
**PATENT DAMAGES REFORM AND
THE SHAPE OF PATENT LAW**

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The shape of patent law is changing. Surprisingly, one of the most significant changes in patent law is rooted in the arcana of damage calculations for patent infringement. Current reform proposals before Congress, which are hotly contested by major technology-rich industries, would radically alter the shape of the patent grant by requiring courts to tease out the “economic value” of the claimed invention as compared with previously existing technology. This Article responds empirically and theoretically to this attempt to reshape patent law through the back door of damages.

Advocates of the damages reform proposals cite empirical evidence that patent verdicts are growing excessively large. This Article reviews the existing empirical literature and presents an original study of patent verdict data obtained from the Administrative Office of the Courts. The literature reviewed and the original study presented in this paper suggest the empirical arguments made by reform advocates are largely misplaced.

This Article also examines the theoretical underpinnings of the remedial structure for patent infringement. It discusses a string of recent Supreme Court opinions suggesting patent law appears to be moving from a property rule towards a liability rule of remedies.

Finally, this Article examines a key factor that has been ignored in the existing patent reform debate: price elasticity of demand. Theoretical models are presented that demonstrate why attempts at reform should focus on shifting towards a restitutionary model of patent damages.

INTRODUCTION

The shape of patent law is changing. Throughout the 1980s and 1990s, as patent-rich industries such as pharmaceuticals and biotechnology expanded, the United States Court of Appeals for the Federal Circuit and the United States Supreme Court pushed the boundaries of patentable subject matter and tied off exceptions to infringement liability.¹ Now, under the pressure of

¹ See, e.g., FED. TRADE COMM’N, TO PROMOTE COMPETITION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY 5, 8-10 (2003); John R. Allison & Mark A. Lemley, *The Growing Complexity of the United States Patent System*, 82 B.U. L. REV. 77, 134-41 (2002) (discussing various factors relating to increased patenting activity including less rigorous examination by patent examiners as well as a larger scope of patentability for improvements on prior art); Arti Kaur Rai, *Regulating Scientific Research: Intellectual*

patent-poor incumbents in the computer industry, Congress is being lobbied to squeeze the law into a smaller shape.

Some of this pressure falls on expected places, such as efforts to ensure a more rigorous examination of patentability in the Patent and Trademark Office.² Surprisingly, however, a key pressure point, which threatens to explode congressional reform efforts, is found deep in the arcana of how damages are calculated for infringement. Damage rules are set to affect the shape of the patent grant for years to come.

Unfortunately, recent proposals for reform of patent damages are based on weak empirical evidence and likely will distort patent incentives in improper ways. In fact, all the reform proposals overlook price elasticity of demand, which is a key driver of patent policy. When this factor is taken into account, a better solution emerges: eliminate the reasonable royalty provision and approach patent remedies from a restitutionary perspective.

Patent reform advocates argue that damage awards in patent cases have grown excessive because reasonable royalty damages are not necessarily limited to the incremental economic value of the invention claimed in the patent.³ They argue that the threat of a large damage award gives undue leverage to patentees in license negotiations and allows owners of patents on minor components to hold up production of finished products.⁴ They seek legislation that would require trial courts to apportion patent damages among the invention identified in the claims of the patent in suit, the commercial device, process or method in which the patented invention is embodied, and the prior art.⁵ The patent reform bill recently passed by the House of Representatives⁶ and the bill currently under consideration by the Senate⁷ each contain extensive apportionment requirements.⁸

Property Rights and the Norms of Science, 94 Nw. U. L. REV. 77, 100-09 (1999) (discussing a shift in case law towards a broader scope of what would be considered patentable).

² See Patent Reform Act of 2008, S. 1145, 110th Cong. (2008) (providing that examiners may not grant patents unless the patents meet specific novelty requirements, and prohibiting the granting of a patent for an invention that has been disclosed to the public more than a year before filing); Patent Reform Act of 2007, H.R. 1908, 110th Cong. (2007).

³ See Coalition for Patent Fairness, Statement of Principles, http://www.patentfairness.org/about_the_coalition/our_principles.cfm (last visited Aug. 5, 2008) (“The current system encourages patent owners to seek settlements that far exceed the value of the patent’s contribution.”).

⁴ *Id.*

⁵ *Id.*

⁶ H.R. 1908.

⁷ S. 1145.

⁸ See *infra* Part I.B (discussing the damages provisions of the House and Senate patent reform bills).

Opponents of an apportionment requirement argue that such a requirement is unnecessary and unworkable.⁹ Existing case law gives trial courts discretion to consider a broad range of factors when determining a reasonable royalty.¹⁰ Apportionment opponents argue that this discretion properly recognizes the trial court's role in crafting remedies tailored to individual cases.¹¹

Supporters of damages reform often position their arguments as fundamentally empirical. Reformers cite a growing trend towards large verdicts. This trend, they suggest, is particularly problematic when the patentee is a non-practicing entity, or "patent troll," that has no business model except to collect and license patents.¹²

There have, in fact, been some enormous patent verdicts in recent years, including a \$1.5 billion verdict against Microsoft relating to MP3 technology.¹³ On careful analysis, however, the data do not seem to support a statistically significant trend towards larger verdicts. A literature review of existing empirical studies, together with an original study of data gleaned from the Administrative Office of the Courts,¹⁴ shows that damage awards are widely and stochastically distributed, suggesting that most cases are being adjudicated according to their facts rather than according to some predisposition towards large awards. The very large verdicts are outliers that must be analyzed individually on their own merits. This suggests any reform should target rogue

⁹ See The Coalition for 21st Century Patent Reform, Key Principles for Reform, http://www.patentmatter.com/issue/key_principles.php (last visited Aug. 5, 2008) ("Codification of the 'apportionment principle' should be undertaken only to address inconsistencies in the application of the law and must avoid injecting unacceptable uncertainty into the determination of damages based upon a 'reasonable royalty' determination.").

¹⁰ See, e.g., *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970) (listing fifteen evidentiary factors for determining a reasonable royalty), *modified on other grounds*, 446 F.2d 295 (2d Cir. 1971), *cert. denied*, 404 U.S. 870 (1971).

¹¹ See, e.g., Innovation Alliance, Our Principles, <http://www.innovationalliance.net/about-us/our-principles/> (last visited Oct. 22, 2008) ("Existing law concerning the determination of a patent's value and calculation of damages when a patent has been infringed provides courts appropriate flexibility to reach a fair conclusion on damages assessment.").

¹² For example, the Coalition for Patent Fairness claims:

The number of companies caught up in patent litigation with patent "trolls" – companies that purchase patents, often from bankrupt firms, in order to sue companies with related products for patent infringement – has risen exponentially. In 2007 alone, the Eastern [sic] District of Texas logged 364 patent cases (151 of which were troll cases), with 1,402 patent defendants sued. That is one patent case filed per day, 28 defendants sued per week. Twice as many as any other district.

Coalition for Patent Fairness Homepage, <http://www.patentfairness.org/> (last visited Aug. 5, 2008).

¹³ See *infra* Part II.A.2 (discussing the PriceWaterhouseCoopers Study of patent damage verdicts from 1995 to 2007 including several "landmark" cases for damages).

¹⁴ See *infra* Part II.A.

verdicts. Given that several layers of safeguards against rogue awards already exist, including procedures for judgment notwithstanding the verdict, remittitur, and appeal, it is unclear what else is required.

Underneath these empirical claims, however, a bigger debate is bubbling to the surface. At a deeper level, arguments about changing the shape of patent damages calculations are arguments about changing the shape of patent law itself. Some reformers fear the scope of the patent franchise has expanded too rapidly.¹⁵ They seek to constrain the patent grant by transitioning from a property rule of patents towards a liability rule.¹⁶ The congressional damage reform proposals, which on their face involve technical details about damages rules, in fact represent a massive and historic shift towards a liability rule.¹⁷

However, recent judicial decisions have weakened the case for broader legislative reform in many ways.¹⁸ In a string of recent decisions involving injunctions,¹⁹ declaratory relief,²⁰ willful infringement,²¹ and other issues, the Supreme Court and the Federal Circuit constrained the power of patents. Given these developments, the congressional damage reform proposals seem particularly unwise. A requirement that the “economic value” of a patent be apportioned against the prior art would create irreconcilable tensions with the way we now think of the patent grant.²² The conservative-sounding congressional reform proposals are in truth quite radical against the background of recent changes in the case law.

Notwithstanding these concerns, the remedial scheme for patent infringement *should* change. There is a factor of great economic importance that the existing remedial scheme for patents overlooks: price elasticity of demand.²³ Price elasticity of demand is an important driver of the patent engine because elasticity is what allows a patentee to obtain rents.²⁴ An

¹⁵ See Coalition for Patent Fairness, Statement of Principles, *supra* note 3.

