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Four Principles for Calculating Reasonable Royalties in Patent Infringement Litigation

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FOUR PRINCIPLES FOR CALCULATING REASONABLE ROYALTIES IN PATENT INFRINGEMENT LITIGATION

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Abstract

The development of more accurate methodologies for calculating reasonable royalties in patent litigation has been the focus of intense interest in patent reform circles over the past decade. This article argues that a rational system for awarding reasonable royalties for patent infringement would be premised on four related principles: (1) that in awarding retrospective damages (damages for past acts of infringement) courts should take the scope of substantive patent law as fixed; (2) that the baseline damages recovery for prevailing patent owners should be the amount that restores them to the position they would have enjoyed, but for the infringement; (3) that courts should depart from this baseline when doing so is necessary to attain optimal deterrence; and (4) that, in attempting to replicate the license the parties would have negotiated ex ante but for the infringement, subject to some exceptions courts should authorize the consideration of factors that the parties realistically would have used, and should exclude consideration of certain other factors that lack a sound basis.

INTRODUCTION

In recent years, juries in some patent infringement suits have awarded prevailing patentees "reasonable royalty" damages in the eight-, nine-, and even ten-figure ranges.[1] Though not all of these

† Briggs and Morgan Professor of Law, University of Minnesota Law School. I thank Stanford Law School for selecting this paper as one of the winners of the Samsung-Stanford Patent Prize, for which I presented this paper at the Inaugural Samsung-Stanford Conference on Patent Remedies held at Stanford Law School on February 18, 2011. In the interest of full disclosure, I should note that I served as a consultant to Samsung Electronics earlier in 2010, and that I also presented this paper at a conference held on January 21, 2011, by the Santa Clara Computer and High Technology Law Journal that was sponsored in part by Samsung. The conclusions stated herein, however, as well as any errors or omissions, are mine. I also thank Sanjiv Laud for excellent research assistance.

1. One commentator lists nine patent infringement cases decided since February 2007 in which jury verdicts amounted to $100 million or more. *See* Christopher B. Seaman, *Reconsidering the* Georgia-Pacific *Standard for Reasonable Royalty Patent Damages*, 2010

awards have been upheld following post-judgment motions or on appeal,[2] concern over the magnitude and frequency of such large damages awards has led to calls for the reform of various practices relating to the calculation of patent damages.[3] Other voices, not surprisingly, have either defended the current system or, at the very least, expressed reservations over the need for significant changes.[4] Underlying some of these debates are fundamental differences of opinion concerning the risks of so-called "patent holdup" resulting from the discovery, ex post, that a firm has infringed (often inadvertently) a patent reading on one of perhaps thousands of

BYU L. REV. 1661, 1663-65 (2011), *available at* http://www.lawreview.byu.edu/archives/2010/5/05Seaman.pdf. Two of these—*Lucent Technologies., Inc. v. Gateway, Inc.*, 509 F. Supp. 2d 912 (S.D. Cal. 2007), *aff'd on other grounds*, 543 F.3d 710 (Fed. Cir. 2008), and *Centocor Ortho Biotech, Inc. v. Abbott Labs.*, No. 2010-1144, 2011 WL 635291 (Fed. Cir. Feb. 23. 2011), see also Verdict Form, Centocor Ortho Biotech, Inc. v. Abbott Labs., No. 2:07-CV-139 (E.D. Tex. June 29, 2009), *available at* http://www.patentlyo.com/centocor_abbott_verdict_form.pdf—involved awards of over $1 billion, although the award in *Lucent* did not survive a post-trial motion, see *Lucent*, 509 F. Supp. 2d at 935-41, and the judgment in Centocor was just recently reversed on written description grounds without addressing the damages issues, *see* Centocor, 2011 WL 635291, at *1, *9. Three of the other awards similarly were either vacated or reduced. *See* Seaman, *supra*, at 1664 nn.6-7, 1665 n.12. For other relevant studies, see Paul M. Janicke, *Patent Damages*, FTC.GOV (Feb. 2009), http://www.ftc.gov/bc/workshops/ipmarketplace/feb11/docs/pjanicke.pdf (reporting that, since January 1, 2005, median district court awards in cases in which patentees prevail have averaged $5-6 million); Aron Levko, *2009 Patent Damages Study: Preliminary Results*, FTC.GOV (Feb. 11, 2009), http://www.ftc.gov/bc/workshops/ipmarketplace/feb11/docs/alevko.pdf (reporting "fairly consistent" median patent damages awards in federal district court since 1995, but that in some years median jury awards, which tend to be higher than median awards in bench trials, have exceeded $10 million in 2008 dollars); J. Shawn McGrath & Kathleen M. Kedrowski, *Damages Trends in Patent and Lanham Act Cases*, AMERICANBAR.ORG (2010), http://www.abanet.org/litigation/committees/corporate/docs/2010-cle-materials/05-hot-topics-ip-remedies-injunctions/05b-damages-trends-ga-bar.pdf (reporting average and median patent damages awards increasing over time, to $17.8 million and $2.8 million, respectively, from 2000-08). Janicke's updated calculation reports median awards over the relevant time period, in cases in which patentees prevail on at least one patent claim, in the range of $6-7 million. *See U.S. Patent Litigation Statistics*, PATSTATS.ORG, http://www.patstats.org/Patstats3.html (last visited Nov. 30, 2010). For discussion of a more recent very large damages award, see Susan Decker & Dennis Robertson, *J & J Told to Pay Doctor $482 Million In Patent Verdict*, BLOOMBERG, Jan. 28, 2011, http://www.bloomberg.com/news/2011-01-28/j-j-told-to-pay-new-jersey-doctor-482-million-in-patent-infringement-case.html (discussing a recent jury verdict from the Eastern District of Texas).

2. *See* Seaman, *supra* note 1, at 1664 nn.6-7, 1665 n.12.

3. I review some of the relevant literature, and related proposals to amend the Patent Act, in Thomas F. Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. CORP. L. 1151, 1182-87 (2009). For discussion of some other proposals and counterproposals, *see infra* Parts II & III.

4. *See* Cotter, *supra* note 3, at 1182-87.

components embodied in a complex end product.[5] Moreover, ever since the Supreme Court's decision in *eBay Inc. et al. v. MercExchange, L.L.C.*[6] freed district courts from the requirement of automatically awarding injunctions to prevailing patent owners, damages law has taken on a new twist as courts have struggled to define the proper methodology for calculating royalties not only for past infringement but, in some instances, for the prospective, post-judgment use of a patented invention.[7]

In this article, I will argue that a rational system for awarding reasonable royalties for patent infringement would be premised on four related principles:

(1) in awarding retrospective damages (damages for past acts of infringement), courts should take the scope of substantive patent law as fixed;

(2) the baseline damages recovery for prevailing patent owners should be the amount that restores them to the position they would have enjoyed but for the infringement;

(3) courts should depart from this baseline when doing so is necessary to attain optimal deterrence; and

(4) in attempting to replicate the license the parties would have negotiated ex ante but for the infringement, subject to some exceptions courts should authorize the consideration of factors that the parties realistically would have used, and should exclude consideration of factors that lack a sound theoretical or empirical basis.

Part I provides a brief overview of the law of reasonable royalties and some of the current controversies surrounding this body of law. Part II elaborates on the four principles set forth above. Part III concludes.

I. CURRENT LAW AND ITS CRITICS

Section 284 of the U.S. Patent Act provides in relevant part: "[u]pon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer."[8] Section 284 therefore authorizes a court to award the

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5. *See id.* at 1160-87.

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

7. *See, e.g.*, Amado v. Microsoft Corp., 517 F. 3d 1353, 1362 (Fed. Cir. 2008); Paice LLC v. Toyota Motor Corp., 609 F. Supp. 2d 620, 630-31 (E.D. Tex. 2009).

8. 35 U.S.C. § 284 (2006).

prevailing patentee its lost profit, if any, attributable to the infringement or, in the alternative, a reasonable royalty.[9] Conceptually, an award of lost profits would be appropriate in cases in which the patentee and the infringer compete in the same market and, but for the infringement, the patentee would have excluded the infringer from using the patented invention (rather than licensing its use).[10] When the patentee does not or cannot prove any lost profits, however, an award of reasonable royalties is said to serve as a "floor" or minimum compensation for the defendant's unauthorized use.[11] In awarding reasonable royalties, courts often recite (and instruct the jury on) the so-called *Georgia-Pacific* factors, a list of fifteen considerations that (at times) have been thought to be relevant to this determination.[12] Courts and commentators sometimes cite the

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9. Damages may take the form of an established royalty, if there is evidence of one. *See* ROGER D. BLAIR & THOMAS F. COTTER, INTELLECTUAL PROPERTY: ECONOMIC AND LEGAL DIMENSIONS OF RIGHTS AND REMEDIES 211 (2005). Awards of reasonable royalties appear to be much more common, however. *See id.* at 211-12.

10. *See id.* at 49-59, 212; *see also* Thomas F. Cotter, *Patent Remedies and Practical Reason*, 88 TEX. L. REV. 125, 130-31, 134 & n.58 (2010) (stating and citing other sources in support of the proposition in the text above). Logically, if the patentee does not compete with the defendant, the infringement cannot deprive the patentee of any sales or, a fortiori, any profits. Moreover, even if the parties do compete, the patentee suffers no loss of profits if, in the absence of infringement, the patentee would have not excluded the defendant—for example, because the patentee would have licensed to the defendant, or because the defendant would have used a substitute technology that would have enabled the defendant to sell the same volume of products at the same price. If, on the other hand, the defendant would have made *some*, but *fewer*, sales using the substitute technology, the patentee is entitled to a lost profit award that reflects the difference between the profit it actually made and the profit it would have made but for the infringement. *See* BLAIR & COTTER, *supra* note 9, at 214-15, 220-22. Finally, if the patentee would have excluded the defendant in preference to an exclusive licensee, the patentee's loss is equal to the forgone licensing revenue it would have earned from that licensee; the exclusive licensee's loss is equal to its own lost profit. *See* Cotter, *supra*, at 135; *see also* Mark A. Lemley, *Distinguishing Lost Profits from Reasonable Royalties*, 51 WM. & MARY L. REV. 655, 673 & n.82 (2009) (recommending that "a patentee who has granted an exclusive license should stand in the shoes of the exclusive licensee; if the exclusive licensee has lost profits because of infringement, those losses should be compensable in a suit by either or both parties, divided as per the agreement between them," while recognizing that "[t]he Federal Circuit has treated the two differently for purposes of awarding both lost profits and injunctive relief") (citing Mars, Inc. v. Coin Acceptors, Inc., 527 F.3d 1359 (Fed. Cir. 2008), and Voda v. Cordis, Inc., 536 F.3d 1311, 1329 (Fed. Cir. 2008)).

11. *See, e.g.*, Bandag, Inc. v. Gerrard Tire Co., 704 F.2d 1578, 1583 (Fed. Cir. 1983) (stating that a reasonable royalty is "merely the floor below which damages shall not fall").

12. The factors are:

> 1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.
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> 2. The rates paid by the licensee for the use of other patents comparable to the patent in suit.
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> 3. The nature and scope of the license, as exclusive or non-exclusive; or as

fifteenth factor, the "amount that a licensor . . . and a licensee . . . would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement" as the overarching consideration, and the other factors as evidence that may be helpful in establishing this amount,[13] though it is not clear that this view has been universally accepted.

> restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold.
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> 4. The licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly.
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> 5. The commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promoter.
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> 6. The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales.
>
> 7. The duration of the patent and the term of the license.
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> 8. The established profitability of the product made under the patent; its commercial success; and its current popularity.
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> 9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.
>
> 10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.
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> 11. The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.
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> 12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions.
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> 13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.
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> 14. The opinion testimony of qualified experts.
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> 15. The amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement; that is, the amount which a prudent licensee—who desired, as a business proposition, to obtain a license to manufacture and sell a particular article embodying the patented invention—would have been willing to pay as a royalty and yet be able to make a reasonable profit and which amount would have been acceptable by a prudent patentee who was willing to grant a license.

Georgia-Pacific Co. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified*, 446 F.2d 295 (2d Cir. 1971).

