

## Patent Licensing, Technology Transfer, & Innovation<sup>1</sup>

Mark A. Lemley<sup>2</sup> & Robin Feldman<sup>3</sup>

### *Abstract*

*Traditional justifications for patents are all based on direct or indirect contribution to the creation of new products. Patents serve the social interest if they provide not just invention, but innovation the world would not otherwise have. Non-practicing entities (NPEs) as well as product-producing companies can sometimes provide such innovation, either directly, through working the patent or transfer of technology to others who do, or indirectly, when others copy the patented innovation. The available evidence suggests, however, that patent licensing demands and lawsuits from NPEs are normally not cases that involve any of these activities.*

*Some scholars have argued that patents can be valuable even without technology transfer because the ability to exclude others from the market may drive commercialization that would not otherwise occur. We demonstrate that even if various commercialization theories can sometimes justify patent protection, they cannot justify most NPE lawsuits or licensing demands.*

### **1. Innovation-Related Justifications for NPEs**

---

<sup>1</sup> © 2015 Robin Feldman & Mark A. Lemley.

<sup>2</sup> William H. Neukom Professor, Stanford Law School; partner, Durie Tangri LLP.

<sup>3</sup> Harry & Lillian Hastings Professor, University of California Hastings College of the Law.

The patent system exists to serve utilitarian goals, rather than to reflect some notion of an inventor's moral right. (Feldman 2012, Lemley 1997, Landes & Posner 2003). From the many commercial activities that might otherwise be open to anyone, we remove some for a limited period of time in the hope that dedicating them to the province of a few, will redound to the benefit of us all. (Feldman 2013).

The traditional utilitarian story supporting the patent system is that the lure of patent rights encourages invention that would not otherwise occur, or at the least would occur later but for the patent. (Landes & Posner, 2003; Duffy 2004). The invention the system is designed to promote is not what is known in science as "basic research," such as an understanding of how nature works or what forces propel the universe. After all, for more than a century, the Courts have reminded us that the proper subject matter of a patent does not include laws of nature, natural phenomenon, or abstract ideas—no matter how valuable and essential to the progress of science these may be. (*Alice Corp. Pty. Ltd. v. CLS Int'l*, 134 S.Ct. 2347, 2354 (2014)) Rather, the patent system is aimed at protecting "applied" inventions, or innovations, that are deployed in the world. Only when broad and basic principles are reduced to a particular practice and applied in a specific endeavor will they be eligible for protection. (*Bilski v. Kappos*, 561 U.S. 593 (2010)).

The patent system's focus is consistent with economic literature, which distinguishes invention—an idea—from innovation—turning the idea into a viable product. The patent system encourages not just invention in the abstract, but the creation of new products. This is the "progress" of the "useful arts" mentioned in the patent clause of the Constitution.

The focus on innovation, not simply invention, is particularly important with the emergence of the modern non-practicing entity (NPE) business model. Colloquially known as patent trolls, NPEs are those whose core activity involves licensing or litigating patents, as opposed to making products. By all accounts, the modern NPE business model has expanded rapidly since its emergence over the last two decades, an expansion that is particularly evident in the context of litigation. (Allison et al., 2016). Different scholars slice the numbers differently, with some excluding NPEs organized as trusts and individuals and others excluding “failed startups” and original inventors, for example. When the broader definition is applied, however, the data are remarkably consistent across studies, with all showing that NPEs now account for the majority of patent lawsuits filed.<sup>4</sup>

Consistent with the goals of the patent system, all of the arguments suggesting the benefits of NPEs rest on their contributions, either directly or indirectly, to the creation of products somewhere in the system. NPEs, unlike practicing entities, do not deploy the technology in the world themselves, but that does not answer the question of whether they contribute to innovation and the creation of new products. To promote innovation, however, they must not only invent, but that invention must lead to the creation of products by someone, somewhere in the system, at some point. NPEs may be acting as middlemen transferring technology to those who would implement it; or they could be collecting revenue

---

<sup>4</sup> Compare Feldman et al., 2013; Chien, 2012 (using data from RPX Corporation and concluding that the percentage of litigation by non-practicing entities in 2012 has reached 62%) with Cotropia et al. 2014 (using a narrower definition of NPEs and finding no real increase in NPE litigation when comparing the years 2010 and 2012, but also noting that “when we repackage all [NPEs] into a single category, they are responsible for a majority of [patent lawsuits] in 2012”); see also Sag, 2016 (finding that patent litigation volume doubled from 2010 to 2013).

from those who copied their invention and implemented it. Neither possibility, however, appears broadly supported by the available evidence.