¹⁶ See *infra* Part IV.A (discussing liability for patent infringement under both property-rule and liability-rule frameworks).

¹⁷ See *infra* Part IV.B.

¹⁸ See *infra* Part III.B.

¹⁹ See *eBay, Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 390 (2006) (vacating the decision of the court of appeals and holding that there is no presumption of injunctive relief in patent cases).

²⁰ See *Medimmune, Inc. v. Genentech, Inc.*, 127 S. Ct. 764, 777 (2007) (departing from Federal Circuit precedent and allowing a declaratory judgment action to proceed).

²¹ See *In re Seagate Tech., LLC*, 497 F.3d 1360, 1376 (Fed. Cir. 2007) (requiring a heightened standard to prove willful infringement in patent cases).

²² See *infra* Part IV.B. (discussing how a requirement that a patented invention’s economic value be apportioned from the prior art would require a reconsideration of patentability after a presumably valid patent has already been granted).

²³ See *infra* Part V.

²⁴ Paul E. Schaafsma, *An Economic Review and Suggested Approach for Licensing Patent Applications*, 81 J. PAT. & TRADEMARK OFF. SOC’Y 340, 343-44 (1999).

analysis of patent remedies that accounts for price elasticity of demand suggests a surprising result: the “reasonable royalty” requirement could be eliminated if the patentee were entitled to disgorge the infringer’s profits, and in many cases the appropriate measure of damages would equal restitution of the infringer’s profits. This would promote results that are both economically efficient and socially desirable as it would help skew innovation incentives towards “necessary” goods for which there is relatively inelastic demand. There is currently no restitutionary remedy under the Patent Act, but this is an historical lacuna that Congress should fill.

Part I of this paper summarizes existing patent damage rules and contrasts them to the current reform proposals. Part II provides a literature review of existing empirical studies on patent damages together with an original empirical analysis of damage awards in patent cases decided from 2002 to 2007. Part III reviews the significant jurisprudential shifts that have occurred in patent law over the past few years. Part IV synthesizes the current state of the jurisprudence and the congressional reform proposals and suggests the apportionment requirement is unwise. Finally, Part V analyzes the implications of price elasticity of demand for patent damage awards and suggests Congress amend the Patent Act to include restitution as a component of patent damages.

I. PATENT DAMAGES AND REFORM PROPOSALS

A. *Lost Profits and Reasonable Royalty Under Existing Law*

Section 284 of the Patent Act provides that damages for patent infringement must be “adequate to compensate for the infringement, but in no event less than a reasonable royalty.”²⁵ Courts have understood § 284 to authorize damages under either of two broad theories: lost profits or a reasonable royalty.²⁶

Recovery under a lost profits theory generally requires the patentee to show the infringing and patented products actually compete in relevant markets.²⁷ In some circumstances the patentee can recover lost profits under the “entire market value rule” when the infringement facilitates competition in a market for an unpatented product manufactured or sold by the patentee.²⁸ In all cases,

²⁵ 35 U.S.C. § 284 (2000).

²⁶ JOHN M. SKENYON, CHRISTOPHER S. MARCHESI & JOHN LAND, *PATENT DAMAGES LAW AND PRACTICE* § 1:3 (2008).

²⁷ *Id.* § 1:7.

²⁸ *Id.*; see *Rite-Hite, Corp. v. Kelley Co.*, 56 F.3d 1538, 1549 (Fed. Cir. 1995) (discussing the entire market value rule where an unpatented product’s value is affected by a patented component).

the patentee must prove causation connecting the infringement and the lost profits.²⁹

A reasonable royalty is the minimum amount of damages that can be awarded.³⁰ The reasonable royalty used in this minimalist sense is a type of actual damages. It represents what the patent owner and a licensee would have freely negotiated where there is evidence of such prior transactions.³¹

Reasonable royalty is also the term for an alternative measure of damages available when there is no competitive nexus between the patented and infringing product or method, or where the measure of lost profits is speculative.³² The purpose of this kind of reasonable royalty calculation is not to approximate actual market transactions that might occur absent infringement.³³ Rather, this calculation is meant to provide “adequate compensation” for infringement.³⁴

Reasonable royalty damages can be calculated under either of two methods. The first is the “analytical approach,” under which the infringer’s profit projections relating to the infringing product or process are apportioned between the patentee and infringer.³⁵ The second is the “willing licensor-willing licensee” approach.³⁶ This approach imagines a hypothetical negotiation between the patentee as a willing licensor and a willing licensee.³⁷ Damages under the two methods of calculation may be substantially higher

²⁹ SKENYON ET AL., *supra* note 26, § 1:7 (explaining that recovery under a lost profits theory requires that “the infringement must cause the loss and that the loss must have been reasonably foreseeable”).

³⁰ 35 U.S.C. § 284.

³¹ SKENYON ET AL., *supra* note 26, § 1:12.

³² *Id.* §§ 1:7, 1:12.

³³ *Id.* § 1:12.

³⁴ *See, e.g.*, *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895, 898-900 (Fed. Cir. 1986) (affirming that a thirty percent royalty rate was reasonable despite evidence of lower market rates, and remarking that the court could not “pretend that the infringement never happened” in assessing damages); *Deere & Co. v. Int’l Harvester Co.*, 710 F.2d 1551, 1554, 1558 (Fed. Cir. 1983) (approving a fifteen percent royalty despite a prior offer by the patentee of a one percent royalty); SKENYON ET AL., *supra* note 26, § 1:12.

³⁵ SKENYON ET AL., *supra* note 26, § 1:13 (explaining that the “analytical approach” involves “calculating damages based on the infringer’s own internal profit projections for the infringing item at the time the infringement began, and then apportioning the projected profits between the patent owner and the infringer”); *see also* Roger D. Blair & Thomas F. Cotter, *Rethinking Patent Damages*, 10 TEX. INTELL. PROP. L.J. 1, 38-42 (2001) (“[S]ome courts have applied the so-called ‘analytical approach,’ under which defendant’s rate of return on noninfringing merchandise is subtracted from his rate of return on infringing goods; the resulting rate, multiplied by the number of infringing sales, is awarded as a reasonable royalty.”).

³⁶ SKENYON ET AL., *supra* note 26, § 1:13; Blair & Cotter, *supra* note 35, at 39.

³⁷ SKENYON ET AL., *supra* note 26, § 1:13.

than the minimum “reasonable royalty” damages required under the statute.³⁸ Courts may consider a variety of factors when attempting to construct this hypothetical negotiation, in particular the factors outlined in *Georgia-Pacific Corp. v. U.S. Plywood Corp.*³⁹ Among those factors are “[t]he utility and advantages of the patent property over the old modes or devices, if any, that had been used” and “[t]he 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.”⁴⁰

B. *Reform Proposals Before Congress*

The patent reform bills recently passed by the House of Representatives and currently pending before the Senate each include provisions designed to limit patent damage awards.⁴¹ These bills focus on the “entire market value” rule and the apportionment of damages between the claimed invention and the prior art.⁴²

Under the House bill, a court must first determine whether reasonable royalty damages should be apportioned from the value of the prior art, whether the entire market value rule is appropriate, or whether damages should be apportioned according to some other “relevant factors.”⁴³ If a court determines that damages should be apportioned, it would be required to conduct an “analysis” to ensure the royalty rate “is applied only to that economic value properly attributable to the patent’s specific contribution over the prior art.”⁴⁴ A court must exclude “economic value properly attributable to the prior art, and other features or improvements, whether or not themselves patented, that contribute economic value to the infringing product or process.”⁴⁵ If a court determines that “the patent’s specific contribution over the prior art is the predominant basis for market demand for an infringing product or process,” then damages may be based on “the entire market value of the products or

³⁸ *Id.* (“Indeed, the Federal Circuit has routinely affirmed ‘reasonable royalty’ awards that are obviously well in excess of what the parties would have actually agreed to as a result of licensing negotiations prior to infringement.”).

³⁹ 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified on other grounds*, 446 F.2d 295 (2d Cir. 1971), *cert. denied*, 404 U.S. 870 (1971); *see* Parental Guide of Tex., Inc. v. Thomson, Inc., 446 F.3d 1265, 1270 (Fed. Cir. 2006) (calculating the “reasonable royalty” rate under 35 U.S.C. § 284 (2000) by evaluating the *Georgia-Pacific* factors).

⁴⁰ *Georgia-Pacific*, 318 F. Supp. at 1120.

⁴¹ Patent Reform Act of 2008, S. 1145, 110th Cong. § 4 (2008); Patent Reform Act of 2007, H.R. 1908, 110th Cong. § 5 (2007).