13. *See* Lucent Technologies, Inc. v. Gateway, Inc., 580 F.3d 1301, 1324-35 (Fed. Cir. 2009) (considering the *Georgia-Pacific* factors in light of this overarching framework); Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 643 (2010) (arguing that *Georgia-Pacific* factor 15 "represents the ultimate question all of the other factors are trying to establish").

Critics have noted many potential pitfalls in the application of the *Georgia-Pacific* factors, as well as with various other standards that sometimes bear on the calculation of reasonable royalties. First, is the malleability of the *Georgia-Pacific* standards themselves. Even if (as some of the commentators interpret the case) the overarching purpose of the factors is to enable a court to estimate the amount to which the willing licensor and licensee would have agreed ex ante, as many of these same commentators recognize, the individual factors are often sufficiently vague as to provide almost limitless discretion to the trier of fact.[14] Second, critics charge that, in applying *Georgia-Pacific* factor two (comparable licenses), courts sometimes have permitted the trier of fact to consider licenses that are not economically comparable at all—for example, licenses involving large portfolios of patents, or using different calculation methodologies.[15] Third, notwithstanding factor fifteen's reference to the amount "a prudent licensee . . . would have been willing to pay as a royalty and yet be able to make a reasonable profit," the Federal Circuit has held more than once that royalty awards not only may exceed the amount the parties would have agreed to, but may even exceed the defendant's entire expected profit from the use of the patent.[16] Fourth, until (very) recently, courts continued to accept expert testimony based on so-called "rules of thumb"—for example, that licensees typically pay 25% of the profits derived from licensed patents[17]—in the face of criticism that such "rules" have no empirical basis.[18] Fifth, courts on occasion have applied the "entire market value rule," a technique derived from the law of lost profits, to the calculation of reasonable royalties.[19] In practice, this means that

14. *See, e.g.*, Durie & Lemley, *supra* note 13, at 632 ("With at least fifteen factors, a complex interaction between them, and little limit on expert testimony on damages, there is likely to be evidence somewhere in the case that could be construed to support virtually any number the jury might settle on.").

15. *See* Brief for Ten *Amici Curai* Technology-Based Companies in Support of Appellant Microsoft Corp., 22, Lucent Technologies., Inc. v. Gateway, Inc., 580 F.3d 1301 (Fed. Cir. 2009) (Nos. 2008-1485, -1486, -1487, -1495), 2008 WL 5550592.

16. *See, e.g.*, Mars, Inc. v. Coin Acceptors, Inc., 527 F.3d 1359, 1373 (Fed. Cir. 2008), *amended by* 557 F.3d 1377 (Fed. Cir. 2009); Monsanto Co. v. Ralph, 382 F.3d 1374, 1383 (Fed. Cir. 2004).

17. *See* i4i Ltd. Partnership v. Microsoft Corp., 598 F.3d 831, 853 (Fed. Cir. 2010), *cert. granted*, 131 S. Ct. 647 (2010).

18. *See, e.g.*, Elizabeth M. Bailey et al., *Groundhog Day: Recurring Themes on Reasonable Royalties in Recent IP Damage Cases*, NERA ECONOMIC CONSULTING, 6 (Dec. 7, 2009) http://www.nera.com/extImage/PUB_IP_Groundhog_Day_1209.pdf (arguing that "[t]he 25% rule makes no economic sense"); *see also infra* Part II.E.

19. *See* Lemley, *supra* note 10, at 660-63.

where the patent is the basis for the demand for the end product, the court may use the entire revenue from sales of the end product as the royalty base.[20] In theory, the entire market value rule need not lead to substantial royalty awards, even if (as is sometimes the case) the entire market value is enormous, as long as the applicable royalty rate is correspondingly small.[21] Critics charge, however, that the use of the entire market value rule in the calculation of royalties grossly inflates royalty awards beyond what any rational licensee would have agreed to.[22]

Some recent case law has begun to move away from some of the positions that have attracted the attention of critics. In *Lucent Techs., Inc. v. Gateway, Inc.*,[23] for example, the plaintiff sued Microsoft and other firms for contributing to and inducing the infringement of a patent relating to the "date picker" function found in products such as Microsoft Outlook.[24] A jury found for the plaintiff and awarded $350 million in lump-sum royalties, which, on the basis of the entire market value rule, equaled 8% of the sales revenue from Microsoft Office during the relevant time period.[25] The Federal Circuit affirmed as to liability but reversed the damages judgment, concluding that the evidence did not support the inference that the date-picker function was a substantial driver of Microsoft Office sales.[26] Considering some of the *Georgia-Pacific* factors, the court also concluded that Lucent's proffered evidence of other licenses was not comparable for a variety of reasons;[27] that the patented feature was "but a tiny feature of one part of a much larger software program" and thus did not constitute a substantial portion of the value of Outlook;[28] and that the other factors were either lacking in evidence or inconclusive.[29] The court reaffirmed that the entire market value rule requires proof that the

20. *See, e.g.*, Cornell Univ. v. Hewlett-Packard Co., 609 F. Supp. 2d 279, 286 (N.D.N.Y. 2009) (Rader, J., sitting by designation) (stating that the critical requirement for using the entire market value of the accused products as the royalty base is a connection between the patented invention and the unpatented components that the patentee seeks to include in the royalty base).

21. *See* Cotter, *supra* note 3, at 1186.

22. *See id.* at 1186 n.166.

23. Lucent Technologies, Inc. v. Gateway, Inc., 580 F.3d 1301 (Fed. Cir. 2009).

24. *See id.* at 1317.

25. *See id.* at 1323-24, 1336.

26. *See id.* at 1337-38, 1340.

27. *See id.* at 1325-32 (concluding that the other lump-sum licenses were not comparable, because one was for a large portfolio and others were for PC-related technology; and that the running royalty licenses were not comparable because they were not lump-sum).

28. *Id.* at 1332-33.

29. *See id.* at 1333-36.

feature at issue is the basis for customer demand,[30] while also suggesting that under other circumstances the choice of royalty base may not matter much as long as the royalty rate is appropriate.[31] Finally, however, the court rejected Microsoft's suggestion that the district judge had abandoned her "gatekeeper" role, and noted that Microsoft had not objected to Lucent's introduction of supposed comparable licenses.[32]

Although the *Lucent* decision went farther than any previous Federal Circuit opinion in responding positively to some of the critical commentary on royalties as noted above, the decision still left several questions open, including the continued vitality of Federal Circuit precedent permitting royalties to exceed the defendant's expected profit and to be based on "rules of thumb." Indeed, in its subsequent decision in *i4i Ltd. Partnership v. Microsoft Corp.*[33] the court found no abuse of discretion in a district court's admission of expert testimony on damages based in part on the application of a 25% rule of thumb—a rule which, notwithstanding substantial academic criticism of its use, "assumes the inventor will keep 25% of the profits from any infringing sales."[34] Similarly, in *Fresenius USA, Inc. v. Baxter Int'l, Inc.*[35] the court approved of the use of a royalty base that included not only the value of the infringing machines but also of certain unpatented disposable parts.[36]

More recently still, however, the pendulum appears to have swung back in favor of the more economically rational approach reflected in *Lucent*. In both *ResQNet.com, Inc. v. Lansa, Inc.*,[37] and *Wordtech Systems, Inc. v. Integrated Networks Solutions, Inc.*[38] for example, the court reversed a damages judgment based on speculative

30. *See id.* at 1336.

31. *See id.* at 1338-39 (stating that "the base used in a running royalty calculation can always be the value of the entire commercial embodiment, as long as the magnitude of the rate is within an acceptable range (as determined by the evidence)," and that "Microsoft surely would have little reason to complain about the supposed application of the entire market value rule had the jury applied a royalty rate of .1% (instead of 8%) to the market price of the infringing programs.").

32. *See id.* at 1325.

33. i4i Ltd. Partnership v. Microsoft Corp., 598 F.3d 831, 853 (Fed. Cir. 2010), *cert. granted*, 131 S. Ct. 647 (2010).

34. *See id.* at 853-55. I discuss the economic critiques of the rule *infra* Part III.D.5.

35. Fresenius USA, Inc. v. Baxter Int'l, Inc., 582 F.3d 1288 (Fed. Cir. 2009).

36. *See id.* at 1303.

37. ResQNet.com, Inc. v. Lansa, Inc., 594 F.3d 860 (Fed. Cir. 2010) (per curiam).

38. Wordtech Systems, Inc. v. Integrated Networks Solutions, Inc., 609 F.3d 1308 (Fed. Cir. 2010).

expert testimony.[39] More recently still, in *Uniloc USA, Inc. v. Microsoft Corp.*,[40] the Federal Circuit embraced economists' criticisms of the 25% rule of thumb as an arbitrary starting point for calculating royalties.[41] Characterizing the rule as "a fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation," the court held that "[e]vidence relying on the 25% rule of thumb is thus inadmissible under *Daubert* and the Federal Rules of Evidence, because it fails to tie a reasonable royalty base to the facts of the case at issue."[42] In addition, the court qualified the *Lucent* court's suggestion, in the context of its discussion of the entire market value rule, that use of a large royalty base may not matter much if the corresponding royalty rate is appropriately small.[43] First, the court noted that the relevant statement in *Lucent* followed an extended discussion of, and reiteration of the principle that, the entire market value rule is appropriate only in a case in which the patented invention is the basis for consumer demand for the entire product.[44] Second, the court observed:

> This case provides a good example of the danger of admitting consideration of the entire market value of the accused where the patented component does not create the basis for customer demand. As the district court aptly noted, "[t]he $19 billion cat was never put back into the bag even by Microsoft's cross-examination

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39. *See* ResQNet.com, 594 F.3d at 868-73; Wordtech, 609 F.3d at 1320-22. In some other cases pre-dating *Lucent*, the court also had expressed the view that the hypothetical negotiations should take into account "real life" factors such as a licensor's unwillingness to negotiate. *See, e.g.*, Mitutoyo Corp v. Central Purchasing, LLC., 499 F.3d 1284, 1292 (Fed. Cir. 2007) (stating that 29.2% royalty rate was "reasonable given the contentious history between these two parties").

40. Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292 (Fed. Cir. 2011).

41. *Id.* at 1313-15.

42. *Id.* at 1315. The court distinguished *i4i Ltd. Partnership v. Microsoft Corp.*, 598 F.3d 831 (Fed. Cir. 2010) and another recent Federal circuit opinion, *Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197 (Fed. Cir. 2010), in which the court had upheld damages awards based in part on the rule of thumb, characterizing *i4i* as a case in which the court had "passively tolerated" use of the rule "where its acceptability has not been the focus of the case," *Uniloc*, 632 F.3d at 1314, and *Finjan*, 626 F.3d at 1211, as one in which the parties disagreed not on the use of the rule but rather on whether the correct percentage should have been 25% or 33%. *See Uniloc*, 632 F.3d at 1314-15. In *Finjan*, the court also detailed at great length the evidence supporting the plaintiff's expert's methodology. *See Finjan*, 626 F.3d at 1203-1206.

43. See *supra* note 31 and accompanying text. In *Uniloc*, Microsoft had objected to the plaintiff's expert's use of the entire market value of Office and Windows as a "check" on the reasonableness of the royalty he had calculated using the 25% rule. *See Uniloc*, 632 F.3d at 1318-19.

44. *Uniloc*, 632 F.3d at 1320 (stating further that "The Supreme Court and this court's precedents do not allow consideration of the entire market value of accused products for minor patent improvements simply by asserting a low enough royalty rate." (citations omitted)).

> of [plaintiff's expert] Mr. Gemini and re-direct of [defendant's expert] Mr. Napper, and in spite of a final instruction that the jury may not award damages based on Microsoft's entire revenue from all the accused products in the case." This is unsurprising. The disclosure that a company has made $19 billion dollars in revenue from an infringing product cannot help but skew the damages horizon for the jury, regardless of the contribution of the patented component to this revenue.[45]

Finally, the court stated that Uniloc exacerbated the risk of misuse of the entire market value rule by calling to the jury's attention, during cross-examination of Microsoft's damages expert, the fact that Microsoft's proposed damages calculation amounted to just .000035 percent of the entire market value of sales of Windows and Office during the relevant time period, noting that Uniloc's "derision of Microsoft's damages expert . . . may have inappropriately contributed to the jury's rejection of his calculations."[46] As a result, the court affirmed the district court's decision granting a new trial on damages.[47]

Whether cases such as *Lucent* and *Uniloc* will stem the calls for legislative reform—and whether future Federal Circuit panels will adhere to the economic logic of these decisions—nevertheless remains to be seen. The following Part of this article attempts to place these decisions within a comprehensive analytic framework for calculating damages and suggests some remaining areas in need of reform.

