unlikely, that deliberate free riders are more abundant outside the universe of litigated cases.

A patent regime that combines expansive rights with information costs and transaction costs that limit effective enforcement creates profit opportunities for entrepreneurs who can buy patents and figure out strategies for reducing those costs. Patents that are worth little to their initial owners may be worth more to entrepreneurs who enjoy a cost advantage in asserting patents against users or who own complementary assets (such as large patent portfolios) that either increase the value of the patents or lower the costs of asserting them.

As a first approximation, one might expect practitioners in the field to have better information than nonpracticing patent entrepreneurs about the patented technology and about which competitors are likely infringers, making information costs higher for entrepreneurs.[74] But if the entrepreneur is a patent aggregator with a large enough patent portfolio, it might not need particularized information about what technology each operating firm in the field is using to be reasonably sure that they are all infringing at least some of its rights. Owners of a small number of patents may thus face higher information costs to identify likely infringers than entrepreneurs that aggregate patent portfolios.

Patent entrepreneurs may also enjoy a transaction cost advantage over other owners. Initial owners of patents are typically firms that employ inventors. Their expertise is in technology, not in patent law. But patent assertion is the business of some entrepreneurs. Patent entrepreneurs are likely to be experienced in the strategic moves of demand letters, license negotiations, and litigation.[75] Owners of large patent portfolios may also enjoy economies of scale in patent assertion. If a

---

72 Christopher A. Cotropia and Mark A. Lemley, *Copying in Patent Law*, 87 NC L Rev 1421, 1443 (2009).

73 Even willful infringement does not require proof that the defendant derived the invention from the patent holder, only that the defendant infringed the patent recklessly, meaning that the defendant "acted despite an objectively high likelihood that its actions constituted infringement of a valid patent." *In re Seagate Technology, LLC*, 497 F3d 1360, 1371 (Fed Cir 2007).

74 As John Golden explains, "[a] patent holder who practices the invention commercially or otherwise competes with the infringer may be able to use internal knowledge and experience, as well as greater familiarity with the nature of a business like the potential infringer's, to make more informed guesses about the potential infringer's cost-benefit analysis." John M. Golden, *"Patent Trolls" and Patent Remedies*, 85 Tex L Rev 2111, 2132–33 (2007).

75 See John R. Allison, Mark A. Lemley, and Joshua Walker, *Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents*, 158 U Pa L Rev 1, 26 (2009) (finding that nonpracticing entities filed 80 percent of the lawsuits involving the set of patents that were litigated eight times or more between 2000 and 2007).

user receives a demand letter asserting one patent or a small number of patents, it may be worthwhile to incur the costs of an opinion letter on validity and infringement, but if the asserting firm has a large enough portfolio at its disposal, the cost becomes prohibitive. At some point, it makes sense for users to pay for licenses without the added cost of careful scrutiny.

The entry of patent entrepreneurs may also increase the level of enforcement in fields previously characterized by norm-driven nonenforcement of patents. Entrepreneurs may be less subject to norm-enforcement mechanisms such as loss of future opportunities for collaboration or sharing of technology and may have less to gain from coordination to limit enforcement. Entrepreneurs who are not themselves technology practitioners may see only benefits from aggressive enforcement of their patents and need not fear reciprocal enforcement of patents against them.

The gap between the nominal scope of patents, enlarged by the effects of examiner costs, and the effective reach of patents, limited by the costs that owners face in identifying and pursuing infringers, is an invitation to entrepreneurs to figure out cost-effective ways to capture the value currently captured by unlicensed users. Patent entrepreneurship business models that have emerged in recent years may thus be understood as market responses to our current expansive but costly patent system. The widespread condemnation of these entrepreneurs as "trolls" reveals how much technology practitioners have come to rely upon incomplete enforcement of patents in the current regime.

CONCLUSION

The patent system is complicated. Tracking its obligations and enforcing its rights impose high costs on owners and users of technology, as well as on the PTO. These costs provide shelter for infringing behavior that might otherwise lead to either licensing or liability. Sometimes these limitations mitigate harmful effects of excesses in the patent system while retaining strong rights for motivated owners who are willing to go to the trouble and expense of enforcing them. But users who rely upon high information costs and transaction costs to protect themselves from patent assertion run the risk of liability when patents fall into the hands of entrepreneurs who figure out cost-reducing strategies to close the gap between the formal reach of patents and the narrower range of activity that has been effectively controlled by prior owners.