⁴² S. 1145, § 4; H.R. 1908, § 5.

⁴³ H.R. 1908, § 5.

⁴⁴ *Id.* § 5(2).

⁴⁵ *Id.*

processes involved that satisfy that demand.”⁴⁶ If a court determines neither apportionment nor an entire market value award is appropriate, it may direct the jury to consider evidence of prior nonexclusive licensing or of “any other relevant factors under applicable law.”⁴⁷

Similarly under the Senate version, a court would determine whether the jury should calculate the reasonable royalty according to the entire market value rule, according to existing non-exclusive license terms for the same or substitute products or methods, or according to apportionment against the prior art.⁴⁸ If a court determines apportionment is appropriate, then the court would require the jury to apply the royalty “only to the portion of the economic value of the infringing product or process properly attributable to the claimed invention’s specific contribution over the prior art.”⁴⁹

Many large manufacturing, computer and information technology, and financial services companies support the damages reform proposals.⁵⁰ These industries are concerned about the negotiating leverage afforded to patentees by the potential for large patent infringement damage awards.⁵¹ For example, Palm, Inc.’s Senior Vice President and General Counsel Mary Doyle testified before the Senate Judiciary Committee that “patent aggregators” increase the cost and complexity of evaluating patent claims by demanding settlements based on the “thwack” factor: “the sound a large stack of patents makes when it hits the negotiating table.”⁵² According to Doyle, the threat of damages based on the full value of a product such as a Palm personal digital assistant

⁴⁶ *Id.* § 5(3).

⁴⁷ *Id.* § 5(4).

⁴⁸ Patent Reform Act of 2008, S. 1145, 110th Cong. § 4(c)(1)(A)-(C) (2008).

⁴⁹ *Id.* § 4(c)(1)(C). Compromise language recently proposed by The Coalition for 21st Century Patent Reform states: “If significant features or improvements independent of the invention added by the infringer contribute separate economic value to the infringing product or process, the award may be based on the economic value of the infringer’s use of the invention excluding the economic value of such features and improvements.” THE COAL. FOR 21ST CENTURY PATENT REFORM, PATENT DAMAGES: A PROPOSED COMPROMISE 6 (2008), http://www.patentsmatter.com/issue/leg_proposals/Coalition%20Damages%20Proposal.pdf.

⁵⁰ See *Patent Reform: The Future of American Innovation: Hearing on S. 1145 Before the S. Comm. on the Judiciary*, 110th Cong. 246-63 (2007) [hereinafter *Hearings*] (statement of Mary E. Doyle, Senior Vice-President and General Counsel, Palm, Inc.) (expressing support for the patent reform proposals on behalf of Palm, Inc. and the Coalition for Patent Fairness), available at http://judiciary.senate.gov/hearings/testimony.cfm?id=2803&wit_id=6507; The Coalition for 21st Century Patent Reform, About Us, <http://www.patentsmatter.com/about/coalition.php> (last visited Apr. 29, 2008) (listing companies in support of the patent reform proposals).

⁵¹ See *Hearings*, *supra* note 50, at 263 (testimony of Mary E. Doyle, Senior Vice-President and General Counsel, Palm, Inc.).

⁵² *Id.* at 252.

that includes a relatively minor patented component results in unnecessary transaction costs and over-valued licenses.⁵³

Opposition to the damages reform proposals comes from many small and mid-size technology companies, particularly those that manufacture and sell components that are incorporated into end-user products by other manufacturers, and from academic research institutions, labor unions, the pharmaceutical and biotechnology industries, and the American Bar Association's Section on Intellectual Property Law.⁵⁴ These groups believe mandatory damages apportionment would improperly limit the flexibility of trial courts to craft appropriate remedies, "would often make infringement cheaper,"⁵⁵ and would "encourage free-riders and even existing licensees to

⁵³ *Id.* at 253 (stating that licensing entities perceive "this gaming behavior . . . as entirely rational in a world where there are few checks and balances on launching speculative claims, demanding high ransom settlements, or threatening legal actions in preferred jurisdictions where it is difficult if not impossible to predict the measure of damages that will be applied").

⁵⁴ *See, e.g., Hearings, supra* note 50, at 202 (testimony of Bruce G. Bernstein, Chief Intellectual Property and Licensing Officer, InterDigital Communications Corp.) (observing that the information technology industry's support for mandatory damages apportionment "appears primarily limited to large, incumbent manufacturers that are opportunistically using the phrase patent 'reform' to justify legislation that would reduce their litigation costs and liability when they infringe third party patent rights"), *available at* http://judiciary.senate.gov/hearings/testimony.cfm?id=2803&wit_id=6509; Chris Frates, *Patent Reform Tackled Before Hitting the Floor*, POLITICO, Apr. 23, 2008, <http://www.politico.com/news/stories/0408/9804.html> (observing opposition to the patent reform bills from a variety of industries, labor groups, and academic institutions); Letter from the Am. Bar Ass'n Section of Intellectual Prop. Law to Senators Patrick Leahy and Arlen Specter (Sept. 20, 2007), <http://www.innovationalliance.net/files/ABA-Opposing%20Patent%20Reform.pdf> (expressing the opposition of the Section of Intellectual Property Law of the American Bar Association to the patent reform bills); Letter from Am. Fed'n of Labor and Cong. of Indus. Orgs. to Representatives John Conyers and Lamar Smith (July 24, 2007), <http://www.innovationalliance.net/files/AFL-CIOletter.pdf> (expressing opposition to the damage apportionment provisions of the House patent reform bill); Press Release, Biotech. Indus. Org., BIO Expresses Concern with Patent Reform Legislation as Reported Out of the House (July 19, 2007), http://bio.org/news/pressreleases/newsitem.asp?id=2007_0719_01 (expressing BIO's opposition to the damages provisions of the House patent reform bill); Letter from the Innovation Alliance to Senators Harry Reid and Mitch McConnell (Oct. 23, 2007), *letter available at* http://www.innovationalliance.net/files/G-430_Senate_Letter.pdf, and *updated list of signatories available at* <http://www.innovationalliance.net/files/Opposing%20Patent%20Reform%20Signatories%202-26-08.pdf>; Press Release, Innovation Alliance, More than 1000 Organizations from All 50 States Have Expressed Opposition to Current Patent Reform Act (Mar. 26, 2008), <http://www.innovationalliance.net/mediacenter/news/more-1000-organizations-all-50-states-have-expressed-opposition-current-patent-ref>.

⁵⁵ Press Release, Biotech. Indus. Org., *supra* note 54.

risk litigation rather than pay, or continue paying, a market-negotiated licensing fee.”⁵⁶ The Bush Administration agreed with these groups that the damages reform proposals “may have the unintended consequence of reducing the rewards of innovation and encouraging patent infringement.”⁵⁷

II. EMPIRICAL REVIEW OF PAST DAMAGE APPORTIONMENT CASES

The patent damages reform debate has mostly focused on fundamentally empirical issues.⁵⁸ Reform advocates argue that runaway verdicts have increasingly tilted the balance of power in favor of patent holders.⁵⁹ This Part presents an empirical review of damage awards in adjudicated patent cases. Section A presents a survey of several important existing empirical studies on patent damage awards. Section B presents an original analysis of data from the Administrative Office of the Courts (“AOC”).

The literature review and independent study presented below suggest the patent damages reform question is empirically under-determined. The studies that have been conducted to date, as well as the original study presented here, are inconclusive concerning whether damages in patent cases are becoming systematically excessive or whether, instead, a few highly unusual awards have skewed the data and the public debate. Moreover, our study, which is the first to examine statistical correlations between the size of damage awards, whether the award was for lost profits or a reasonable royalty, and apportionment, found no statistically significant correlations. In other words, the distribution of awards appears to be stochastic, as we might expect if courts are deciding cases individually on the merits. Following this discussion on the empirical literature, we will argue that the patent damages debate is really one of the

⁵⁶ *Hearings, supra* note 50, at 203 (testimony of Bruce G Bernstein, Chief Intellectual Property and Licensing Officer, InterDigital Communications Corp.).

⁵⁷ Letter from Nathaniel F. Wienecke, Assistant Sec’y for Legislative and Intergovernmental Affairs, U.S. Dep’t of Commerce, to Senator Patrick J. Leahy (Feb. 4, 2008), <http://www.ogc.doc.gov/ogc/legreg/letters/110/S1145020408.pdf>.