There is a substantial literature that calls into question whether the patent system in general encourages innovation that would not otherwise happen. The facts that most significant innovations are simultaneously created by two or more people (Lemley, 2012), and that in most industries virtually all patent enforcement is done against independent inventors (Cotropia & Lemley, 2009) cast significant doubt on the claim that the innovations would not have happened but for the lure of a patent. The issue is, however, complicated by the very different characteristics of different industries. There may be industries in which invention is so complex and uncertain that it would not be undertaken without patent protection. (Burk & Lemley, 2009). But there also seem to be industries – perhaps most of them – in which the patent system does not seem to be driving new invention, and may even be retarding it. (Bessen & Meurer, 2008). That might lead one to question the patent system as a whole (Boldrin & Levine, 2007), or at least the traditional innovation-based justification for it.

In addition to doubts about how well patents in general actually drive innovations that would not otherwise have occurred, the evidence casts significant doubt on the efficacy of the patent disclosure as a way of disseminating ideas and leading to the creation of products. While writing down and publishing a description of the invention has long been a *quid pro quo* for a patent, in the modern world there is good reason to think that engineers in many fields rarely read patents in order to learn about a technology. (Lemley, 2008; Lemley, 2012; Harvard

Note, 2005).<sup>5</sup> Lawyers at many companies discourage their engineers from reading patents for fear of increasing legal liability. (Lemley & Tangri, 2003). The quality of the disclosure in the patent may be poor, particularly in the IT industries. (Burk & Lemley, 2002; Feldman, 2012, other cites). There are simply too many patents in many fields to possibly keep up with, and 600,000 more applications are filed every year. And in a fast-moving industry like IT a delay of several years between invention and disclosure may make the technology described obsolete by the time anyone could read it. (Feldman & Lemley, 2015).

Further, economic literature suggests that in order for effective technology transfer—in other words, transfer that can lead to commercialization—reading a patent alone is not enough. Such transfer generally must include not only the information publicly available in the patent, but also the transfer of know-how, complementary assets and other peripheral disclosures. (Bessen, 2015; Teece, 1986; Rantanen, 2012). Thus, if patents actually drive innovation by third parties we would expect to see not simply patenting but business transactions that involve the transfer of other types of information assets.

Similarly, NPEs could drive innovation if they served as efficient middlemen, connecting those who invent but whose inventions have not been deployed with those who can produce a product from that invention. Several people have argued that NPEs serve this role. (Khan 2014; Spulber, 2012; Crane, 2009;) Here, too, an innovation benefit requires technology transfer. The social benefit of the middleman story depends on the middleman providing something of value to the implementer.

---

<sup>5</sup> By contrast, in some fields patents may provide more useful guidance to engineers. (Ouellette, 2012).

In short, then, the traditional justifications for NPEs contributing to social welfare all involve some form of technology transfer or learning dissemination by which the NPE or the patent it holds teaches the implementer a technology it did not otherwise possess. Practicing entities can benefit social welfare without technology transfer by making and selling the invention directly; NPEs cannot.

Early evidence testing the positive impact of NPEs on commercialization goals is not encouraging. The evidence is largely observational in nature, flowing from small sample studies, with all of the attendant limitations. Nevertheless, the data provide a useful window on the NPE business model and suggest approaches for generalizable analyses.

Feldman and Lemley provide survey evidence of the direct measure of the creation of new products as a result of patent assertions by NPEs. We also test commercialization effects by measuring other markers of potential innovation, such as technology transfer beyond the patent. (Feldman & Lemley, 2015). Including such markers creates a more dynamic picture of the potential for future commercialization, even if that commercialization has yet to occur.

We know that actual technology transfer happens within the patent system in the ex ante context. (Arora, 2001). Both practicing entities and some NPEs engage in ex ante technology transfer. In particular, universities and inventors create alliances with companies that can more easily develop and commercialize their inventions through joint ventures and other types of technology and research sharing agreements. (Feldman & Lemley, 2015). These agreements frequently occur before a patent issues or even before any of the parties file for a patent. Notably, these agreements involve technology transfer. Universities and other inventors in these deals provide new technology to those in a position to implement it. And

that technology often includes trade secrets and know-how beyond the to-be-patented technology itself.