II. FOUR PRINCIPLES

In this Part, I elaborate upon the four principles referred to above. In particular, I first defend the principle that courts should take the substantive law as a given, for purposes of assessing damages for past conduct. I then argue that this premise leads to the second principle, that courts generally should strive to award damages (either in the form of lost profits or reasonable royalties) that would restore the status quo ante between the parties; in the context of reasonable royalties, this involves the application of the willing licensor-willing licensee framework. Third, I argue that courts should depart from the status quo baseline only when necessary to attain optimal deterrence. Fourth, I argue that in reconstructing the terms of the hypothetical

45. *Id.* (internal citations omitted).

46. *Id.* at 1321.

47. *Id.* at 1323.

license, courts should apply realistic measures of patent value by (when possible) assessing the value of the patent in comparison with the next-best alternative; taking into account the existence of other patents reading on the end product; and considering comparable licenses and realistic rates and bases. Courts nevertheless should continue to exclude from consideration the ex ante probability of infringement and invalidity and probably should eliminate the use of the entire market value rule altogether. The court is to be congratulated on its recent rejection of the 25% rule of thumb.

A. *Taking the Substantive Law as a Given*

In other work, I have argued that patent damages should be ancillary to patent substance—that is, that courts should award patent damages in such a way as to support, and not undermine, the tradeoffs between access and incentives as embodied in the substantive law.[48] This principle does not in any way depend upon the illusion that substantive patent law is ideal. Indeed, it would be remarkable if substantive patent doctrine perfectly attained the maximum surplus of social benefits over social costs. Reasonable minds may differ, for example, on questions whether a twenty-year patent term is too long or too short (or too "uniform"), whether the standards for evaluating obviousness or enablement are too strict or too lenient, whether continuation abuse needs to be reined in, and whether a host of other reforms to the substantive or administrative law of patents would be desirable.[49] My points are simply that the law of damages must begin from some set of premises and that, for both rule-of-law and institutional competency considerations, taking the substantive law of patents as a given makes more sense than the alternative of asking courts to manipulate damages law to counter perceived defects in substance.[50]

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48. *See* BLAIR & COTTER, *supra* note 9, at 5-6; Cotter, *supra* note 3, at 1159; Cotter, *supra* note 10, at 130.

49. *See generally*, Cotter, *supra* note 10, at 130.

50. *See* BLAIR & COTTER, *supra* note 9, at 5-6; Cotter, *supra* note 3, at 1159; Cotter, *supra* note 10, at 130. As a consequence, I have expressed disagreement with John Golden's characterization as "draconian" the assumption that, for purposes of awarding patent remedies one should assume that the rest of patent law remains fixed, see John M. Golden, *Principles for Patent Remedies*, 88 TEX. L. REV. 505, 527 (2010); and with his concern over the "disconnect between a patentee's reward, the social value of the invention, and the fraction of realized social value that the patentee appropriates," see *id.* at 544. *See* Cotter, *supra* note 10, at 129-30 (suggesting that a more pragmatic view of the patent system would alleviate the disappointment over patent law's failure to attain such a Platonic ideal). For a contradictory view, see Ted Sichelman, *Purging Patent Law of "Private Law" Remedies* (Feb. 18, 2011),

As stated, this first principle may seem both obvious (or at least, it has always so appeared to me) and modest—modest in the sense that its principal implications relate to the calculation of monetary damages, as discussed below, and not to the choice of monetary damages over other possible remedies such as injunctive relief. Of course, with respect to remedying past harms, there may be few if any alternatives to monetary damages. With respect to prospective relief, by contrast, the substantive law provides no clear answer as to whether courts should generally opt for an ongoing damages remedy or a permanent injunction; courts therefore may have no option but to consider which remedy better serves public policy.[51] Principle One and the three other related principles nevertheless will have implications for the correct *calculation* of any such prospective damages, as we shall see.[52]

B. Restoring the Status Quo Ante

The second principle, which follows from the first, is that at least as a first approximation the law of patent damages should attempt simply to restore the status quo ante—that is, to make the patentee neither worse nor better off than it would have been, but for the infringement.[53] Two considerations underlie this principle. First, if courts systematically awarded patent damages *below* the greater of the patentee's lost profits or the royalties the patentee would have earned but for the infringement, prospective users would be better off infringing (ignoring, for the moment, the possibility of incurring attorneys' fees and other related costs); and patent owners would systematically be undercompensated, in comparison with a baseline under which they are free to charge whatever the market will bear for their technology. On the assumption, as embodied in Principle One, that courts generally should not second-guess Congress's decision to allow patentees to charge whatever the market will bear, as long as their patents are valid and enforceable, a damages regime that makes patentees worse off in the event of infringement would be

http://www.law.stanford.edu/display/images/dynamic/events_media/Ted%20Sichelman%20-%20Purging%20Patent%20Law%20of%20Private%20Law%20Remedies.pdf (arguing that restoration of the status quo may not be optimal patent policy).

51. *See* Cotter, *supra* note 10, at 131. Doctrinally, the standards for determining whether to grant an injunction require consideration of the public interest. *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006).

52. *See infra* Parts II.B, II.D.

53. *See* Cotter, *supra* note 3, at 1176-77; *see also* BLAIR & COTTER, *supra* note 9, at 58-61.

undesirable.[54] Second, however, if courts systematically *over rewarded* patentees in comparison with what patentees would have earned from exploiting their patents in the absence of infringement, they in effect would be increasing the returns on patentees' investments in the inventive process beyond what the market for patented technology otherwise would dictate. Though in theory this may increase some patentees' incentives to invent, it also necessarily raises the social costs of the patent system, including monopoly costs (if any) and (perhaps more likely) the costs of investing in and marketing follow-up improvements. In addition, inflated damages awards may threaten to over deter would-be users from lawfully designing around in ways that come close to, but do not, constitute infringement; the possibility of obtaining such awards also could encourage patentees to lie in wait and sue, rather than to negotiate in good faith up front.[55]

Applying Principle Two, in a case in which the patentee can prove that the infringement caused it to lose sales, a court should award the patentee its lost profits attributable to the infringement, and not a reasonable royalty.[56] As in other areas of tort law, principles of proximate causation or public policy may dictate that some measures of consequential harm should be non-remediable. For example, the rule that patentees may recover for lost profits on sales of convoyed goods only if those goods are functionally related to the patented invention[57] may be a reasonable accommodation between the competing policies of preserving the patent incentive scheme and preventing the patentee from putting competitors in related markets at an undue competitive disadvantage.[58]

In a case in which the patentee cannot prove lost profits, however, its expectation damages typically[59] will be the value of the

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54. Of course, there may be some exceptions to this principle—for example, when governments impose compulsory licenses at below-market rates for essential medicines. *See* Thomas F. Cotter, *Market Fundamentalism and the TRIPs Agreement*, 22 CARDOZO ARTS & ENT. L.J. 307 (2004).

55. *See* Cotter, *supra* note 3, at 1177, 1179.

56. *See* BLAIR & COTTER, *supra* note 9, at 235-42; Cotter, *supra* note 10, at 130.

57. *See* Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538, 1550 (Fed. Cir. 1995) (en banc).

58. *See* BLAIR & COTTER, *supra* note 9, at 254-62.

59. I say "typically" because one can imagine other instances in which licensing would not have occurred: for example, a case in which the patentee preferred not to "work" the patent at all, or would have licensed someone else to the exclusion of the defendant. In such a case, the proper measure of expectation damages would be, in the first instance, the profit or licensing revenue the patentee would have earned absent the defendant's competition with the patentee's other, favored, technology (assuming, as is usually the case under U.S. law, that such

license that the patentee would have negotiated with the defendant, absent the infringement: in the words of the *Georgia-Pacific* standards, the "amount that a licensor . . . and a licensee . . . would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement."[60] Estimating the negotiated royalty as of the date the infringement began, in preference to other possible alternatives (for example, a later date such as the date on which judgment is entered, or at the other extreme some point preceding the date on which infringement began) demands some explanation. Estimating the royalty based on a later date, such as the date on which judgment is entered, might be administratively easier in some respects. It might be simpler, for example, to determine the value of the patent in light of the next-best alternative as of the date of trial rather than as of some date several years earlier when the infringement began. Using the date of judgment as the baseline period from which to estimate the hypothetical royalty nevertheless would be inadvisable, because doing so would exacerbate the effects, if any, of technological lock-in or patent holdup. Switching from one technology to another, in other words, inevitably entails some switching costs, which are likely to be greater as of the date of trial than they would have been on a date preceding infringement when other, complementary investments in the products at issue had yet to be made. Allowing the royalty to be based in part on these switching costs, which are not a function of the invention's contribution to the art,[61] would threaten to make the patentee better off than it would have been, but for the infringement, and thus to violate Principles One and Two.[62] A fortiori, Principle

technology suppression by the patentee is itself lawful). *See* BLAIR & COTTER, *supra* note 9, at 248. In the second instance, the measure of damages would be the forgone licensing revenue the patentee would have earned from its desired licensing arrangement. If the infringement precluded the patentee from entering into the desired arrangement, the correct measure of damages logically would appear to be the royalty for which the patentee would have bargained with the desired licensee. *See* Cotter, *supra* note 10, at 135. Yet another possibility is that the patentee suffered lost profits but cannot prove the amount to the satisfaction of the trier of fact. In such a case, an award of reasonable royalties is, in effect, a substitute for lost profits rather than an estimate of what the parties would have agreed to ex ante. *See* BLAIR & COTTER, *supra* note 9, at 231-32; Cotter, *supra* note 3, at 1187-89 n.178; Lemley, *supra* note 10, at 656.

60. Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp 1116, 1120 (S.D.N.Y. 1970).

61. *See* Cotter, *supra* note 3, at 1184-85 n.158.

62. *See id.* As switching costs go to zero, the effects of using of a royalty calculated ex ante as compared to a royalty calculated ex post are less clear. Ex post, the value of the technology in comparison with the next best alternative might be higher or lower than it would have appeared ex ante. A rule that consistently uses one time period, however, rather than one that varies depending on which is higher ex post, may be more likely to encourage ex ante

Two would provide no justification for awarding the patentee a larger royalty than the defendant would have agreed to ex ante (absent the need for a damages enhancement, as discussed in Part II.C below), notwithstanding the Federal Circuit's approval of such awards in a few cases.[63]

The same reasoning suggests that, if there is some class of cases in which policy dictates that courts award prospective royalties in lieu of a permanent injunction, they should use the same, ex ante, license terms used in setting retrospective royalties.[64] I have argued before that the principal reason *not* to award a permanent injunction is to avoid the effects of lock-in driven patent holdup; a prospective damages award that is based on ex post negotiations therefore undermines the very reason for not awarding injunctive relief in the first place.[65] For analogous reasons, using a time frame that *precedes* the date of infringement, such as was arguably embodied in the proposed 2007 Patent Reform Act,[66] probably would be inadvisable as well.[67]

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negotiations.

63. *See supra* note 16.

64. *See supra* note 7.

65. *See* Cotter, *supra* note 3, at 1181-82, 1187-88 n.172; *see also* Mark A. Lemley, *The Ongoing Confusion over Ongoing Royalties* (Feb. 18, 2011), http://www.law.stanford.edu/display/images/dynamic/events_media/Mark%20Lemley%20-%20The%20Ongoing%20Confusion%20Over%20Ongoing%20Royalties.pdf (arguing in favor of using the same royalty rate and base both pre- and post-verdict). Whether the conditions counseling against permanent injunctions are common or rare is a matter in which I offer no opinion at this time. Nor do I have a firm conviction at this point as to the strength of the statutory and constitutional arguments against awards of prospective damages. *See, e.g.*, H. Tomás Gómez-Arostegui, *Prospective Compensation in Lieu of a Final Injunction in Patent and Copyright Cases*, 78 FORDHAM L. REV. 1661, 1671-72 (2010) (arguing that courts lack authority in law or equity to award ongoing royalties); Bernard H. Chao, *After eBay, Inc. v. MercExchange: The Changing Landscape of Patent Remedies*, 9 MINN. J. L. SCI. & TECH. 543, 567-68 (2008) (arguing that courts lack statutory authority to impose ongoing royalties); Tim Carlton, Note, *The Ongoing Royalty: What Remedy Should a Patent Holder Receive When a Permanent Injunction Is Denied?*, 43 GA. L. REV. 543, 564-565 (2009) (arguing that courts should not impose compulsory licenses at the reasonable royalty rate).