⁵⁸ See, e.g., NAT’L ACADS. OF SCI., A PATENT SYSTEM FOR THE 21ST CENTURY 1 (Stephen A. Merrill et al. eds., 2004) (empirically evaluating the performance of the U.S. patent system, and concluding the system “does not require fundamental changes,” but “economic and legal changes are putting new strains on the system”); Coalition for Patent Fairness, Protecting Consumers and the Economy, http://www.patentfairness.org/case_for_reform/protecting_consumers_and_economy.cfm (last visited Aug. 5, 2008) (citing empirical evidence to illustrate problems with the current patent system); PRICEWATERHOUSECOOPERS, ARON LEVKO, VINCENT TORRES & JOSEPH TEELUCKSINGH, A CLOSER LOOK 2008 PATENT LITIGATION STUDY: DAMAGES, AWARDS, SUCCESS RATES AND TIME-TO-TRIAL (2008), <http://www.pwc.com/extweb/pwcpublishations.nsf/docid/ebc144cf6220c1e785257424005f9a2b> [hereinafter PWC, PATENT LITIGATION STUDY] (analyzing patent damage awards from 1995 to 2007).

⁵⁹ See, e.g., Coalition for Patent Fairness, Protecting Consumers and the Economy, *supra* note 58.

front lines in a broader ideological and theoretical debate about the fundamental nature of the patent grant.

A. *Previous Empirical Studies*

This Section describes existing empirical studies of damages in patent cases. Such studies can help frame the debate over whether patent damage reform is necessary and, if so, what sorts of reform might be appropriate. As discussed below, however, each of the existing studies is limited in data, scope, and methodology. Following the discussion of the strengths and weaknesses of existing studies, we present an original empirical study that provides additional context to the discussion.

1. Kimberly Moore 1983-1999 AOC Data

In a 2000 study, Kimberly Moore analyzed the AOC data on patent cases that were tried from 1983 to 1999.⁶⁰ The primary purpose of her study was to assess differences between judge and jury verdicts.⁶¹ Of particular relevance to this Article, Moore found that damages were awarded in 501 of the cases – approximately 41% of all the cases tried to verdict – which represents only about 2% of all the roughly 23,000 patent cases terminated during the study period.⁶² The mean award was approximately \$6.5 million in cases tried by juries and \$4.4 million in cases tried by the court; the medians were approximately \$1.1 million and \$531,000 respectively.⁶³ A large standard deviation suggested the presence of outliers, and in fact more than 40% of the awards in both judge and jury trials were in the range of \$0 to \$500,000.⁶⁴ Moore did not address whether the awards were based on lost profits or reasonable royalties.

2. PriceWaterhouseCoopers

The accounting and consulting firm PriceWaterhouseCoopers (“PWC”) conducted a study of patent damage awards from 1980 through 2007 and success rates of patent cases from 1995 through 2007.⁶⁵ Data for the PWC Study were drawn from Westlaw intellectual property and jury verdict

⁶⁰ Kimberly A. Moore, *Judges, Juries, and Patent Cases – An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 380 (2000). Professor (now Judge) Moore indicated the AOC data showed 1411 cases reached trial, with 1209 verdicts split between 533 jury trials and 676 bench trials. *Id.*

⁶¹ *Id.* at 366-67.

⁶² *Id.* at 394-95; see *id.* at 384-85 tbl.1 for the total number of cases terminated.

⁶³ *Id.* at 395 n.21.

⁶⁴ *Id.* at 395 fig.6.

⁶⁵ See PWC, PATENT LITIGATION STUDY, *supra* note 58, at 1.

databases.⁶⁶ The PWC Study concludes that “[w]ith trial success rates at their highest level in history, patent holders appear to be winning with considerable awards of damages.”⁶⁷

It is interesting to break down the data PWC uses to support this statement. According to the PWC Study, patent holders succeeded in proving liability, either through summary judgment or at trial, in 37% of all cases.⁶⁸ The average success rate from 1995 to 2000 was 32%.⁶⁹ The average rate from 2001 to 2007 was 40%.⁷⁰ This is a minor difference given the total sample included only 1282 patent-holder-success cases over the entire period.⁷¹

Success rates at trial appear to have grown significantly, with an average success rate of 47% from 1995 to 2000 and a 63% average from 2001 to 2007.⁷² The PWC Study suggests this increase is related to an increase in the total number of jury trials compared to the total number of bench trials.⁷³ However, the PWC Study offers no regression or other analysis to demonstrate statistical correlation.

The PWC Study also notes the “stark contrasts” in trial success rates between bench and jury trials, with a higher likelihood of success in the latter.⁷⁴ Again, however, the PWC Study offers no context for the percentages given. For example, in 1997 the PWC Study shows a 100% success rate for jury trials compared to less than 50% for bench trials.⁷⁵ However, according to PWC’s data, only about 15% of the patent cases tried in 1997 were jury trials.⁷⁶ This represents only a handful of jury trials during that year; one jury trial loss would have changed the relative percentages dramatically.

Similar problems plague the PWC Study’s analysis of damage awards. For example, the study states that “[r]ecent awards by juries have been running several multiples of the amounts awarded by judges.”⁷⁷ It appears, however, that the small number of jury verdicts may have produced some outlier numbers. For example, the PWC Study lists nine high-profile patent damage

⁶⁶ See *id.* at 19 (stating that data for the study were drawn from “two WestLaw databases, Federal Intellectual Property – Cases (FIP-CS) and Combined Jury Verdicts and Settlements (JV-ALL)”).

⁶⁷ *Id.* at 18.

⁶⁸ *Id.* at 8.

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² *Id.* at 9.

⁷³ *Id.* at 5-6 (“Jury success rates have consistently outperformed their bench counterparts for every year since 1995 . . .”).

⁷⁴ *Id.* at 5.

⁷⁵ *Id.* at 5 chart 3C.

⁷⁶ *Id.* at 5 chart 3B.

⁷⁷ *Id.* at 6.

verdicts of \$100 million or more from 2005 to 2007.⁷⁸ These awards far exceed the average median damage award of approximately \$3.8 million for the 1995 to 2007 period.⁷⁹

The PWC Study offers these “landmark” awards as cause for serious concern about the patent system.⁸⁰ Undoubtedly, even the remote probability of a \$100 million-plus verdict will make anyone think carefully about intellectual property. Examining the details of the nine landmark damages cases listed in the PWC Study, however, reveals a much more complex picture than usually surfaces in debates over patent damages reform. None of these nine cases involved patent trolls. In fact, most of the cases were extraordinarily complex, long-running disputes by fierce market competitors involving multiple patents and other claims.

For example, the \$133 million patent verdict in favor of Rambus, Inc. against rival memory and chipmaker Hynix, Inc. was part of a corporate war that involved fifty-nine claims from fourteen Rambus patents as well as antitrust and other claims.⁸¹ Similarly, the dispute between Advanced Medical Optics and Alcon ended with a \$121 million settlement resolving four pending patent infringement cases brought by Advanced Medical against Alcon, a leading competitor in the medical device and pharmaceutical products industries relating to eye care.⁸² Notably, the Federal Circuit upheld the damage award against Alcon’s argument that the award violated the entire market value rule.⁸³ The Federal Circuit found that the patents covered “elements found throughout the [infringing] devices,” such that the value of the patents could not be functionally separated from the value of the finished devices.⁸⁴ In addition, the Federal Circuit upheld the jury’s finding of willful

⁷⁸ *Id.* at 3.

⁷⁹ *Id.* at 2 (“The median was \$3.9 million from 1995 through 2000, and \$3.8 million from 2001 through 2007.”).

⁸⁰ *See id.* at 3.

⁸¹ *See* OUT-LAW.com, *Jury Orders Hynix to Pay Rambus \$306.5 Million*, Apr. 25, 2006, <http://out-law.com/default.aspx?page=6866> (describing a jury award of \$306.5 million for Rambus in a month-long patent infringement trial against rival Hynix). For information about Hynix and Rambus, see Hynix, <http://www.hynix.com> (last visited Dec. 9, 2008); Rambus – Leaders in High-Performance Memory Solutions, <http://www.rambus.com/us/> (last visited Dec. 9, 2008).

⁸² Press Release, Advanced Medical Optics, Advanced Medical Optics Announces Settlement With Alcon of Patent Infringement Suits (July 10, 2006), available at <http://phx.corporateir.net/phoenix.zhtml?c=131956&p=irolnewsArticle&ID=880435&highlight>.

⁸³ *Advanced Med. Optics, Inc. v. Alcon Labs., Inc.*, No. Civ.A. 03-1095-KAJ, 2005 WL 3454283, at *12 (D. Del. Dec. 16, 2005). For further discussion of the entire market value rule, see *infra* Part III.