Patent litigation and licensing demands for existing patents, by contrast, tend to occur after the defendant has already developed and implemented the technology. This is particularly true of NPE patent assertions and licensing demands, which some evidence suggests tend to happen in the last few years of a patent's life, although the picture is complicated. (Love, 2013; Feldman, Ewing & Jeruss, 2013). NPE licensing demands and litigation against companies that are producing products do not seem to involve technology transfer or other indicia of new innovation.

While some have argued that NPEs serve as efficient middlemen through this activity, transferring inventions from creators to commercializers, Feldman and Lemley found no such evidence. The authors surveyed 181 in-house licensing attorneys at companies that produce products, on the theory that these parties have direct knowledge of whether the company implemented new technology and because in-house counsels tend to negotiate licenses both as patent holders and as potential licensees. The survey examined the effects of licenses that a company took after receiving a patent demand, which was defined to include calls or letters suggesting areas of mutual interest or joint ventures, offering to license patents, threatening litigation, giving notice of intent to file an infringement lawsuit or actually filing infringement lawsuit. Respondents were whether those licenses led to any markers of innovation. Direct markers of innovation were the addition of new products or features. Indirect markers of innovation included whether the patent holder transferred know-how or other technical knowledge along with the patent, whether the patent holder transferred personnel (including

through a consulting agreement), and whether any joint ventures were created. Again, the survey considered only licenses taken in response to unsolicited licensing requests. It did not look at the practice, particularly among university inventors, of entering into technology transfer agreements before embarking on development of a new technology.

The responses suggest that licensing requests from NPEs rarely lead to direct or indirect markers of innovation. Ninety-two percent of respondents reporting that they added new products or features from zero-10% of the time, with NPE licensing. The results were even stronger when respondents were asked about indirect markers of innovation, with respondents reporting with complete unanimity that they rarely received technical knowledge, transfer of personnel or joint ventures along with a patent license. Thus, the results suggest that NPEs do not appear to be playing the role of efficient middlemen.

Interestingly, the evidence was also dismal when ex post licensing requests came from those other than traditional NPEs. When product producing companies and universities made unsolicited approaches and those approaches resulted in a licensing agreement, the agreements were unlikely to lead to direct or indirect markers of innovation. Three-quarters of respondents reported new products or features from zero to 10 percent of the time; 88% of respondents reported transfers of knowledge zero to 10 percent of the time; 94% reported transfers of personnel (including through consulting agreements) zero to 10 percent of the time; and 91% reported joint ventures from zero to 10% of the time. (Feldman & Lemley, 2015). These observational results suggest that ex post patent licensing demands do not appear to lead to technology transfer or other markers of innovation, no matter who what type of party initiates the unsolicited approach.



A middleman who is not making a product and not actually providing the licensee with new technology is operating at most as a tax collector for inventors who could not otherwise do battle against large companies who have implemented their ideas. (Feldman & Lemley, 2015). But transactions are not desirable for their own sake. (Burstein, 2015) It is socially desirable to impose such a tax on innovators only if the world gains something from it. That might be true if, for instance, the implementer had actually copied the idea from the patentee.

The available evidence suggests it is unlikely that most patent enforcement targets such copying. For example, Cotropia and Lemley demonstrate that most patent lawsuits are filed against those who have developed a product independently, rather than those who have taken the idea from a patent holder. (Cotropia & Lemley, 2009). And while some have speculated that defendants may copy indirectly, learning about the invention from the patentee's product or from scientific discussions of the idea without ever reading the patent itself (Merges, 2014), that is far more likely when the patentee actually makes a product than when it produces nothing other than the patent. Further, there is evidence that NPEs tend to assert patents at the end of their lives, while practicing entities assert patents early, furthering casting doubt on the copying story. (Love, 2013).<sup>6</sup> And there is very little evidence that patentees have used a remedy created in 1999 to protect against copying of published patent applications. 35 U.S.C. §154(d).

## 2. "Commercialization-Plus" Justifications

---

<sup>6</sup> We (and Love) acknowledge that the interpretation of his data is complicated by the change in the number of NPE suits during the time of his study. (Feldman, Ewing & Jeruss 2013).