66. *See* Cotter, *supra* note 3, at 1184-85. For a contrary view, see Amy L. Landers, *Theorizing "Patentee Injury": Apportioning Claims for Reasonable Royalty Compensation* (Feb. 18, 2011), http://www.law.stanford.edu/display/images/dynamic/events_media/Amy%20L.%20Landers%20-%20Theorizing%20Patentee%20Injury.pdf (arguing in favor of basing royalties on the invention's contribution to the art as of the date of invention). Perhaps one could reconcile the two views by arguing that royalties should reflect the value to the user, *as of the date of infringement*, of the invention's contribution to the art, *as of the date of invention*—though whether this nuance would be worth pursuing remains, in my view, unclear.

67. *See* John W. Schlicher, *Patent Damages, the Patent Reform Act, and Better Alternatives for the Courts and Congress*, 91 J. PAT. & TRADEMARK OFF. SOC'Y 19, 38 (2009)

C. Departures from the Baseline

The third principle is that, to the extent that an award of either lost profits or (perhaps more especially)[68] forgone royalties threatens to under deter infringement, courts should have the authority to award enhanced damages or attorneys' fees where necessary to approximate optimal deterrence.[69] Providing courts with this option may be necessary in some instances to channel would-be infringers into negotiations with patent owners,[70] though the point probably should

(arguing that "[t]he technical differences between the patented invention and prior art that justify granting the patent do not determine the value damages attempt to measure."). In conversation, Schlicher has suggested to me that it might be theoretically sound to choose as the date of hypothetical negotiations the date on which the infringer chose the technological path that embraced the use of the patent at issue, insofar as this date (unlike, perhaps the date on which the infringer actually began using the patent) would necessarily precede any form of lock-in. But the use of this alternative date likely would be administratively more complex, and it would require a significant modification of settled law.

68. "Perhaps more especially" because, in a case in which the patentee can prove lost profits, economic analysis suggests that the patentee likely lost more than the infringer gained from the infringement. *See* BLAIR & COTTER, *supra* note 9, at 58-59.

69. *See id.* at 61; Thomas F. Cotter, *An Economic Analysis of Enhanced Damages and Attorney's Fees for Willful Patent Infringement*, 14 FED. CIR. B.J. 291, 316 (2004). In cases in which the defendant earned more from the infringement than the patentee would have earned from marketing patented articles itself, a restitutionary award would be another possible alternative for creating additional deterrence (and thus channeling would-be users into negotiations with patentees). *See* BLAIR & COTTER, *supra* note 9, at 61, 71-74. Indeed, in some respects, a restitutionary award might seem superior to an award of reasonable royalties, to the extent that determining the amount the defendant actually earned from the infringement might seem easier to calculate than the hypothetical amount the parties would have agreed to—itself a function, in part, of the defendant's *expected* profit from the use of the patented invention, measured as of the date of infringement. *See id.* Restitutionary awards nevertheless present three problems. First, if the correct amount of a restitutionary award is the amount the defendant earned from the use of the patent in comparison with the amount if would have earned by using the next-best available alternative, the calculation may not be any more tractable than the calculation of the hypothetical license. *See id.* at 73. Second, restitutionary awards may pose some risk of overdeterrence, particularly if the profit the defendant earned from the use of the patented invention is not calculated as the surplus over and above what it have earned from the next-best alternative, or is difficult to separate from the defendant's overall profits from the sale of a product incorporating many patented inventions. *See* Cotter, *supra* note 3, at 1176 n.128. Third, for better or worse, U.S. patent law discarded restitutionary awards in 1946. *See* BLAIR & COTTER, *supra* note 9, at 71-72.

70. *See* BLAIR & COTTER, *supra* note 9, at 61. The prospect of awarding enhanced damages, where necessary, to achieve optimal deterrence, has a long pedigree in the law-and-economics literature. *See* Cotter, *supra* note 69, at 310 n.75. Appropriately implemented, this policy tool would reduce the risk, cited by some commentators, that awards based on the willing licensor-willing licensee framework will encourage infringement. *See, e.g.*, J. Gregory Sidak, *Holdup, Royalty Stacking, and the Presumption of Injunctive Relief for Patent Infringement: A Reply to Lemley and Shapiro*, 92 MINN. L. REV. 714, 717, 736-43 (2007). Note, however, that Federal Circuit case law on enhanced damages does not necessarily take this "optimal deterrence" perspective into adequate account. *See In re* Seagate Tech., LLC, 497 F.3d 1360, 1371 (Fed. Cir. 2007) (en banc) (holding

not be overstated; the cost of defending a patent infringement suit, after all, is substantial.[71] Moreover, empirical evidence indicates that intentional infringement (deliberate copying) is relatively rare, particularly in some high-tech industries; inadvertent infringement is by far the norm.[72] As noted above, then, contrary to some of the case law[73] courts should not award royalties that exceed the amount of the defendant's expected profit from the use of the patented technology, except to the extent (if any) that a damages enhancement is necessary to attain optimal deterrence.[74]

D. Using Realistic Measures of Patent Value

The last of the four principles is that, in awarding reasonable royalties based on the estimated terms that the parties would have agreed upon ex ante, the trier of fact should consider variables that reflect the ex ante value of the technology and that would have constrained real-world negotiations as a general rule. Such evidence may include the expected value, in terms of contribution to profitability or cost reduction, of the patented invention in comparison with the next-best available alternative as of the date of infringement; the existence and strength of other patented inventions possibly incorporated into the relevant end product, as a possible constraint on how much the defendant would have been willing to pay for the use

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that an infringement is willful, and therefore possibly deserving of an award of enhanced damages, if there was an "objectively high likelihood" that the patent was valid and infringed, and the defendant either knew or should have known of this risk); Cotter, *supra* note 3, at 1179 n.139 (stating that *Seagate* "nevertheless fails to grasp the fundamental economic rationale for awarding enhanced damages, insofar as such awards continue to hinge upon ex ante probabilities of infringement and validity, and not upon ex ante probabilities of detection"). *See also* Mahurkar v. C.R. Bard, Inc., 79 F.3d 1572, 1580-81 (Fed. Cir. 1996) (reversing the addition of a royalty "kicker" as compensation for litigation and other expenses); Roger D. Blair & Thomas F. Cotter, *Rethinking Patent Damages*, 10 TEX. INTELL. PROP. L.J. 1, 42 n.207 (2001) (citing other Federal Circuit case law that appears to conflict with *Mahurkar* on this point).

71. *See* BLAIR & COTTER, *supra* note 9, at 231. On the cost of patent litigation, see AIPLA REPORT OF THE ECONOMIC SURVEY 2009 29 (reporting median litigation costs of $650,000 to $5.5 million, depending on the amount at risk).

72. *See* Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. Rev. 1421 (2008). In theory, users can always search before infringing. *See* Roger D. Blair & Thomas F. Cotter, *Strict Liability and Its Alternatives in Patent Law*, 17 BERKELEY TECH. L.J. 799, 811-12 (2002). In reality, searches are often not feasible, particularly in IT, due to the multiplicity of patents and the opacity of patent drafting techniques. *See, e.g.*, JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 194-98 (2008).

73. *See supra* note 16.

74. *See* Cotter, *supra* note 3, at 1186 n.163.

of the plaintiff's invention; the value of realistically comparable licenses, if any; and the use of realistic royalty rates and bases for calculating "running" royalties. Two real-world factors nevertheless should not factor into the analysis, for reasons explained below. Moreover, courts should eschew factors that lack solid empirical or theoretical grounding as proxies for patent value.

1. Value of the Patented Invention in Comparison with the Next-Best Alternative

From a purely economic perspective, the value of a patent at any given point in time is no more (and no less) than the present value of the expected profit (or cost saving) attributable to the use of the patented invention in comparison with the next-best available alternative.[75] Thus, in a world of perfect and costless information, one could simply compare the present value at time *t* of the user's expected profit or cost saving from the manufacture, use, and sale of a product incorporating the patented invention, with the present value at time *t* of the user's expected profit or cost saving from the manufacture, use, and sale of a product incorporating the next-best alternative. The difference between the two would be the value of the patent to that user, and it would represent the maximum a rational user would be willing to pay for the use of the patented invention. Seen in this light, patents have no *inherent* value; rather, their value is solely *relational* inasmuch as it depends on what the patent enables the user to do. As a means to an end, patents have value depending upon what those ends are and how (if at all) they shift over time; the value the market places on those ends; and the comparative advantages and disadvantages of alternative ways of attaining those ends.[76]

Realistically, of course, determining the difference between the user's expected profits at time *t* with and without the use of the patented invention is at best an imperfect undertaking. For one thing, the user/infringement defendant may not have such finely-grained profitability or cost projections as of time *t*. This is particularly likely to be the case when the invention at issue relates to only one of a large number of component parts of a larger device and when the infringement is inadvertent—which is to say in many fairly

75. *See id.* at 1178 n.137. Presumably, the present value of the license as of the date of infringement would take into account the license's term. Note that patents cannot lawfully be licensed past their termination date. *See* Brulotte v. Thys Co., 379 U.S. 29 (1964).

76. *See* Cotter, *supra* note 10, at 129-30.

commonplace settings in the high-tech industries.[77] For another, depending on the nature of the invention, it might be difficult to identify exactly what the next-best alternative *was* as of the date infringement began due both to the passage of time between that date and the date of judgment and to the possible synergistic effects of choosing one alternative over another for other elements of product design. Moreover, even if such an alternative is identified, one must be careful not to fall into the trap of inferring that the value of the patented invention is simply the difference between the patented invention's contribution to expected profit or cost saving, in comparison with the next-best alternative's contribution; rather, one must also take into account the cost, if any, of licensing the use of the next-best alternative.[78]

Notwithstanding these practical difficulties, logic suggests that a patent's expected contribution to profitability or cost reduction in relation to the next-best alternative—its expected *economic utility* to the user, if you will—should be a key determinant of the user's reservation price for the use of the invention. Therefore, competent evidence of the patent's relative economic utility (even if such evidence is not particularly "granular") [79] should be highly relevant to the royalty determination.[80] By this same logic, a patent that offers no

77. *See supra* note 72.

78. To illustrate the point, suppose that use of the patented technology is expected to reduce costs by $10,000, whereas a license to use the next-best alternative is expected to cost $4,000 and to reduce costs by $6,000. The value of the patent to the user is not $4,000 ($10,000 minus $6,000), but rather $10,000 minus the *net* value of the next-best alternative ($6,000 minus $4,000 = $2,000); in other words, the value to the user is $10,000 minus $2,000 = $8,000. $8,000 is the maximum that a rational user would be willing to pay for the use of the patented invention. *See* Cotter, *supra* note 3, at 1183 n.157. If the patented invention is no better than the next-best alternative—in the preceding example, if it reduces expected costs by only $6,000—the user should be willing to pay no more than $4,000 (that is, the cost of a license to use the next-best alternative). Note, however, that according to this logic, if the next-best alternative is no worse than the patented invention and is in the public domain (meaning here that the cost to use it equals zero), the value to the user of a license to use the patented invention is zero. See *infra* text accompanying notes 80-82.

79. In other words, it may be more of a rough-and-ready estimate that the patent is highly advantageous in comparison with the next-best alternative, or only moderately valuable, or something along those lines.