⁸⁴ *Advanced Med. Optics*, 2005 WL 3454283 at *8. The Federal Circuit also upheld the jury’s award of lost profits and enhanced damages. *Id.* at *8-9 (finding the current case to be exceptional and thus appropriate for treble damages and attorneys’ fees).

infringement based on evidence that Alcon directly copied its design from examples of machines manufactured by Advanced Medical – in other words, that Alcon reverse engineered the machines without regard for Advanced Medical’s patent rights.⁸⁵ The parties eventually settled the dispute in a package deal for a lump-sum payment by Alcon of \$121 million.⁸⁶

In some of the landmark damages cases in the PWC Study, the post-trial and appellate processes changed the result. The largest and most discussed award, a \$1.5 billion jury verdict against Microsoft in favor of Alcatel-Lucent on a patent relating to MP3 audio technology, was overturned by the trial court on post-trial motions.⁸⁷ The court found the entire market value rule was improperly applied to permit royalties on the sale of entire computers rather than only on the patented software, and the royalty rate assessed by the jury lacked an adequate evidentiary foundation.⁸⁸

Likewise, in *Verizon Services Corp. v. Vonage Holdings Corp.*,⁸⁹ the Federal Circuit vacated the judgment of infringement with respect to one of the three patents in suit based on an erroneous claim construction, and vacated the damage award entirely because the jury failed to allocate the award among the three different patents.⁹⁰ The Federal Circuit also vacated the finding of infringement, and therefore the \$115 million damage award, in *Finisar Corp. v. DirecTV Group, Inc.*⁹¹ Thus, three out of the six \$100 million-plus damage awards from 2005 to 2007 involving the computer and telecommunications

⁸⁵ *Id.* at *9.

⁸⁶ See *Advanced Medical Optics Settles Patent Infringement Suits with Alcon*, NEWS-MEDICAL.NET, July 10, 2006, <http://www.news-medical.net/?id=18777>. In contrast, the *DePuy Spine v. Medtronic* verdict involved only a single patent. See *DePuy Spine, Inc. v. Medtronic Sofamar Danek, Inc.*, 469 F.3d 1005, 1026 (Fed. Cir. 2006) (affirming in part and reversing in part the district court’s rulings regarding infringement of DePuy’s patent). The defendant did not, however, appeal the amount of the lost profits award, which suggests there were no substantive problems with the manner in which that amount was calculated. The only issue on appeal relating to damages was whether the plaintiff was an exclusive licensee entitled to damages under a license agreement with the patentee. *Id.* at 1024. The Federal Circuit upheld the trial court’s ruling on this point. *Id.* at 1026.

⁸⁷ See *Lucent Techs. Inc. v. Gateway, Inc.*, 509 F. Supp. 2d 912, 942-43 (S.D. Cal. 2007), *aff’d*, Nos. 2007-1546, 2007-1580, 2008 WL 4349236 (Fed. Cir. Sept. 5, 2008).

⁸⁸ *Id.* at 935-40 (stating that a major problem in applying the entire market rule is failure to establish a link between the cost of computers and the value of the patented technology). The ruling was recently affirmed by the Federal Circuit. *Lucent Techs., Inc.*, 2008 WL 4349236 at *12.

⁸⁹ 503 F.3d 1295 (Fed. Cir. 2007).

⁹⁰ *Id.* at 1305-11.

⁹¹ *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1326 (Fed. Cir. 2008) (“Because the district court incorrectly construed a vital term featured prominently in each asserted claim, this court vacates the verdict of infringement.”).

industries were overturned.⁹² This additional information is missing from the PWC Study, which raises serious questions about the study's value for policy analysis.

3. Lemley and Shapiro

Mark Lemley and Carl Shapiro analyzed cases reported by Westlaw from 1982 through mid-2005 in which courts awarded a reasonable royalty to the patentee.⁹³ They identified only fifty-eight such cases over that twenty-three year period.⁹⁴ Curiously, they noted that cases in which courts award lost profits are more prevalent than reasonable royalty cases, while the PWC Study concluded the opposite.⁹⁵

The core empirical finding of the Lemley-Shapiro study is that the mean reasonable royalty rate for their sample was just over 13% of the price of the infringing product.⁹⁶ As the authors note, “[t]his number will strike many patent lawyers as surprisingly high” because market royalty rates, and even rates negotiated as part of settlement agreements, are typically much lower.⁹⁷

⁹² The other three computer and telecommunications cases were upheld by the Federal Circuit or settled. *See* *Z4 Techs., Inc. v. Microsoft Corp.*, 507 F.3d 1340, 1356 (Fed. Cir. 2007) (affirming the verdict); *Freedom Wireless, Inc. v. Boston Commc'ns Group, Inc.*, No. 2006-1020, 2006 WL 2883135, at *1 (Fed. Cir. 2006) (granting a motion to remand due to settlement); *Advanced Medical Optics Settles*, *supra* note 86.

⁹³ Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2030 (2007).

⁹⁴ *Id.*

⁹⁵ *Compare id.* (“[I]n those cases that do result in a damages award, the damages award is frequently based on lost profits rather than a reasonable royalty . . .”), *with* PWC, PATENT LITIGATION STUDY, *supra* note 58, at 7 (“[R]easonable royalties have overtaken lost profits as the most frequent basis of damages awards in patent cases.”). Lemley and Shapiro suggest:

[L]ost-profits cases are overrepresented in the subset of cases that actually go to trial, because those cases involve a patent owner seeking to exclude a competitor from the market, a type of case that is significantly less likely to settle than cases in which a patentee seeks only a royalty.

Lemley & Shapiro, *supra* note 93, at 2030. The PWC Study shows that lost profit damages were awarded more frequently than a reasonable royalty in the 1980s and 1990s, but that this mix shifted significantly in the 2000s. PWC, PATENT LITIGATION STUDY, *supra* note 58, at 7 (showing a rise in reasonable royalty cases from 45% in the 1990s to 56% in the 2000s). The PWC Study suggests this shift has occurred because proving lost profits is more difficult and complex, because some patent holders might not want to disclose proprietary profit data, and because infringement suits are increasingly brought by entities that own patent rights without selling any goods or services. *Id.* at 7-8. Thus, the PWC Study suggests, without saying so explicitly, that “patent trolls” account for some of the apparent shift towards reasonable royalty damages.

⁹⁶ Lemley & Shapiro, *supra* note 93, at 2032.

⁹⁷ *Id.* at 2032-33.

One important reason Lemley and Shapiro offer for this disparity in royalty rates is the “probabilistic nature of patent rights.”⁹⁸ The boundaries of a patent right are fuzzy prior to a court’s determination of issues such as claim construction, non-obviousness, and the range of equivalents.⁹⁹ The parties to a license negotiation must take this uncertainty into account when valuing the royalty rate. Furthermore, cases litigated to verdict likely involve a greater monetary stake than a garden-variety license.¹⁰⁰

Lemley and Shapiro suggest the most significant contributions to the disparity in royalty rates are the problems of holdup and royalty stacking.¹⁰¹ The holdup problem results from the threat of injunctive relief when a complex product requires rights to many different upstream patents.¹⁰² Under these circumstances, a single upstream patent owner can hold up the process of clearing all the necessary rights by demanding an unreasonably high royalty.¹⁰³ The downstream firm is faced with a dilemma: either pay the extortionate royalty, undertake the expense of redesigning the product to eliminate the holdout’s component, or run the risk of an injunction barring the sale of the entire product that incorporates the patented component.¹⁰⁴ In addition to a game theoretic model of this dynamic, the authors provide some anecdotal examples of how this happens in practice, particularly “in the industries in which so-called patent trolls predominate” such as computers and telecommunications.¹⁰⁵

Royalty stacking refers to the circumstance in which “multiple patents read on a single product, so that the downstream firm must deal with the stacking of royalties paid to two or more patent holders.”¹⁰⁶ This situation leads to the “patent thicket” or “anticommons” problems sometimes associated with industries in which downstream products depend on many small upstream

⁹⁸ *Id.* at 2033.

⁹⁹ *See id.* (citing Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, J. ECON. PERSP., Spring 2005, at 75, 95 (“The actual scope of a patent right, and even whether the right will withstand litigation at all, are uncertain and contingent questions.”)).

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² *Id.* at 1994-95.

¹⁰³ *Id.* (“Each patent holder’s threat to obtain an injunction is fundamental to licensing negotiations in these settings.”).

¹⁰⁴ *Id.* at 1996.

¹⁰⁵ *Id.* at 1995-2010. Lemley and Shapiro observe that the Federal Circuit considers this dynamic an appropriate adjunct to the right to exclude under the patent law, a conclusion with which they “respectfully but vigorously disagree.” *Id.* at 2010 (quoting *MercExchange, L.L.C. v. eBay, Inc.*, 401 F.3d 1323, 1339 (Fed. Cir. 2005), *vacated*, 547 U.S. 388 (2006) (“The Federal Circuit has concluded that this ‘additional leverage in licensing’ is ‘a natural consequence of the right to exclude and not an inappropriate reward’ to a patentee.”)).