Responding to some of the concerns with traditional justifications for patent protection and licensing, a number of scholars have articulated what we call “commercialization-plus” justifications for patent protection. (Kitch, 1977; Abramowicz, 2007; Kieff, 2001; Abramowicz & Duffy, 2008; Sichelman, 2010). These justifications differ from the traditional innovation-based justifications because they focus on the alleged need for early or additional protections to encourage post-invention investment in commercialization. The most famous of these, known as “prospect theory,” recommends granting strong patents early in the life cycle of an idea so that a single party can control development of the idea much the way that a mineral prospector manages a mineral claim site. (Kitch, 1977). Other scholars have suggested that we should grant patents to old technologies in areas like pharmaceuticals in order to encourage the patent owner to bring the product to market. (Roin, 2009). Still others have suggested granting normal patents at the outset, and then, if no one commercializes it, granting extra rights to the person who does. (Sichelman, 2010). The Bayh-Dole Act, passed in 1980, was premised on the worry that university inventions would languish unless one party was given the right to turn those inventions into commercial product. (Council on Government Relations, 1999).

Commercialization-plus theories are controversial. Lemley among others has criticized Kitch’s prospect theory as “fundamentally anti-market” because it presumes that central control is superior to market allocation of existing resources, and Feldman has argued that patents are entirely unlike the more clearly defined rights in Kitch’s mineral analogy. (Lemley, 2004; Lemley, 1997; Lemley, 2012; Feldman 2012). Others have suggested that commercialization theory is poorly fitted to industries in which invention proceeds by stages and improvements rather than by discrete advances. (Merges & Nelson, 1990).

Kitch's theory may justify patent protection in certain industries. Burk and Lemley suggest that the theory maps best to the pharmaceutical industry, where government regulatory barriers significantly raise the cost of entry and may require exclusivity. (Burk & Lemley, 2009). And it may justify patent protection for NPEs in some cases, as with university technology transfer agreements. (cites)

Notably, though, any form of commercialization theory is self-limiting in certain important respects. First, if exclusivity is necessary to induce a firm to commercialize a technology, we should rarely, if ever, see multiple companies independently develop the same technology. The very concept of commercialization theory is that no one would invest in developing and commercializing the technology unless they were first confident they would have exclusive rights over that technology. There may be exceptions in which companies engage in patent racing, each hoping to be the first to reach an important invention. (Barzel, 1968; Tirole, 1988; Dasgupta & Stiglitz, 1980; Grady & Alexander, 1992; Reinganum, 1989). But the historical examples of patent races have tended to be races to invent, not races to commercialize. (Lemley, 2012). If commercialization theory is correct, even independent inventors won't commercialize the technology unless and until they are confident they will have exclusive rights over that technology. And racing to commercialize (rather than to invent) is presumably something mostly engaged in by practicing entities, not NPEs. For the same reason, under commercialization theory we shouldn't see open source or public domain companies. If we do, that is reasonable evidence that exclusivity is not necessary to induce commercialization in that industry. (Asay, 2015).

Further, if any form of commercialization theory is correct, and certainly if enhanced commercialization theory is, infringement should be rare. Independent later inventors shouldn't commercialize, since they won't have exclusive rights to the invention. Nor should we see much copying of the patentee's invention, since if commercialization requires market exclusivity the copier won't generally be any better off than an independent inventor who doesn't have exclusivity. That doesn't mean we would never see patent litigation. But it does mean that if commercialization theory is correct, it should involve exceptional circumstances such as a lower regulatory burden on second entrants (true of generic pharmaceutical companies) or some reason to think that simply knowing that a market exists somehow dramatically reduces the costs of commercialization. There may be such cases. *Apple v. Samsung* is arguably one. But those cases would involve copying of existing market participants.