80. *See* Grain Processing Corp. v. American Maize-Products Co., 893 F. Supp. 1386, 1392-93 (N.D. Ind. 1995) (Easterbrook, J., sitting by designation) (using the defendant's cost savings from the use of the patented invention, in comparison with the next-best available alternative, for purposes of estimating a reasonable royalty), *rev'd mem. on other grounds*, 108 F.3d 1392 (Fed. Cir. 1997); BRIAN G. BRUNSVOLD & DENNIS P. O'REILLEY, DRAFTING PATENT LICENSE AGREEMENTS § 10.00, at 110 (5th ed. 2004); Martin S. Landis, *Pricing and Presenting Licensed Technology*, at § 21.03[C][3], *in* 2 DRAFTING LICENSING AGREEMENTS (Michael A. Epstein & Frank L. Politano eds., 4th ed. 2010).

advantages over the next-best alternative should command a royalty no higher than what it would have cost the user to obtain a license to that next-best alternative.[81] In a case in which that next-best alternative was in the public domain, therefore, the appropriate royalty would be zero.[82] To be sure, where the user deliberately chooses the patented technology over the public domain alternative, it may be fair to infer that the user viewed the patented technology as superior, and thus that some non-zero royalty is appropriate. When there is reason to believe, however, that the patented invention offered no advantages over the next-best public domain alternative, there would not appear to be any good economic reason to award any royalties; the fair market value of an economically worthless patent license is still zero.[83] How often such problems would arise in the real world nevertheless remains to be seen; perhaps they are rare.

2. Other Patented Inventions Incorporated into the Infringing End Product

Another potentially relevant factor is the existence and strength of other patented inventions possibly incorporated into the relevant end product as a possible constraint on how much the defendant would have been willing to pay for the use of the plaintiff's invention. In particular, it stands to reason that a prospective licensee would negotiate the royalty for a specific patent with an eye toward avoiding the risk of royalty stacking.[84] Thus, if the evidence in a given case supports the proposition that, say, the number and strength of other patents reading on the end product would have been a factor the prospective licensee would have taken into account in deciding how much it was willing to pay for the use of the patent at issue, it would be appropriate for the trier of fact to give this factor substantial weight in the calculation of a reasonable royalty.[85]

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81. *See supra* note 78.

82. *See id.*

83. *See* Transamerica Corp. v. United States, 15 Cl. Ct. 420, 475 (1988) (observing that "[w]here no one is willing or able to pay anything for property, its fair market value is zero"), *aff'd*, 902 F.2d 1540 (Fed. Cir. 1990). *See also* Nathaniel C. Love, Comment, *Nominal Reasonable Royalties for Patent Infringement*, 75 U. CHI. L. REV. 1749, 1768 (2008) (noting, *inter alia*, that "[a]wards of zero or nominal damages are entirely unremarkable elsewhere in the law where there is no actual injury").

84. Royalty stacking is the aggregation of multiple royalties such that the aggregate licensing fee threatens to exceed the value of the end product. *See* Cotter, *supra* note 3, at 1169 & n.94.

85. *See* Durie & Lemley, *supra* note 13, at 641("The intensity of the patent thicket should be taken into account in setting a reasonable royalty. A willing buyer might be willing to pay up

Practical problems nevertheless may arise in attempting to present evidence of such other patents to the trier of fact. Would testimony about the existence of such other patents open the door for the patentee to inquire into whether the defendant has entered into licensing agreements for these other patents? Could the defendant be compelled to answer such questions? Might the answer to such a question elicit unwanted interest in the defendant's activities from the owners of these or other patents, or risk an adverse determination from the jury on the basis of improper character evidence?[86] One way out of this dilemma would be for courts to permit an expert witness to testify (where appropriate)[87] concerning the amount the willing

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to 3% for a technology that reduces its costs by 3%, but it surely isn't willing to pay 3% to each of ten different patent owners claiming rights in the technology. As a result, courts should consider the number of other successful, pending, and potential patent claims on a technology in deciding how to allocate royalties for that technology."). *See also* BRUNSVOLD & O'REILLEY, *supra* note 80, at § 10.01.D (discussing potential contractual solutions to reduce the risk of royalty stacking). In a related vein, Doug Lichtman has argued that, as the number of patents incorporated into an end product increases, the less value any single patent has. *See* Doug Lichtman, *Patent Holdouts in the Standard-Setting Process*, IP CENTRAL ACAD. ADV. COUNCIL BULL. 1. 3 (May 2006), http://www.pff.org/issues-pubs/ip/bulletins/bulletin1.3patent.pdf. Although I have expressed doubt whether this phenomenon by itself would render problems of patent holdout moot, see Cotter, *supra* note 3, at 1170 n.96, Lichtman's insight that patent value is a function of the number of patents makes sense insofar as the willing licensee would never voluntarily agree to pay more for a portfolio of patents than it expects to earn from the sale of relevant end products. In the limiting case in which the number of effective patents is infinite, the value of any one patent is zero. *See* Lichtman, *supra*, at 3.

86. *See* FED. R. EVID. 404(a) (stating the general rule that "[e]vidence of a person's character or a trait of character is not admissible for the purpose of proving action in conformity therewith on a particular occasion"); FED. R. EVID. 404(b) (stating that "[e]vidence of other crimes, wrongs, or acts is not admissible to prove the character of a person in order to show action in conformity therewith," but that it may "be admissible for other purposes, such as proof of motive, opportunity, intent, preparation, plan, knowledge, identity, or absence of mistake or accident"). The defendant presumably could ask for a limiting instruction, see FED. R. EVID. 105, but commentators have long perceived the limited usefulness of such instructions. *See, e.g.*, Nash v. United States, 54 F.2d 1006, 1007 (2nd Cir. 1932) (referring to a limiting instruction as "the recommendation to the jury of a mental gymnastic which is beyond, not only their powers, but anybody's else").

87. That is, assuming that the expert's opinion on this matter satisfies Rule 702 and the *Daubert* trilogy. *See* FED. R. EVID. 702 (stating that "[i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact at issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case"); *see also* Daubert v. Merrell Dow Pharm. Inc., 509 U.S. 579, 592, 597 (1993) (holding that courts must play a role in ensuring that expert testimony is reliable and based on scientific knowledge); Kumho Tire Co. v. Carmichael, 526 U.S. 137, 141 (1999) (expanding the general *Daubert* "gatekeeping" obligation to all expert testimony, not just expert testimony relating to "scientific" knowledge); Gen. Electric Co. v. Joiner, 522 U.S. 136, 142-47 (1997) (affirming

licensee would have paid, based in part on the expert's analysis of the existence and strength of other patents potentially reading on the end product, without permitting further inquiry at trial into the nature of the supporting evidence concerning the other licenses.[88] (The sufficiency of the supporting evidence could of course be tested pursuant to a motion in limine). Perhaps other analysts will propose yet other methods for according appropriate consideration to this type of evidence.[89]

3. Comparable Licenses and License Terms

Although theory suggests that the terms of a patent license should depend largely upon the patent's expected impact on the user's profits or costs, experience suggests that parties negotiating patent licenses may resort to various proxies for estimating patent value. One such proxy is the value of comparable patent licenses.[90] Another is the use of "running" royalties, calculated by multiplying a royalty rate by a royalty base such as ongoing sale revenue.[91] In particular, the parties may prefer a running royalty to a lump-sum royalty if the value of the patent is difficult to calculate ex ante;[92] if the patentee

exclusion of expert testimony on causation given the "analytical gap between the data and the opinion proffered," and specifically referring to the district courts' gatekeeping function).

88. *See* FED. R. EVID. 703 (stating that "[t]he facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to the expert at or before the hearing," and that "[i]f of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence in order for the opinion or inference to be admitted"); FED. R. EVID. R. 705 (stating that "[t]he expert may testify in terms of opinion or inference and give reasons therefor without first testifying to the underlying facts or data, unless the court requires otherwise"). Although Rule 705 goes on to state that "[t]he expert may in any event be required to disclose the underlying facts or data on cross-examination," FED. R. EVID. 705, courts retain the discretion to exclude or limit the admissibility of such evidence where its "probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury," FED. R. EVID. 403. *See, e.g.*, United States v. A & S Council Oil Co., 947 F.2d 1128, 1134 (4th Cir. 1991) (stating that "Rule 705 permits the cross-examiner to require the expert to reveal otherwise-inadmissible underlying information before the jury, subject . . . to Fed. R. Evid. 403's prejudice/probative value balancing test") (citing United States v. Gillis, 773 F.2d 549, 553-554 (4th Cir.1985)).

89. *See* Durie & Lemley, *supra* note 13, at 641 n.62 (stating that, in a forthcoming work, one of the authors will offer "some thoughts on the process by which courts might collect and use this information").

90. *See, e.g.*, BRUNSVOLD & O'REILLEY, *supra* note 80, at § 10.00 (discussing use of comparable licenses in negotiations); MARK S. HOLMES, PATENT LICENSING: STRATEGY, NEGOTIATION, AND FORMS § 4.13 (2010); RUSSELL L. PARR, ROYALTY RATES FOR LICENSING INTELLECTUAL PROPERTY 61-66 (2007); Landis, *supra* note 80, § 21.02[A].

91. *See* BLAIR & COTTER, *supra* note 9, at 190-96, 199-202.

92. *See id.* at 190-96.

prefers to license on a nonexclusive basis;[93] or if the licensee prefers to retain the option of reevaluating the technology's usefulness as time goes on.[94] For purposes of crafting reasonable royalties ex post, however, courts should be careful that the supposedly comparable licenses, or the selected royalty rates and bases, are the types of licenses, rates, and bases that the parties themselves realistically would have considered ex ante.

The use of comparable licenses in particular can be tricky. In the typical patent infringement action, only one or a small number of patents are at issue. As a result, portfolio licenses incorporating hundreds of patents are not likely to be comparable to a hypothetical license for the use of a single or small number of patents,[95] a point which the Federal Circuit recognized in *Lucent*.[96] Similarly, licenses involving running royalties are not readily comparable to lump-sum licenses because, as suggested above, running royalties typically reflect greater uncertainty over patent value and/or different perspectives on the most efficient method of exploiting the patent.[97] Thus, where the patentee requests a judgment based on a lump-sum royalty, other licenses involving running royalties may not be sufficiently comparable. The Federal Circuit also recognized this point as in *Lucent*.[98] In the alternative, patent owners sometimes proffer as evidence licenses to which other users have agreed in settlement of litigation.[99] As a proxy for expected patent value ex

93. *See id.* at 198-202 (explaining why, in the case of nonexclusive licensing, running royalties may be more efficient than lump-sum royalties).

94. *See* Lucent Technologies, Inc. v. Gateway, Inc., 580 F.3d 1301, 1326 (Fed. Cir. 2009). By contrast, a lump-sum royalty provides the patentee with an immediate payment in full, obviates the need to monitor the licensee's use, and removes the risk to the patentee of licensee underreporting. *See id.*

95. *See* PARR, *supra* note 90, at 65; Brief for Ten Amici Curiae In Support of Appellant, *supra* note 15, at 22.

96. *See Lucent*, 580 F.3d at 1328.

97. *See supra* Part II.D.

98. *See Lucent,* 580 F.3d at 1329-30 (concluding that "[t]his is not to say that a running-royalty license agreement cannot be relevant to a lump-sum damages award, and vice versa," but that "[f]or a jury to use a running-royalty agreement as a basis to award lump-sum damages . . . some basis for comparison must exist in the evidence presented to the jury"). *Accord* Wordtech Sys., Inc. v. Integrated Networks Solutions, Inc., 609 F.3d 1308, 1320 (Fed. Cir. 2010).

99. *See* Danielle Williams & Leslie T. Grab, *Contemporary Issues in Patent Royalty Damages, in* PATENT LITIGATION 2010, at 314-17 (PLI Intell. Prop. Course Handbook Series No. 24179, 2010) (noting that, despite the courts' traditional reluctance to consider such licenses, recently courts have begun considering them); Michael J. Chapman, *Using Settlement Licenses in Reasonable Royalty Determinations*, 49 IDEA 313 (2009) (arguing in favor of their use).

ante, however, this type of license should be suspect too; a license entered into ex post in settlement of litigation is likely to reflect, among other things, avoided litigation and design-around costs.[100] Strictly speaking, then, for a license to be economically comparable it should relate to the same patent or patents at issue (and not other patents); it should cover uses or products that are the same as (or at least analogous to) the uses or products at issue; and it should involve the same type of structure (lump-sum or running royalty) that the patentee is seeking to impose in litigation.