¹⁰⁶ *Id.*

components or bits of basic research, such as semiconductors and biotechnology.¹⁰⁷ Among other distortions, royalty stacking can produce a Cournot-complements effect, in which the above-marginal-cost pricing of each patent holder in the upstream chain produces downstream externalities that increase the price and reduce the output of the finished product.¹⁰⁸ The aggregate deadweight loss in this circumstance can be greater than that imposed by a vertically-integrated monopolist.¹⁰⁹ Lemley and Shapiro acknowledge that cross licenses, patent pools, and reciprocal infringement threats can mitigate stacking problems, but they suggest patent trolls will not engage in these strategies.¹¹⁰

Lemley and Shapiro cautiously conclude from their empirical and theoretical analysis that existing rules about injunctions and reasonable royalties in patent cases do not sufficiently mitigate the effects of holdups and royalty stacking, particularly in the electronics industry.¹¹¹ They suggest that trial courts should be reluctant to grant injunctions when the patent in suit is only one component of a complex product.¹¹² They further suggest that in holdup cases, courts should hesitate to grant injunctions when the cost to design around the patented component is high, or should stay enforcement of injunctive relief in order to give the defendant time to design around the patent.¹¹³ Finally, they argue that in assessing reasonable royalties, courts should consider the cost of acquiring design-around alternatives as a proxy for royalties rather than the price and margin on the entire product, and they endorse the congressional damages reform proposals, which would make this sort of analysis an explicit requirement.¹¹⁴

¹⁰⁷ *Id.* Lemley and Shapiro briefly discuss some of the conflicting empirical data on whether patents in the semiconductor and biotechnology industries do in fact produce an anticommons effect. *See id.* at 2010 n.40. For a review of studies finding no anticommons effect in biotechnology, see Yann Joly, *Open Source Approaches in Biotechnology: Utopia Revisited*, 59 ME. L. REV. 385, 394-98 (2007).

¹⁰⁸ Lemley & Shapiro, *supra* note 93, at 2013-14.

¹⁰⁹ *Id.* (“[I]f multiple input owners each control an essential input and separately set their input prices, output is depressed even below the level that would be set by a vertically integrated monopolist.”).

¹¹⁰ *Id.* at 2015.

¹¹¹ *Id.* at 2034-35.

¹¹² *Id.* at 2036-37.

¹¹³ *Id.* at 2037-38.

¹¹⁴ *Id.* at 2039-40. One weakness of the Lemley-Shapiro study is that it only includes cases in which the court authored an opinion that is available on Westlaw. *Id.* at 2030. The authors acknowledge this limitation and recognize that only using those cases with opinions creates a bias by ignoring jury verdicts. *Id.* at 2031.

B. *An Original Study of Data from the Administrative Office of the Courts*

This Section reports the results of an original empirical study of patent damages.¹¹⁵ We obtained the Administrative Office of the Courts' data files for all civil cases decided from 2002 through 2007.¹¹⁶ We extracted from these files all cases listed as "Patent" actions. From this set, we extracted all cases that were terminated by a judgment in favor of the plaintiff after trial. Finally, we generated a random sample of cases from this set using statistical analysis software.¹¹⁷

We supplemented the AOC data by reviewing court documents obtained via the Federal Judiciary's PACER system and, in some instances, by contacting lawyers involved in the cases.¹¹⁸ Some cases were removed from our sample because we could not locate complete data, the cause of action on which judgment was rendered was something other than a patent claim, or the judgment was one of non-infringement and/or invalidity in favor of a potential infringer seeking declaratory relief.

This study provides a useful supplement to existing studies because the AOC data appears to be more comprehensive than what is available through commercial services such as Westlaw. In addition, as discussed below, we tested for correlations with different variables, such as the award size, the field of art, and the type of remedy.

One possible weakness in our data is that we extracted only cases that were tried to a verdict, and not cases that were decided on dispositive motions or settled before trial. Concerning dispositive motions, our intent here is to study the argument that runaway verdicts in patent cases are tipping the balance too far in favor of patentees. With regard to settlements, the AOC data does not permit any meaningful evaluation of the amount of or basis for most settlements. Moreover, the purpose is to evaluate the arguments being made about the nature of verdicts in cases that go to trial.¹¹⁹

¹¹⁵ The author particularly acknowledges in this Section the work of his research assistants, Adrienne Eisen and Anastasia Newell, in collecting and coding the data set. An Appendix containing statistical data and analysis for this study is available at <http://www.lawsciencetech.com/patentdamages/patentdamagesreform.html>.

¹¹⁶ These files are available through the Inter-University Consortium for Political and Social Research. See Federal Court Cases: Integrated Database Series, <http://www.icpsr.umich.edu/cocoon/ICPSR/SERIES/00072.xml> (last visited Aug. 5, 2008) ("The purpose of this data collection is to provide an official public record of the business of the federal courts. The data originate from 100 court offices throughout the United States.").

¹¹⁷ I used the Stata 10 SE package. See Stata: Data Analysis and Statistical Software, <http://www.stata.com> (last visited June 21, 2008).

¹¹⁸ See PACER Service Center Home Page, <http://pacer.psc.uscourts.gov/> (last visited June 21, 2008).

¹¹⁹ Another possible weakness is that some cases that are primarily about patent infringement could be classified in the AOC records under a different heading, either

1. Descriptive Statistics

The mean and median damage awards in the sample are set forth in Table 1 below:

Table 1
Summary Statistics: Amount of Total Damage Award (in Dollars)

Mean	4,338,790
Median	759,709
Standard Deviation	9,836,058
Percentiles	
1%	3000
5%	5000
10%	12,965
25%	46,020
50%	759,709
75%	4,200,000
90%	11,198,172
95%	19,185,199
99%	54,106,066
Skewness	3.97

As the percentile figures, very large standard deviation, and skewness coefficient make clear, the range of awards varied widely. This alone suggests a lack of any pattern in the awards.

Reasonable royalty served as the sole basis for award in 20% of the cases; also in 20% of the cases, the verdict included both reasonable royalties and lost profits, sometimes because more than one patent was infringed.¹²⁰ None of the cases involved conveyed sales.

It is interesting to juxtapose the type of award against the lowest and highest percentile statistics for the amount of award:

inadvertently or because the patent claims are mixed with contract, tort, or other kinds of claims. There is no meaningful way to locate such cases or to control for this problem.

¹²⁰ In one case, the basis for the award was unclear.

Table 2
Percentiles Compared to Amount of Award, Field of Art and Type of Remedy

Percentile	Amount of Award	Field of Art	Type of Remedy
1%	3000	Mechanics	Lost Profits and Reasonable Royalty
5%	5000	Mechanics	Lost Profits
10%	12,965	Computer-Related	Reasonable Royalty
25%	46,020	Chemistry	Reasonable Royalty
50%	759,709	Medical Device	Reasonable Royalty
75%	4,200,000	Energy-related	Lost Profits
90%	11,198,172	Mechanics	Reasonable Royalty
95%	19,185,199	Computer-related	Lost Profits
99%	54,106,066	Pharmaceutical	Lost Profits and Reasonable Royalty

The fact that the lowest percentiles of awards are dominated by the “Mechanics” arts, while the highest are in “Computer-related” and “Pharmaceutical” arts, seems to confirm that the computer and pharmaceutical industries are likely to be significantly impacted by any damages reform. However, a “Mechanics” patent also fell within the top percentile range, and the regression analysis presented below does not seem to support any strong conclusions about correlation.

Our sample’s mean damage award is significantly lower than that reported in both the Kimberly Moore and PWC studies. This may be an artifact of the relatively small universe of patent cases that are tried to verdict and the relative rarity of very large awards. A few outlying results, such as the \$1.5 billion Microsoft verdict reported in the PWC Study,¹²¹ can dramatically alter the descriptive statistics.

2. Statistical Comparisons

We tested for correlations between the size of the award and the field of art, and between the size of the award and the type of remedy. Our findings were as follows:

¹²¹ See *supra* Part II.A.2.