A final implication of commercialization-plus theory is that patent owners should generally not grant nonexclusive licenses. If this type of theory is correct, universities should be granting exclusive licenses to practicing entities in any given market, since the licensee needs that exclusivity to commercialize the invention. Nonexclusive licenses should be rare and tightly controlled, since the nonexclusive licensees would have to coordinate their production and pricing decisions under commercialization theory.<sup>7</sup> And nonexclusive licenses to multiple parties should be nonexistent, since allowing open entry into a market is inimical to the theory of commercialization. In fact, however, the evidence suggests not only that nonexclusive

---

<sup>8</sup> While in an ideal world a court might want to determine whether there was transfer of non-patent know-how along with the patent, any legal rule requiring such a transfer would lead to sham transactions in which NPEs attached useless "know-how" to a nonexclusive patent license in order to obtain more favorable treatment.

licensing by universities is common, but that the lack of exclusivity is an important driver of subsequent improvement for core enabling technologies. (Lemley, 2005).

Even if commercialization theory justifies patent protection in some industries, it cannot justify most modern patent litigation. Nor can it justify ex post licensing demands by NPEs. Outside the pharmaceutical industries, NPE licensing does not look much like commercialization theory would predict. There is evidence that NPE patents are asserted late in life, (Love, 2013), and almost always against independent inventors. (Cotropia & Lemley, 2009). Ex post NPE patent licenses don't transfer the technology to a party that can later make use of it. (Feldman & Lemley, 2015). And NPE patent licensing demands essentially always seek nonexclusive licenses from multiple parties, not an exclusive license from a single party. Indeed, NPEs commonly sue twenty or more defendants in the same industry and the same time, settling with each of them in exchange for a nonexclusive license. (Allison et al., 2009).

The evidence also suggests that NPEs are targeting successful commercializers, not facilitating new commercialization. Feldman & Frondorf studied 50 product companies that had initial public offerings between 2007 and 2012. (Feldman & Frondorf, 2016; Feldman, 2014; Chien, 2014). The authors found that that 40% of respondents received patent demands during the periods around the time of the IPOs, with those demands coming largely from NPEs. The effects were even more pronounced for information technology companies, with almost 60% of respondents reporting patent demands around the time of their IPOs. Similarly, Cohen, Gurun, & Kominers found that a company was 50% more likely to be sued by an NPE following a large, positive cash shock such as a funding event or an IPO, and that a cash shock was a significant predictor of the number of times a company was sued by NPEs. (Cohen et al., 2015).

The results suggest that NPE demand behavior may be driven by the lure of deep pockets and the leverage opportunities afforded by an IPO period, rather than the meritorious representation of claims that a wronged inventor could not bring on its own. Such studies also provide a reminder that any virtuous benefits of NPE activity should be evaluated against any costs to innovation and society. (Bessen & Meurer, 2014; Morton & Shapiro, 2014).

All forms of commercialization and product-based theories have a final, surprising implication for NPE suits. If the reason we need a patent is not to induce invention but to induce commercialization of that invention, the law should prefer those who actually commercialize the invention over those who merely invent it but do nothing further. Thus, the owners of those patents have failed in their purpose if they have neither commercialized the invention themselves or exclusively licensed the patent to someone who does. Such an approach, therefore, may justify a working requirement, something that is generally considered anathema to patent advocates. (Sichelman, 2010). Further, as between the NPE inventor who does not engage in technology transfer and the independent inventor defendant, commercialization and product-based theories should prefer the defendant, since it is the defendant, not the patentee, who has achieved the goal of the patent system.

### **3. Independent Invention and Prior User Rights**

Most other IP regimes, including copyright and trade secrets, exempt independent development from legal liability. Patent law, by contrast, punishes anyone who practices the claimed invention, even independent inventors. A number of scholars have suggested that patent law should adopt some form of independent invention or prior user rights defense.

(Shapiro, 2006; Vermont, 2006). Others have worried that an independent invention defense might interfere with patent races or incentives to commercialize. (Lemley, 2007).

Our analysis suggests that the patent system might sensibly require that a patentee show *either* that it practices in the market *or* that it has engaged in technology transfer to those who then put the technology into practice.<sup>8</sup> A patentee who cannot show either would still be able to enforce its patent, but only against those it could show copied the invention from it, directly or indirectly. This hybrid approach tracks the legal justifications that have been offered for patents. An inventor who develops an idea others copy would be able to enforce the patent against those copiers, since copying is a form of technology transfer (and one we view as socially inferior to a license agreement). An inventor who ends up disseminating technology to the world, either by practicing the invention or by transferring technology to others who do, would be able to enforce the patent against both copiers and independent infringers. And a practicing entity would similarly be able to enforce patents against both copiers and independent infringers on a commercialization theory.