Similarly, the use of running royalties should reflect the types of royalty rates and bases that the parties realistically would have chosen ex ante. Much of the debate over this issue in recent years has centered on the use (or misuse) of the "entire market value rule" ("EMVR") in the calculation of reasonable royalties.[101] Historically, courts developed the entire market value rule as a guide for awarding lost profits in a case in which the patent covered only some portion or component of an end product.[102] In such a case, conventional wisdom was that the patentee was entitled to recover only the fraction of its lost profit that was properly attributable to the unauthorized use of the patent; to recover its entire lost profit from forgone sales, the patentee would have to prove that the "entire market value" of the end product was attributable to the patented component—or, to put it another way, that the patented component was the basis for consumers' demand for the end product.[103] Seen in this light, the entire market value rule has never stood on a very solid economic footing.

Economic logic suggests that, in a case in which the defendant's unauthorized use of the patented invention was both the but-for and proximate cause of the patentee's loss of sales, the defendant should be liable for whatever profit the patentee would have made on those forgone sales; there is no good reason to award only some supposedly allocable portion of those proven lost profits.[104] The intuition that lay

100. *See WordTech*, 609 F.3d at 1320-1321. On the other hand, such licenses might tend to show that the technology was worth less than the patentee claims. *See* Durie & Lemley, *supra* note 13, at 642-43.

101. *Compare, e.g.*, Lemley, *supra* note 10, at 663-65 (arguing that applying the EMVR in the context of reasonable royalty awards makes no logical sense, and leads to inflated awards); *see also* Brian J. Love, Note, *Patentee Overcompensation and the Entire Market Value Rule*, 60 STAN. L. REV. 263 (2007), *with* Michael A. Einhorn, *Patent Reform and Infringement Damages: Some Economic Reasoning*, PATENT DOCS (Feb. 5, 2008), http://www.patentdocs.org/2008/02/patent-reform-a.html (taking a more favorable view).

102. *See Lucent*, 580 F.3d at 1337; BLAIR & COTTER, *supra* note 9, at 216.

103. *See Lucent*, 580 F.3d at 1336-37; BLAIR & COTTER, *supra* note 9, at 216.

104. *See* BLAIR & COTTER, *supra* note 9, at 220-22.

behind the entire market value rule nevertheless was not necessarily entirely off-base. In a case in which the presence of the patented component in the end product is meaningful only to some purchasers of the end product, it is likely that the unauthorized use caused the patentee to lose some sales, but that the defendant would have made some sales too even absent the infringement. In such a case, therefore, it would be correct to assume that the patentee should not recover lost profits measured by the patentee's profit margin on infringing sales made by the defendant;[105] some sort of allocation or apportionment would be necessary to avoid overcompensation. The correct economic framework for awarding damages in such a case, however, involves (1) calculating the number of sales the patentee lost to the infringer as a consequence of the infringement, and awarding the patentee its forgone profits on those sales; and (2) awarding the patentee a reasonable royalty on sales the defendant made that did not deprive the patentee of any sales. In practical terms, this means that one must estimate the number of purchasers who bought the product from the defendant as a consequence of the product's incorporation of the patented feature, and who would have bought it from the patentee absent the infringement. For these lost sales, the patentee is entitled to recover its provable lost profit. For any other sales the defendant made to consumers who wouldn't have bought the product from the patentee even absent the infringement, the patentee should recover only reasonable royalties; there *are* no lost profits on these sales. Based on this analysis, I have long argued that, in the lost profits context, courts should do away with both apportionment and the entire market value rule, and simply award the patentee the lost profits and lost royalties that it suffered as a but-for, proximate consequence of the infringement.[106] Federal Circuit case law over the past twenty years or so has operated more or less consistently with this recommendation, though without explicitly discarding either apportionment or the entire market value rule.[107]

Although the courts' failure to expressly discard the rule has arguably had little if any practical consequence in the lost profits context in recent years, the rule has enjoyed something of a second

105. In some early cases, courts assumed that the every sale made by the defendant was a sale lost by the patentee. *See id.* at 213. Even in a case in which the patent reads on an entire end product, however—a situation that probably was more common in the nineteenth century than it is today—the assumption that every sale made by the defendant was a sale lost by the patentee was facile. *See id.*

106. *See id.* at 220-22.

107. *See id.*

career in the reasonable royalties context due to some unfortunate dictum in the Federal Circuit's opinion in *Rite-Hite Corp. v. Kelley Co.*[108] In particular, *Rite-Hite* suggested that when the elements of the entire market value rule are in place, a court could use the entire market value of end products incorporating the patented invention as the royalty base.[109] At present, the clearest articulation of the rule in the reasonable royalty context comes from opinions by Federal Circuit Judge Rader, sitting by designation as a district court judge in a patent dispute between Cornell University and Hewlett-Packard.[110] According to Judge Rader, the "critical requirement" for using "the entire market value of the accused products as the royalty base" is "a connection between the patented invention and the unpatented components that the patentee seeks to include in the royalty base."[111] More precisely:

> The entire market value rule in the context of royalties requires adequate proof of three conditions: (1) the infringing components must be the basis for customer demand for the entire machine including the parts beyond the claimed invention; (2) the individual infringing and non-infringing components must be sold together so that they constitute a functional unit or are parts of a complete machine or single assembly of parts; and (3) the individual infringing and non-infringing components must be analogous to a single functioning unit. It is not enough that the infringing and non-infringing parts are sold together for mere business advantage. Notably, these requirements are additive, not alternative ways to demonstrate eligibility for application of the entire market value rule.[112]

Applying the rule, Judge Rader reduced Cornell's damages award from $184,044,408 to $53,494,282, based on his conclusion that the "record contains no reasonable basis for finding that Cornell is entitled to the entire market value of Hewlett-Packard's CPU bricks or servers or workstations as a reasonable royalty base," and that "the hypothetical processor revenue of $8,061,545,086, not the hypothetical CPU brick revenue [of $23,005,506,034], is the

108. Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538 (Fed. Cir. 1995) (en banc).

109. *See id.* at 1549.

110. Cornell Univ. v. Hewlett-Packard Co., No. 01-CV-1974, 2008 WL 2223197 (N.D.N.Y. May. 27, 2008) (pretrial opinion on the EMVR); Cornell Univ. v. Hewlett-Packard Co, 609 F. Supp. 2d 279 (N.D.N.Y. 2009) (post trial opinion granting defendant's motion for JMOL or, in the alternative, remittitur). The judgment is on appeal before the Federal Circuit (No. 01-CV-1974).

111. *Hewlett-Packard*, 2008 WL 2223197 at *2.

112. *Hewlett-Packard*, 609 F. Supp. 2d at 286-87 (citations omitted).

appropriate royalty base."[113] Note, however, that although the court in this case rejected application of the entire market value rule on the facts—and although some of the dicta in *Lucent* might be read as questioning the relevance of the rule altogether[114]—in one subsequent case the Federal Circuit has approved a lower court's use of a royalty base that included not only the value of the infringing end products, but also the value of certain unpatented disposable products linked to the infringing products.[115]

From an economic perspective, the fundamental problem is that the entire market value rule remains just as incoherent in the context of reasonable royalties as it does in the context of lost profits. As I argued above, the overarching consideration in awarding reasonable royalties should be to replicate the bargain the parties would have struck ex ante.[116] The factors courts take into account in determining whether to apply the rule to the calculation of royalties[117] bear little if any relationship to this objective. A better policy would be simply to inquire into whether the parties would have chosen a running royalty ex ante, and if so to elicit expert testimony concerning the rate and base they might have chosen. Parties sometimes do choose sales revenue from sales of the end product as the royalty base, after all, as a matter of convenience; in such a case, there is no particular reason to avoid using such a base as long as it is accompanied by an appropriate rate.[118] Where there is no reason to believe the parties would have chosen such a base, however, courts should avoid doing so as well. Thus in *Cornell*, there was no reason to believe that the parties would have chosen sales of CPUs as the royalty base for a license involving a single component of a processor.[119] Similarly, in *Lucent*, there was no reason to believe that the parties would have chosen sales of Microsoft Outlook as the royalty base for a date

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113. *Id.* at 289, 292. Judge Rader reduced the base further to account for an implied license with Intel, and thus awarded Cornell $53,494,282, using a final royalty base of $6,686,785,273 and a jury-determined royalty rate of 0.8 percent. *Id.* at 292.

114. *See* Lucent Technologies, Inc. v. Gateway, Inc., 580 F.3d 1301, 1338-39 (Fed. Cir. 2009) (rejecting application of the entire market value rule on the facts of the case, while also noting that the rule was developed before the contemporary appreciation of the economics of infringement damages).

115. *See* Fresenius USA, Inc. v. Baxter Int'l, Inc., 582 F.3d 1288, 1303 (Fed. Cir. 2009).

116. *See supra* Part II.B.

117. See *supra* text accompanying note 112.

118. *See Lucent*, 580 F.3d at 1338-39; Einhorn, *supra* note 101; *see also* Cotter, *supra* note 3, at 1186 & n.164 (citing additional sources for the proposition that firms may use the revenue derived from sales of final products as the royalty base, as a matter of convenience).

119. *See* Cornell Univ. v. Hewlett-Packard Co, 609 F. Supp. 2d 279, 289 (N.D.N.Y. 2009).

picker function that many Outlook users probably never used.[120] To be sure, as the Federal Circuit itself noted in *Lucent*, there is a sense in which the choice of royalty base can be seen as a minor issue; even an enormous base, if multiplied by a correspondingly minute rate, could still result in a royalty that approximates the value of the invention at issue.[121] Nevertheless, the problem remains that lay juries may find it difficult to accept the correspondingly minute rate that would be appropriate to avoid overcompensation,[122] or (as the court recently noted in *Uniloc*) may be affected merely by hearing mention of an enormous royalty base.[123] To be sure, some difficulties in getting the message across to a lay jury may simply be unavoidable in a system that renders trial by jury a constitutional right. Courts nonetheless should be aware of the risks entailed and, as a consequence, should be vigilant in requiring proof that the patentee's proposed royalty rate and base correspond to the types of rates and bases the parties would have agreed to in ex ante, arms' length transactions. As long as courts adhere to the appropriate touchstone of approximating the bargain the parties themselves realistically can be expected to have struck, there is no reason to adopt bright-line rules either forbidding the use of end product sales as a royalty base or of requiring its use in the presence of arbitrary, economically irrelevant factors.

4. Realistic Factors That Nevertheless Should Be Excluded

Notwithstanding Principle Four, however, for purposes of calculating royalties courts should continue to exclude two real-world considerations the use of which would lead to incorrect calculations in court. First, courts should continue to exclude from consideration the parties' ex ante probability estimates of patent validity, enforceability, and infringement because (contrary to intuition) applying these factors ex post would introduce a double discounting problem. Standard analysis shows that *not* making this assumption at trial, after the patentee has already borne the risk that the court would find the patent invalid or not infringed, would in effect amount to double

120. *See Lucent*, 580 F.3d at 1337-38.

121. *See id.* at 1338-39.

122. For example, if thousands of patents read on a particular end product, the appropriate rate to multiply by the value of the end product might be something in the nature of 0.000001%. *See Hearing on the Evolving IP Marketplace-Remedies*, Fed. Trade Comm'n, (2009), *available at* http://htc-01.media.globix.net/COMP008760MOD1/ftc_web/transcripts/021109_sess1.pdf.