Table 3
Correlation Between Size of Award and Field of Art

Size of Award	Coefficient of Determination (r^2)	p -value
Any	.13	.03
\$500 thousand or over	.36	.27
\$1 million or over	.54	.009
\$10 million or over	.63	.20

Size of Award	Correlation with Field of Art
Any	Some correlation ($r=.13$)
\$500 thousand or over	Possibly significant correlation ($r=0.36$)
\$1 million or over	Possibly significant correlation ($r=0.54$)
\$10 million or over	Possibly significant correlation ($r=0.63$)

Table 4
Correlation Between Size of Award and Type of Remedy

Size of Award	Coefficient of Determination (r^2)	p -value
Any	.05	.17
\$500 thousand or over	.12	.50
\$1 million or over	.01	.73
\$10 million or over	.52	.27

Table 5
Correlation Between Type of Remedy and Field of Art

Size of Award	Coefficient of Determination (r^2)	p -value
Any	.06	.13
\$500 thousand or over	.27	.36
\$1 million or over	.02	.63
\$10 million or over	.13	.63

When all sizes of awards are included, the correlation coefficients are very low in each of these comparisons.¹²² There are some interesting correlations at some of the higher award levels, in particular the .63 coefficient for awards of \$10 million or more and field of art, and the .52 coefficient for awards of \$10 million or more and type of remedy. It is difficult to draw any conclusions about causation from these data, however, because the sample size for cases in the \$10 million or more range is very small.

In short, both our descriptive statistics and the regression analyses run on our sample reveal no overriding patterns to the awards, except for some varying degrees of correlation between the size of award and the field of art or type of remedy. This further suggests that damage awards are based on the unique facts of each case rather than some systemic bias.

This empirical analysis does not necessarily demonstrate that Lemley and Shapiro's game theoretic models of holdup and royalty stacking problems are misplaced. It may be that patentees in some industries are able to engage in this sort of strategic behavior because of a mistaken *perception* that damage awards in patent cases are out of control. In addition, the prospect of high litigation costs alone may dictate the choice of accepting a relatively costly license rather than challenging the patentee.¹²³ Finally, even a remote probability of falling on the wrong side of an outlier verdict might be enough to compel agreement to an above-market license.

Contrary to the thrust of the congressional reform proposals, our analysis suggests that the manner in which courts calculate reasonable royalty rates does not fundamentally cause any holdup and royalty stacking problems. In fact, it seems that some facially shocking but mostly innocuous data are being used as the point of a much longer spear, which aims to redefine what kind of right a "patent" represents. This weapon has been launched by major players in industries, such as personal computers and PC operating systems, in which patents benefit upstarts against the established market leaders.¹²⁴ Not

¹²² The "coefficient of determination (r^2)" value measures the proportion of variation in the dependent variable that is explained by the independent variable in the regression model. See DAVID LEVINE, ET AL., STATISTICS FOR MANAGERS USING MICROSOFT EXCEL 525 (4th ed. 2005). In Table 3, for example, the R^2 coefficient of .13 in the category "Any" indicates that 13% of the variability in the size of the award can be explained by differences in the field of art. *Id.* The "*p*-value" refers to the probability that any linear relationship described by the R^2 value is significant. *Id.* A *p*-value of 0.05 is often used as a measure of significance. *Id.* at 540-41. The full reports of each regression analysis, along with component-plus-residual plots, are reproduced in the Statistical Appendix located at <http://www.lawsciencetech.com/patentdamages/patentdamagesreform.html>.

¹²³ As discussed *infra* Part III.B.2, the Supreme Court may have significantly altered this calculus in a recent case involving declaratory judgment actions.

¹²⁴ As discussed *supra* Part I, the damage reform proposals are supported by technology and computer companies such as Microsoft, for which patents are a relatively insignificant form of intellectual property protection, but are opposed by major players in patent-dependent industries, such as pharmaceuticals.

surprisingly, the reforms are opposed by industries, such as pharmaceuticals, in which patents benefit the established players.¹²⁵

III. PROPERTY OR LIABILITY RULES: JUDICIAL REMEDIES REFORM AND THE NATURE OF PATENTS

This Part summarizes a number of recent decisions that help define the contours of the patent damages debate and that have arguably altered the shape of the patent grant in significant ways. The Sections following will suggest that remedies are serving as a proxy for two interrelated “big” questions: whether patents represent a broad property right or a narrow contractual privilege, and whether patents should be subject to a property or a liability rule. It is primarily these overarching jurisprudential questions, rather than any particular empirical results, that underlie the damage reform efforts.

A. *Convoyed Sales and the Contours of Patent Damages*

The various opinions in the Federal Circuit’s en banc review of *Rite-Hite Corp. v. Kelley Co.*¹²⁶ expose the points at which the damages question intersects the very foundation of patent law. *Rite-Hite* represents a basic dispute over the nature of the patent grant: is a patent a discrete property right in an economic entitlement (Judge Nies),¹²⁷ a right in goodwill protected from appropriation by tort theory (Judge Newman),¹²⁸ or a hybrid of both (Judge Lourie)?¹²⁹

The patent at issue in *Rite-Hite* covered restraints for securing a vehicle to a loading dock.¹³⁰ The trial court found that but for the defendant’s infringement, Rite-Hite would have made additional sales of a kind of restraint not covered by the patent in suit (model ADL-100), and its “dock levelers,” which bridge the gap between a truck and the loading dock.¹³¹

The Federal Circuit affirmed the damage award with respect to the plaintiff’s lost profits on sales of the ADL-100 restraints.¹³² The court rejected the defendant’s argument that damages should be limited to “the intrinsic value of the patent in suit.”¹³³ The “intrinsic value of the patent,” the court explained, “is subsumed in the ‘but for’ analysis; if the patent infringement had

¹²⁵ See *supra* Part I.

¹²⁶ 56 F.3d 1538 (Fed. Cir. 1995).

¹²⁷ Although Judge Nies frames her dissent in terms of property rights, her damage theory would limit the recovery far more sharply than ordinary damages for violation of a property right would allow. See *id.* at 1556 (Nies, J., dissenting in part).

¹²⁸ *Id.* at 1578 (Newman, J., concurring in part and dissenting in part).

¹²⁹ *Id.* at 1542 (majority opinion).

¹³⁰ *Id.*

¹³¹ *Id.* at 1543.

¹³² *Id.* at 1547-49.

¹³³ *Id.* at 1548.

nothing to do with the lost sales, ‘but for’ causation would not have been proven.”¹³⁴ If sales on an unpatented device are lost because of the infringement, and such losses were a reasonably foreseeable consequence of the infringement, the Patent Act’s provision of “adequate compensation” requires that the plaintiff be awarded damages for those lost sales.¹³⁵

The majority took a somewhat different approach concerning the dock levelers that would have been sold with the patented device. When the patentee seeks damages relating to unpatented components sold with a patented product, courts apply the “entire market value” rule to determine whether such damages are recoverable.¹³⁶ Judge Lourie interpreted the entire market value rule to mean that the “unpatented components must function together with the patented component in some manner so as to produce a desired end product or result.”¹³⁷ According to Judge Lourie, the dock levelers were not sufficiently integrated with the fasteners for the entire market value rule to apply.¹³⁸

Judge Newman, in a partial concurrence, agreed with the award of profits for the unpatented ADL-100 restraint, but disagreed with the limitation of entire market value damages on the dock levelers.¹³⁹ She considered the majority’s approach a “half-a-loaf award.”¹⁴⁰ According to Judge Newman, “[t]he purpose of tort damages is to place the wronged party, as closely as possible, in the financial position that it would have occupied but for the wrong.”¹⁴¹ Damages in patent cases are simply a type of general economic damages, and “[a] wrongdoer is, simply put, responsible for the direct, foreseeable consequences of the wrong.”¹⁴² Therefore, the defendant should have been liable for losses on the dock levelers as well as on the ADL-100 restraints.

Judge Nies, in a dissenting opinion, argued that the majority improperly “expanded[ed] the property rights granted by a patent” by awarding lost profits on an unpatented component.¹⁴³ Judge Nies explained that “but-for” causation is distinct from legal or “proximate” cause.¹⁴⁴ According to Judge Nies, Supreme Court precedent prior to the 1946 amendments to the Patent Act

¹³⁴ *Id.*

¹³⁵ *Id.* at 1548-49.

¹³⁶ *Id.* at 1549 (stating that the entire market value rule has been used for determining damages in both reasonable royalty and lost profit cases).

¹³⁷ *Id.* at 1550.

¹³⁸ *Id.* at 1550-51.

¹³⁹ *Id.* at 1578 (Newman, J., concurring in part and dissenting in part).

¹⁴⁰ *Id.*

¹⁴¹ *Id.* at 1579.

¹⁴² *Id.* at 1581-82.

¹⁴³ *Id.* at 1556 (Nies, J., dissenting in part).