Introducing even such a limited independent invention defense would require courts to evaluate disputed claims of copying on some cases. Some have worried that much independent invention is really copying in disguise (Merges, 2014), though others are skeptical. (Lemley, 2012). As Sam Vermont has observed, though, courts are quite good at resolving factual disputes of this sort. Independent development will tend to leave a paper trail. And the parties will have an incentive to collect and present evidence on the question. Further, we

---

<sup>8</sup> While in an ideal world a court might want to determine whether there was transfer of non-patent know-how along with the patent, any legal rule requiring such a transfer would lead to sham transactions in which NPEs attached useless “know-how” to a nonexclusive patent license in order to obtain more favorable treatment.

think courts can properly include in the concept of copying cases of indirect copying from an idea once it has been publicized by the patentee. (Merges, 2014).

A requirement that patentees who do not engage in any form of commercialization or technology transfer prove that the defendant copied from them should be paired with stricter penalties against those deemed to have copied the invention. It would be reasonable to require, not merely permit, treble damage awards and attorneys' fees against those found to copy. Increasing the penalties for those who opt to take technology from a patentee without paying, while eliminating the penalty imposed on innovators who do not benefit from patentee technology transfer, properly aligns the patent system's incentives with the evidence and the array of theoretical justifications for patents.



## References

- Michael Abramowicz, *The Danger of Underdeveloped Patent Prospects*, 92 Cornell L. Rev. 1065 (2007).
- Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 N.Y.U. L. Rev. 337 (2008).
- John R. Allison, Mark A. Lemley, & David Schwartz, *How Often Do PAEs Win Patent Suits?* (working paper 2016).
- John R. Allison, Mark A. Lemley, & Josh Walker, *Extreme Value or Trolls on Top? Evidence From the Most-Litigated Patents*, 158 **University of Pennsylvania Law Review** 1 (2009).
- Ashish Arora, **Markets for Technology** (2001).
- Clark D. Asay, *Enabling Patentless Innovation*, 74 **Md. L. Rev.** 431 (2015).
- Yoram Barzel, *Optimal Timing of Innovations*, 50 Rev. Econ. & Stat. 348, 352 n.11 (1968)
- James Bessen, **Learning by Doing** (2015).
- James Bessen & Michael J. Meurer, **Patent Failure: How Judges, Lawyers, and Bureaucrats Put Innovation at Risk** (2008)
- James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes*, 99 CORNELL L. REV. 387, 411 (2014)
- Michele Boldrin & David Levine, **Against Intellectual Monopoly** (2007)
- Dan L. Burk & Mark A. Lemley, **The Patent Crisis and How the Courts Can Solve It** (University of Chicago Press 2009).
- Michael Burstein, *Patent Markets: A Framework for Evaluation*, 47 **Ariz. St. L.J.** (forthcoming 2015).
- Colleen V. Chien, *Patent Assertion Entities*, Presentation to the DOJ/FTC Hearing on PAEs (Dec. 10, 2012) [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2187314](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2187314)
- Colleen Chien, *Startups and Patent Trolls*, 17 STAN. TECH. L. REV. 461 (2014).
- Cohen, Gurun & Kominers, *Patent Trolls: Evidence from Targeted Firms* (Harvard Business School Working Paper No. 15-002, July 14, 2015).

Christopher A. Cotropia, Jay P. Kesan & David L. Schwartz, *Unpacking Patent Assertion Entities*, 99 MINN. L. REV. 649, 655 (2014)

Christopher A. Cotropia & Mark A. Lemley, Copying in Patent Law, 87 **North Carolina Law Review** 1421 (2009).

Daniel A. Crane, *Intellectual Liability*, 88 **Tex. L. Rev.** 253, 286-287 (2009).

Council on Government Relations, *The Bayh-Dole Act: A Guide to the Law and Implementing Regulations* 1999.

Partha Dasgupta & Joseph Stiglitz, *Uncertainty, Industrial Structure, and the Speed of R&D*, 11 Bell J. Econ. 1 (1980).

John F. Duffy, *The Marginal Cost Controversy in Intellectual Property*, 71 **U. Chi. L. Rev.** 37 (2004).

ROBIN FELDMAN, RETHINKING PATENT LAW 76-78 (Harvard 2012).