123. *See* Uniloc USA Inc. v. Microsoft Corp., 632 F.3d 1292, 1320-21 (Fed. Cir. 2011).

discounting.[124] As the courts have correctly surmised, the trier of fact should assume that, at the time of the hypothetical negotiations, the patentee and the would-be user believed the patent to be valid and infringed.[125]

Second, courts also probably should continue to exclude evidence of the parties' relative bargaining power, even though this factor surely must have some bearing on the terms of actual licensing agreements,[126] because evidence of bargaining power is unlikely to be susceptible to adequate empirical verification.[127] The only case thus far that has passed judgment on this issue therefore has, in my view, resolved the matter correctly by excluding such evidence.[128]

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124. *See* Cotter, *supra* note 3, at 1183 n.156 (with a correction noted in brackets):

> Kalos and Putnam use the following example to illustrate this point. Suppose that, at the time of infringement, the defendant would have agreed to license the patent for $1,000,000 discounted to reflect an 80% probability of validity and a 70% probability of infringement. Stephen Kalos & Jonathan D. Putnam, *On the Incomparability of "Comparable": An Economic Interpretation of "Infringer's Royalties,"* 9 J. PROPRIETARY RTS. 2, 4-5 (1997). Assuming that the latter two probabilities are independent, the resulting license fee to which the parties would have agreed would have been $560,000 (that is, $1,000,000 x 0.7 x 0.8). *Id.* The patent owner's expected payoff prior to trial, however, also must be discounted to reflect the uncertainty surrounding validity and infringement. *Id.* For example, if the patent owner's pretrial estimation of the probabilities of validity and infringement are the same as the estimated probabilities of these events at the time of infringement, the patent owner's expected payoff is only 56% of her best estimate of the damages she is likely to be awarded. *Id.* Thus, if she is entitled to recover $1,000,000 in the event that she prevails at trial, and has a 56% chance of prevailing at trial, she should be indifferent between licensing the patent ex [ante] and recovering damages ex [post]. If instead she were entitled to recover only $560,000 in the event she prevailed at trial, her expected payoff from litigating would be only $313,600 ($560,000 x 0.7 x 0.8). Kalos & Putnam, *supra*, at 4-5. She would, in other words, be worse off as a result of the infringement. *Id.*

125. *See, e.g.*, *Lucent*, 580 F.3d at 1325; Ariba, Inc. v. Emptoris, Inc., 567 F. Supp. 2d 914, 917-18 (E.D. Tex. 2008), *aff'd mem.*, 2010 WL 55625 (Fed. Cir. Jan. 8, 2010) (citing Georgia-Pacific Corp. v. Plywood Corp., 318 F. Supp. 1116, 1120 (S.D.N.Y. (1970))); Sundance, Inc. v. Demonte Fabricating, Ltd., No. 02-73543, 2007 WL 2287829, at *4 (E.D. Mich. Aug. 1, 2007); Monsanto Co. v. Bayer Bioscience N.V., No. 4:00CV01915, 2005 WL 5989796, at *14-*15 (E.D. Mo. Oct. 28, 2005); Accuscan, Inc. v. Xerox Corp., No. 96 Civ. 2579 (HB), 1998 WL 603217, at *6 (S.D.N.Y. Sept. 11, 1998) (citing Mobil Oil Corp. v. Amoco Chems. Corp., 915 F. Supp. 1333, 1352-1353 (D. Del. 1994)).

126. While I recognize that the licensor's bargaining power would be a factor influencing real-world negotiations—and have sided with scholars arguing that, in theory, an optimal royalty calculation should take this consideration into account, see Cotter, *supra* note 3, at 1182-83—I have consistently expressed doubt that courts *would* consider this factor in awarding reasonable royalty damages. *See id.* at 1182 & n.154. *See also* Cotter, *supra* note 10, at 133.

127. *See* Cotter, *supra* note 3, at 1182 (expressing doubt that courts could accurately estimate the parties' relative bargaining power, or that any expert would be competent to testify on this issue).

128. *See Emptoris*, 567 F. Supp. 2d 914.

5. Other Factors That Should Be Excluded

Principle Four's emphasis on the application of real-world variables also suggests various ways in which courts could improve the law of patent damages by excluding some types of evidence that have been considered in previous cases. I have already suggested above, for example, that the Federal Circuit should overrule case law permitting courts to estimate royalties based on unrealistic assumptions such as the licensee's willingness to negotiate for a license that would have left it with no expected profit from the use of the patented invention.[129] I also argued that the court should do away with the entire market value rule.[130] A third reform, which the Federal Circuit implemented just recently (in early January 2011),[131] is to discard so-called "rule of thumb" approaches that are inconsistent with contemporary standards for the admissibility of expert testimony.

As noted above, the term "rule of thumb" was sometimes used to refer to the assumption that, in patent licensing transactions, the licensee typically pays royalties equal to 25% of the profits derived from the use of the patented invention.[132] (The rule was sometimes viewed as more in the nature of a "starting point" for negotiations than a hard-and-fast rule, however.[133] Moreover, if the reported decisions are any guide, application of the rule of thumb appears to have varied a bit from one case to another.[134]) As noted above, even

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129. See *supra* notes 63, 74, 75 and accompanying text.

130. See *supra* notes 116-123 and accompanying text.

131. *See* Uniloc USA Inc. v. Microsoft Corp., 632 F.3d 1292, 1315 (Fed. Cir. 2011).

132. *See, e.g.*, i4i Ltd. Partnership v. Microsoft Corp., 598 F.3d 831, 853-56 (Fed. Cir. 2010) (referring to the 25-percent rule as assuming that "the inventor will keep 25% of the profits from any infringing sales," and concluding that district court did not abuse its discretion in admitting expert testimony based in part on that the rule, which the expert characterized as "'well-recognized' and 'widely used' by people in his field"), *cert. granted*, No. 10-290, 526 U.S. __ (2010), *available at* http://www.supremecourt.gov/orders/courtorders/112910zor.pdf; Static Control Components, Inc. v. Lexmark Int'l, Inc., Nos. 5:02-571, 5:04-84, 2007 WL 7083655, at *13-14 (D. Ky. May 12, 2007) (stating that "'the 25% rule or a close variant of it has been recognized by a number of other federal courts as a 'rule of thumb' or 'typical' in the licensing field'") (quoting Standard Mfg. Co. v. United States, 42 Fed. Cl. 748, 766 (1999)).

133. *See* Inline Connection Corp. v. AOL Time Warner Inc., 470 F. Supp. 2d 424, 432 n.38 (D. Del. 2007).

134. *See, e.g.*, *i4i*, 589 F.3d at 1268-72 (describing expert's methodology as involving the multiplication of the price of an allegedly comparable product by Microsoft's profit margin by 25%, with further adjustments in light of the *Georgia-Pacific* factors); Paice LLC v. Toyota Motor Corp., 609 F. Supp. 2d 620, 630 (E.D. Tex. 2009) (multiplying defendant's profit margin by 25%, then further reducing the resulting percentage to take into account, inter alia, defendant's lower margin on sales of hybrid vehicles); Cohesive Technologies, Inc. v. Waters Corp., 526 F. Supp. 2d 84, 123 & nn.21 & 22 (D. Mass. 2007) (after concluding that the

after *Lucent* the Federal Circuit in *i4i* held that the district court did not abuse its discretion in admitting expert testimony on damages, which testimony was based in part on the witness's application of a 25% rule of thumb.[135]

The problem with the 25% rule of thumb was that it often lacked a sufficient basis to satisfy Federal Rule of Evidence 702, which requires that expert opinions be supported by reliable methodology and be tied to the specific facts of the case at issue.[136] As others

evidence did not support a finding of actual damages in the form of lost profits, and that plaintiff was therefore entitled to a reasonable royalty, describing the 25% rule as "a rule of thumb for calculating a hypothetical royalty rate, determined by taking 25% of [plaintiff's] gross profit margin (revenues minus marginal costs divided by revenues) for the year of the infringement," on the assumption that the defendant's "gross profit margin would be similar," and the "book of wisdom" approach as applied in this case as involving the calculation of a "royalty rate based upon a 25% rule of the profits as hypothesized by but-for lost profits during the infringement period"), *aff'd in part, vacated in part, rev'd in part on other grounds*, 543 F.3d 1351 (Fed. Cir. 2008); *Standard Mfg.*, 42 Fed. Cl. at 766-67 (determining the base royalty rate by multiplying the licensee's average profit rate on sales of end products by 25%); Ajinomoto Co. v. Archers-Daniels-Midland Co., No. 95-218, 1998 WL 151411, at *52 n.46 (D. Del. Mar. 13, 1998) (after describing determining the royalty base by multiplying the defendant's cost saving from the use of the patented invention by 25%), *aff'd*, 228 F.3d 1338 (Fed. Cir. 2000).

Interestingly, the court in *Cohesive Technologies* appears to have viewed the terms "25 percent rule of thumb" and "book of wisdom" as synonyms. *See Cohesive Technologies.*, 526 F. Supp. 2d at 123 n.22. More commonly, however, the term "book of wisdom," which appears to have originated in Justice Brandeis's opinion in *Sinclair Refining Co. v. Jenkins Petroleum Process Co.*, 289 U.S. 689, 698 (1933), is used to refer to a different concept, namely the practice of calculating royalties based in part on events that occurred *after* the date of the hypothetical negotiations. *See, e.g.*, Fromson v. Western Litho Plate & Supply Co., 853 F.2d 1568, 1575 (Fed. Cir. 1988) (stating that the reasonable royalty approach "permits and often requires a court to look to events and facts that occurred thereafter and that could not have been known to or predicted by the hypothesized negotiators," such as whether the patented invention will meet with commercial success) (citing *Sinclair*, 289 U.S. at 698-99); *see also* Studiengesellschaft Kohle GmbH v. Dart Indus., 862 F.2d 1564, 1571-72 (Fed. Cir. 1988) (similar); Honeywell Int'l Inc. v. Hamilton Sundstrand Corp., 378 F. Supp. 2d 459, 462-70 (D. Del. 2005) (following *Fromson*, and distinguishing three post-*Fromson* cases, *Integra Lifesciences I, Ltd. v. Merck KGaA*, 331 F.3d 860 (Fed. Cir. 2003), *Riles v. Shell Exploration & Prod. Co.*, 298 F.3d 1302 (Fed. Cir. 2002), and *Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371 (Fed. Cir. 2001), in which the Federal Circuit arguably disfavored some uses of post-negotiation information). *But see* TWM Mfg. Co. v. Dura Corp., 789 F.2d 895, 899 (Fed. Cir. 1986) (stating that evidence of infringer's actual profits is admissible, but that correct focus is "the date when the infringement began"); Hanson v. Alpine Valley Ski Area, Inc., 718 F.2d 1075, 1081 (Fed. Cir. 1983) (stating that infringer's profit "is to be determined not on the basis of a hindsight evaluation of what actually happened, but on the basis of what the parties to the hypothetical license negotiations would have considered at the time of negotiations"). To the extent such ex post developments are relevant to determining what the parties' expectations may have been ex ante, the analysis presented above in Part II suggests that the evidence of such developments sometimes may be helpful in reconstructing the terms of the hypothetical ex ante bargain. Courts nevertheless should be wary of the risk of hindsight bias.

135. *See i4i*, 598 F.3d at 853-56.

136. *See* FED. R. EVID. 703.

previously had noted,[137] the 25% rule was largely derived from a study conducted by Robert Goldscheider in the late 1950s of "the Swiss subsidiary of a large American company, with 18 licensees around the world, each having an exclusive territory."[138] Moreover, the licenses covered a range of intellectual property, not just patents.[139] It seems highly doubtful, to say the least, that such limited support would shed any light on contemporary licensing practices across a range of industries. In addition, although Goldscheider and his coauthors argued that another, more recent study they conducted confirms the general validity of a rule of thumb based on payments of 25% of operating profits,[140] as Cox and Rusek pointed out in response, the data on which this study was conducted was derived from publicly traded companies only; did not take into account

137. *See generally* Alan Cox & Stephen Rusek, *The Demise of Junk Science and the 25% Rule*, LAW360, July 28, 2010, http://www.nera.com/67_6830.htm; William C. Rooklidge & Martha K. Gooding, *When Hypothetical Turns to Fantasy: The Patent Reasonable Royalty Negotiation*, BNA PAT, TRADEMARK & COPYRIGHT L. DAILY, Sept. 28, 2010. For additional critical commentary, see Bailey, *supra* note 18, at 6 (stating that "[t]he 25% rule makes no economic sense"); Roy J. Epstein & Alan J. Marcus, *Economic Analysis of the Reasonable Royalty: Simplification and Extension of the Georgia-Pacific Factors*, 85 J. PAT. & TRADEMARK OFF. SOC'Y 555, 573 (2003) (arguing that "[t]he resulting royalties can be either excessive or too small, depending on the underlying economics"); Amy Landers, *Let the Games Begin: Incentives to Innovation in the New Economy of Intellectual Property Law*, 46 SANTA CLARA L. REV. 307, 334 (2005) (stating that "[t]he rule of thumb fails to account for the parties' actual individual risk-sharing, the risks assumed by both parties, and the resources contributed by each"); Gregory K. Leonard & Mario A. Lopez, *Patent Damages: What Reforms are Still Needed?*, LANDSLIDE, May/June 2010, at 37-38 (referring to the "25 percent rule" as having "no basis in economic reality"); Gregory K. Leonard & Lauren J. Stiroh, *Economic Approaches to Intellectual Property Policy, Litigation, and Management*, in PATENT LITIGATION 2008, at 454-55 (PLI Pat., Trademark, & Literary Prop. Course Handbook Series No. 14977, 2008) (referring to the 25 percent rule as "unambiguously unreasonable," "arbitrary"); Seaman, *supra* note 1, at 1696 (referring to the rule as having been "justly criticized for numerous reasons"); Richard S. Toikka, *Patent Licensing under Competitive and Non-Competitive Conditions*, 82 J. PAT. & TRADEMARK OFF. SOC'Y 279, 292-93 (2000). *But see* Jonathan E. Kemmerer & Jiaqing Lu, *Profitability and Royalty Rates Across Industries: Some Preliminary Evidence* 2 (2008), *available at* http://ssrn.com/abstract=1141865 (concluding that "royalty rates across industries do not converge with the rates generated by 25% rule at an industry level, although the reported rates tend to fall between 25% of the gross profit margins and 25% of operating profit margins," but that "the 25% rule serves [as] a good starting point for royalty negotiations"); Matthew Sag & Kurt Rohde, *Patent Reform and Differential Impact*, 8 MINN. J. L. SCI. & TECH. 1, 26-27 (2007) (stating that "patent license fees are frequently determined by seemingly arbitrary rules of thumb such as the '25 Percent Rule' or reference to past industry practices" and that "[e]ach of these methods is something of a 'guesstimate,'" but that "it seems fair to assume that methods of valuation that were not a function of the alleged infringer's potential profit would be displaced in the market by those that were") (citations omitted).

138. Robert Goldscheider et al., *Use of the 25 Per Cent Rule in Valuing IP*, 37 LES NOUVELLES 123, 123 (2002).

139. *See id.*

140. *See id.* at 132-33.

differing license terms (e.g., exclusive versus nonexclusive, territorial, type of IP, etc.) or the viability of noninfringing alternatives; computed percentages using licensees' operating profits generally, not by product; did not report a rate of error; and varies widely from one industry to another.[141] To be fair, Goldscheider et al. argued only that the rule "is best used as one pricing tool and should be considered in conjunction with other (quantitative and qualitative) factors that can and do affect royalty rates."[142] Even on these terms, however, it is difficult to perceive the rule as serious economic analysis; as Cox and Rusek note, Goldscheider et al.'s own mathematical example of the rule in operation would result in royalties that would cost the licensee the entire revenue enhancement or cost reduction resulting from the use of the patented invention.[143] Given this context, the Federal Circuit's affirmation of the application of the rule of thumb in *i4i*[144] seemed doubly disappointing, coming as it did so soon after the *Lucent* opinion seemed to herald a renewed emphasis on economic realism in damages calculations.[145]

Fortunately, the Federal Circuit has now rectified matters by unequivocally holding in *Uniloc* that "[e]vidence relying on the 25% rule of thumb is . . . inadmissible under *Daubert* and the Federal Rules of Evidence, because it fails to tie a reasonable royalty base to the facts of the case at issue."[146] One would hope that the decision in *Uniloc* reflects a return to the economic rationality foreshadowed in *Lucent*, and heralds a greater receptivity on the part of the court to economically convincing arguments (even when those arguments go against the grain of the court's own precedent). Given the nontrivial risk that legislative intervention on the damages front could result in making things worse,[147] the patent community may be forgiven for breathing a collective sigh of relief at the court's recent efforts to fend off such intervention by voluntarily reforming some of the practices it had tolerated for so long.

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141. *See* Cox & Rusek, *supra* note 137.

142. *See* Goldscheider et al., *supra* note 138, at 133.

143. *See* Cox & Rusek, *supra* note 137 (pointing out, in addition, that in the context of Goldscheider et al.'s mathematical example an increase in revenue of $6 instead of $10 would result in royalties exceeding the value of the invention to the licensee). For a response, see John C. Jarosz et al., *The 25% Rule Lives On*, LAW360, Sept. 8, 2010, http://ip.law360.com/web/articles/187507.

144. *See* i4i Ltd. Partnership v. Microsoft Corp., 598 F.3d 831, 853-56 (Fed. Cir. 2010).

145. *See* Lucent Technologies, Inc. v. Gateway, Inc., 580 F.3d 1301, 1338-39 (Fed. Cir. 2009).

146. Uniloc USA Inc. v. Microsoft Corp., 632 F.3d 1292, 1315 (Fed. Cir. 2011).

147. See *supra* notes 66-67 and accompanying text.

III. CONCLUSION

I have argued above that a rational system of patent damages would take into account four related principles in awarding reasonable royalties: (1) for purposes of awarding retrospective damages, courts should take the scope of substantive patent law as fixed; (2) the baseline damages recovery for prevailing patent owners should be the amount that restores them to the position they would have enjoyed, but for the infringement; (3) courts should depart from this baseline when doing so is necessary to attain optimal deterrence; and (4) in attempting to replicate the license the parties would have negotiated ex ante but for the infringement, courts generally should authorize the consideration of factors that the parties realistically would have used, and should exclude consideration of factors that lack a sound basis.

None of these principles constitutes a radical departure from existing law, and the Federal Circuit probably could accomplish the necessary remaining changes without the need for additional legislation.[148] Indeed, the reforms I have advocated build upon evolving case law as exemplified in the Federal Circuit's *Lucent* and, more recently, *Uniloc* decisions. The express adoption of these principles, nevertheless, would mark a transition in patent jurisprudence, towards explicit judicial recognition of patent law as nothing more (or less) than a type of economic regulation. According exclusive rights in inventions, in other words, is a means to an end or ends (encouraging investment in invention, disclosure, innovation, and so on),[149] and not as an end in itself. Similarly, damages in the form of lost profits or reasonable royalties are best viewed as a means to preserve the utilitarian structure upon which patent rights are premised.

From this perspective, courts should employ the best methodology reasonably available for carrying out this utilitarian mandate; and for better or worse, for now that methodology consists mostly of insights drawn from empirical and theoretical economics. Seen in this light, damages analyses that are premised on unsupportable assumptions (such as the licensee's willingness to bargain for a license that would have left it with no profit from the use

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148. For example, to the extent the *Georgia-Pacific* factors are likely to remain good law for the foreseeable future, Durie and Lemley's suggestions for the structured use of these factors seems fully consistent with the analysis presented in this article. *See generally* Durie & Lemley, *supra* note 13.

149. *See* Cotter, *supra* note 3, at 126; Golden, *supra* note 50, at 509-11, 520-21.

of the invention),[150] that are based on an outmoded understanding of the economic consequences of patent-driven market power (such as the entire market value),[151] or that defy mathematical logic (like some applications of the now defunct 25% rule of thumb),[152] should have no place in contemporary patent jurisprudence. Like antitrust law before the Chicago and post-Chicago School revolutions,[153] the law of patent damages has yet to fully mature in terms of its economic sophistication. Fortunately for patent lawyers, courts, and scholars, incorporating a few more insights from economic analysis should not be terribly burdensome; unlike the subject matter of some patents, most of the relevant insights are not exactly rocket science.

To be sure, some may argue that the factors this article urges courts to focus upon—such as the value of the patent in comparison with the next-best alternative, the use of economically comparable licenses, and the use of realistic royalty rates and bases—are in many instances likely to be difficult to quantify with any degree of precision. Such criticism may not be entirely off the mark; there likely will be difficulties in abandoning the *faux* precision of the entire market value rule or rules of thumb for the type of analysis this article advances. In response, however, I offer four concluding observations. First, just because something is difficult does not mean that it is not worth doing. To the extent the governing legal standards provide incentives for repeat players to develop better databases on comparable licenses, for experts to develop specialties in identifying and quantifying next-best alternatives, and for lawyers to develop methods for teaching juries to understand the relationship between royalty rates and bases, I remain reasonably confident that the market for the necessary information will evolve. Second, perhaps there are better ways of quantifying patent value (as an input into the terms of the hypothetical license) than the methods I have identified herein. Without endorsing any specific analysis, I note only that economists have presented various alternatives in recent years that may merit further examination than they have received thus far.[154] Third, the

150. See *supra* notes 63, 74, 75 and accompanying text.

151. See *supra* notes 116-123 and accompanying text.

152. See *supra* note 144 and accompanying text.

153. *See, e.g.*, Daniel A. Crane, *Technocracy and Antitrust*, 86 TEX. L. REV. 1159, 1160 (2007) (noting, and celebrating, that "[s]ince the Chicago School revolution in the 1970s, federal antitrust enforcement has become considerably less democratic and more technocratic").

154. *See, e.g.*, F. Russell Denton, *Rolling Equilibriums at the Pre-Commons Frontier: Identifying Patently Efficient Royalties for Complex Products*, 14 VA. J. L. & TECH. 48 (2009); F. Russell Denton & Paul J. Heald, *Random Walks, Non-Cooperative Games, and the Complex*

difficulty of quantifying damages is itself a factor that may weigh in favor of injunctive relief,[155] and an award of injunctive relief surely takes some of the sting out of not obtaining a large damages award. Fourth, the fact that patent law, unlike copyright and trademark,[156] lacks a provision permitting courts to award statutory damages in lieu of proof of actual harm should not entitle courts to indulge speculative theories that fail governing standards for the admissibility of scientific and technical evidence. Indeed, it is particularly difficult to justify a policy in favor of admitting speculative damages evidence when there is no proof of intentional copying (as there often is not).[157] Inadvertent infringement means that the defendant independently invented; and while patent law does not recognize independent invention as a defense, there is surely no compelling need to depart from rational standards of proof and award speculative damages in such a case either, given that (by hypothesis) the patent incentive was largely unnecessary to the creation of the invention under consideration.[158]

I conclude by noting that the progress of the useful arts to which patent law is supposed to be ancillary[159] critically depends upon scientific norms of rational, skeptical inquiry.[160] By contrast, there have been times when patent norms (in particular, some aspects of the law of patent damages) have seemed to be based more on the sort of

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Mathematics of Patent Pricing, 55 RUTGERS L. REV. 1175 (2003); Epstein, *supra* note 137; Ravi Mohan, *Analysis of the Entire Market Value Rule in Complex Technology Litigation: Arduous Royalty Base Determinations, Unjust Damage Rewards, and Empirical Approaches to Measuring Consumer Demand*, 27 SANTA CLARA COMPUTER & HIGH TECH. L.J. 639, 663-65 (2011), *available at* http://www.chtlj.org/sites/default/files/media/articles/v027/v027.i3.Mohan_.pdf; Mariko Sakakibara, *An Empirical Analysis of Pricing in Patent Licensing Contracts* (2009), *available at* http://ssrn.com/abstract=1515163.

155. *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006) (stating that "[a] plaintiff must demonstrate: (1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction").

156. *See* 17 U.S.C. § 504(c) (2006) (providing for statutory damages for copyright infringement); 15 U.S.C. § 1117(c) (2006) (providing for statutory damages for trademark counterfeiting). For discussion, see Thomas F. Cotter, *Optimal Fines for False Patent Marking*, 17 MICH. TELECOM. & TECH. L. REV. 181, 182 (2010).

157. *See* Cotropia & Lemley, *supra* note 72.

158. Of course, the patent incentive may have encouraged the patentee to invent earlier, to have disclosed, etc.

159. *See* U.S. CONST. art. I, § 8, cl. 8.

160. Some postmodern scholars of science may disagree, but this is neither the time nor the place to get into *that* debate.

unsustainable assumptions that I have referred to elsewhere as "folk economics."[161] If nothing else, I hope that the reader takes away from this article the idea that patent law occasionally might benefit from a larger dose of both rationality and skepticism—especially when it comes to determining entitlements to patent damages.

161. *See* Cotter, *supra* note 3, at 1155-56, 1179 n.137.

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