Robin Feldman, *Intellectual Property Wrongs*, 18 STAN. J.L. BUS. & FIN. 252, 252 (2013).

Robin Feldman, Tom Ewing & Sara Jeruss, *The AIA 500 Expanded: The Effects of Patent Monetization Entities*, 17 UCLA J.L. & TECH. 1, 42 (2013), <http://www.lawtechjournal.com/articles/2013/041024-Feldman.pdf> [<http://perma.cc/9RET-3ERZ>].

Robin Feldman & Evan Frondorf, *Patent Demands and Initial Public Offerings*, (forthcoming STANFORD TECH. L. REV. 2016), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2591648](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2591648);

Robin Feldman, *Patent Demands & Startup Companies: The View from the Venture Capital Community*, 16 YALE J.L. & TECH 236 (2014)

Robin Feldman & Mark Lemley, *Do Patent Licensing Demands Mean Innovation?* 101 IOWA L. REV. 137, 139 (2015).

Mark F. Grady & Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 Va. L. Rev. 305, 306 (1992)

B. Zorina Khan, *Trolls and Other Patent Inventions: Economic History and the Patent Controversy in the Twenty-First Century*, 21 Geo. Mason. L. Rev. 825, 832 (2014).

F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 Minn. L. Rev. 697 (2001).

Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & Econ. 265, 275–80 (1977).

William M. Landes & Richard A. Posner, **The Economic Structure of Intellectual Property Law** (2003).

Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 Tex. L. Rev. 989 (1997).

Mark A. Lemley, *The Myth of the Sole Inventor*, 110 **Michigan Law Review** 709 (2012)

Mark A. Lemley, *Patenting Nanotechnology*, 58 **Stanford Law Review** 601 (2005).

Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 **University of Chicago Law Review** 129 (2004).

Mark A. Lemley, *Should Patent Infringement Require Proof of Copying?*, 105 **Michigan Law Review** 1525 (2007).

Mark A. Lemley, *Ignoring Patents*, 2008 **Michigan State Law Review** 19

Mark A. Lemley, *A Cautious Defense of Intellectual Oligopoly With Fringe Competition*, 5 **Review of Law and Economics** 3 (2009)

Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 **Columbia Law Review** 2117 (2013).

Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law's Willfulness Game*, 18 **Berkeley Technology Law Journal** 1085 (2003).

Brian Love, *An Empirical Study of Patent Litigation Timing: Could a Patent Term Reduction Decimate Trolls Without Harming Innovators?*, 161 **U. Pa. L. Rev.** 1309 (2013).

Robert P. Merges, *A Few Kind Words for Absolute Infringement Liability in Patent Law*, [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2464756](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2464756) (working paper 2014).

Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 **Colum. L. Rev.** 839 (1990).

Fiona M. Scott Morton & Carl Shapiro, *Strategic Patent Acquisitions*, 79 **ANTITRUST L.J.** 463, 482–83 (2014).

Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 Harv. L. Rev. 2007, 2025–26 (2005).

Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 **Harv. J. L. & Tech.** 531 (2012).

Jason Rantanen, *Peripheral Disclosure*, 74 U. PITT. L. REV. 1 (2012).

Jennifer F. Reinganum, *The Timing of Innovation: Research, Development, and Diffusion*, in 1 Handbook of Industrial Organization 849 (Richard Schmalensee & Robert D. Willig eds., 1989).

Benjamin N. Roin, *Unpatentable Drugs and the Standards of Patentability*, 87 Tex. L. Rev. 503, 557–58 (2009).

Matthew Sag, *IP Litigation in United States District Courts: 1994 to 2014*, IOWA L. REV. (forthcoming) (manuscript at 17), [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2570803](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2570803) [<http://perma.cc/B4SK-9JXX>]

Carl Shapiro, *Prior User Rights*, 96 **Am. Econ. Rev.** 92 (2006).

Ted Sichelman, *Commercializing Patents*, 62 Stan. L. Rev. 341, 345 (2010).

Daniel F. Spulber, *Intellectual Property and the Theory of the Firm*, in Perspectives on Commercializing Innovation 9, 31 (F.Scott Kieff & Troy A. Paredes eds., 2012).

David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RES. POL'Y 285, 293 (1986).

Jean Tirole, *The Theory of Industrial Organization* 394–99 (1988).

Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 **Mich. L. Rev.** 475 (2006).