¹⁴⁴ *Id.* at 1558-60.

allowed for recovery of lost profits only on sales of the patented article.¹⁴⁵ This limitation, which effectively delimits the scope of proximate cause for recovery of patent damages, “protects the only property rights of a patentee which are protectable, namely those granted by the patent.”¹⁴⁶ It also encourages commercialization of the patent, which is not required for injunctive relief, but which Judge Nies believed ought to factor into the damages calculation.¹⁴⁷ The core of Judge Nies’s dissent is her observation that “infringement of a patent is not a species of common law unfair competition; it is a distinct and independent federal statutory claim.”¹⁴⁸

The differing opinions of Judges Lourie, Newman, and Nies in *Rite-Hite* nicely frame the current debate over patent damages reform. At its heart, the debate is not merely about tweaking the levers represented by different measures of damages, but instead involves fundamental questions about the nature of patent rights.

B. *Recent Judicial Limitations on Patent Remedies*

Recent Supreme Court and Federal Circuit jurisprudence on remedies is steadily reshaping patent jurisprudence. This includes cases on injunctions,¹⁴⁹ declaratory relief,¹⁵⁰ enhanced damages for willfulness,¹⁵¹ and exhaustion of remedies.¹⁵²

1. Injunctions

In *eBay, Inc. v. MercExchange, L.L.C.*,¹⁵³ the Supreme Court reviewed the Federal Circuit’s “general rule that courts will issue permanent injunctions against patent infringement absent exceptional circumstances.”¹⁵⁴ Plaintiff MercExchange held a business method patent that allegedly covered eBay’s

¹⁴⁵ *Id.* at 1560-67 (citing, among other cases, *Seymour v. McCormick*, 57 U.S. (16 How.) 480, 487 (1853)) (“Over a hundred years ago, the Supreme Court expressed its view that damages in the form of lost profits must be based upon injury to the patentee’s trade in products *embodying the patented invention.*”).

¹⁴⁶ *Id.* at 1561.

¹⁴⁷ *Id.* at 1562-63 (“The patent system was not designed merely to build up a library of information by disclosure, valuable though that is, but to get new products into the marketplace during the period of exclusivity so that the public receives full benefits from the grant.”).

¹⁴⁸ *Id.* at 1570.

¹⁴⁹ *eBay, Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 391 (2006).

¹⁵⁰ *Medimmune, Inc. v. Genentech, Inc.*, 127 S. Ct. 764, 767 (2007).

¹⁵¹ *In re Seagate Tech., LLC*, 497 F.3d 1360, 1377 (Fed. Cir. 2007).

¹⁵² *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2113 (2008).

¹⁵³ 547 U.S. 388 (2006).

¹⁵⁴ *Id.* at 391 (quoting *MercExchange, L.L.C. v. eBay, Inc.*, 401 F.3d 1323, 1339 (Fed. Cir. 2005), *vacated*, 547 U.S. 388 (2006)).

online reputation-based auction business.¹⁵⁵ MercExchange was essentially a patent troll whose primary business was to license out its patent portfolio on methods for conducting electronic commerce.¹⁵⁶

The Supreme Court held that a “general rule” in favor of injunctive relief in patent cases is inappropriate.¹⁵⁷ Instead, the Court stated, the usual four-factor test should apply; this test requires the plaintiff to prove that it will suffer irreparable harm absent the award of an injunction, that the remedies at law are inadequate, that the balance of hardships of both parties favors granting the injunction, and public interest favors granting the injunction.¹⁵⁸ According to the Court, both lower courts misapplied this test: the district court denied relief largely based on MercExchange’s practice of licensing without practicing its inventions, and the Federal Circuit applied a presumption in favor of injunctive relief.¹⁵⁹

Although the Court’s decision in *eBay* was unanimous, the Court disagreed on how the four factors should apply in patent cases. Justice Roberts, in a concurrence joined by Justices Scalia and Ginsburg, suggested the historical prevalence of injunctive relief in patent cases reflects the fact that a patent represents “a right to *exclude*,” which often is not compensable in money damages.¹⁶⁰ In contrast, Justice Kennedy, in a concurrence joined by Justices Stevens, Souter, and Breyer, rejected the notion that a right to exclude implies equitable relief.¹⁶¹ Moreover, Justice Kennedy stated that trial courts “should bear in mind that in many instances the nature of the patent being enforced and the economic function of the patent holder present considerations quite unlike earlier cases.”¹⁶² Injunctive relief may be particularly inappropriate when the plaintiff is a patent troll and/or the patent covers a business method.¹⁶³ Justice Kennedy explained that for patent trolls “an injunction, and the potentially serious sanctions arising from its violation, can be employed as a bargaining

¹⁵⁵ *Id.* at 390-91.

¹⁵⁶ *See id.* This was a key reason why the district court denied MercExchange’s request for injunctive relief. *See MercExchange v. eBay, Inc.*, 275 F. Supp. 2d 695, 711 (E.D. Va. 2003) (weighing the fact that “the plaintiff does not practice its inventions and exists merely to license its parented technology to others”), *aff’d in part, rev’d in part*, 401 F.3d 1323 (Fed. Cir. 2005), *vacated*, 547 U.S. 388 (2006). It seems clear from its website that MercExchange’s “technical tools” consist essentially of licenses to its patents. *See MercExchange, Solutions*, <http://www.mercexchange.com/solutions.htm> (last visited June 12, 2008).

¹⁵⁷ *eBay*, 547 U.S. at 392-95.

¹⁵⁸ *Id.* at 391-92.

¹⁵⁹ *Id.* at 393-94.

¹⁶⁰ *Id.* at 394-96 (Roberts, J., concurring).

¹⁶¹ *Id.* at 395-96 (Kennedy, J., concurring) (“Both the terms of the Patent Act and the traditional view of injunctive relief accept that the existence of a right to exclude does not dictate the remedy for a violation of that right.”).

¹⁶² *Id.* at 396.

¹⁶³ *Id.* at 396-97.

tool to charge exorbitant fees to companies that seek to buy licenses to practice the patent.”¹⁶⁴ With respect to business method patents, “[t]he potential vagueness and suspect validity of some of these patents may affect the calculus under the four-factor test.”¹⁶⁵

After remand, the district court again denied MercExchange’s request for injunctive relief. The case subsequently settled when eBay purchased the patents at issue.¹⁶⁶

2. Declaratory Relief

In *MedImmune, Inc. v. Genentech, Inc.*,¹⁶⁷ the Court addressed the issue of when a patent licensee can seek a declaratory judgment of non-infringement.¹⁶⁸ MedImmune entered into a license agreement with Genentech. The agreement covered an existing patent relating to chimeric antibodies and a pending patent application relating to immunoglobulin chains.¹⁶⁹ Four years after the license agreement was signed, the immunoglobulin application matured into a patent.¹⁷⁰ After the patent issued, Genentech delivered a letter to MedImmune stating that one of MedImmune’s top products was covered by the immunoglobulin patent and that MedImmune must pay royalties on the product under the license agreement.¹⁷¹ MedImmune paid the demanded royalties “under protest” and brought a declaratory judgment action for non-infringement, claiming the immunoglobulin patent was invalid.¹⁷² The trial court dismissed the declaratory judgment claims under Federal Circuit jurisprudence that barred a patent licensee in good standing to establish a case or controversy concerning the validity, enforceability, or scope of the patent.¹⁷³

¹⁶⁴ *Id.* at 396. Justice Kennedy further stated:

When the patented invention is but a small component of the product the companies seek to produce and the threat of an injunction is employed simply for undue leverage in negotiations, legal damages may well be sufficient to compensate for the infringement and an injunction may not serve the public interest.

Id. at 396-97.

¹⁶⁵ *Id.* at 397.

¹⁶⁶ See Press Release, eBay Inc. and MercExchange, L.L.C. Reach Settlement Agreement (Feb. 28, 2008), <http://investor.ebay.com/releasedetail.cfm?ReleaseID=296670>.

¹⁶⁷ 127 S. Ct. 764 (2007).

¹⁶⁸ *Id.* at 767.

¹⁶⁹ *Id.* at 768.

¹⁷⁰ *Id.*

¹⁷¹ *Id.*

¹⁷² *Id.*

¹⁷³ *Id.* (citing *Gen-Probe, Inc. v. Vysis, Inc.*, 359 F.3d 1376, 1381 (Fed. Cir. 2004)). Under *Gen-Probe*, a licensee in good standing could not assert a case or controversy regarding patent validity because the license “obliterate[s] any reasonable apprehension” of a suit for infringement. *Id.* (quoting *Gen-Probe*, 359 F.3d at 1381).

The Supreme Court reversed.¹⁷⁴ The Court agreed that MedImmune's "continuation of royalty payments makes what would otherwise be an imminent threat [of an infringement suit] at least remote, if not nonexistent."¹⁷⁵ However, the Court relied on *Altavater v. Freeman*,¹⁷⁶ a case from the 1940s suggesting that continuation of a license agreement under the compulsion of an injunction is a form of coercion that can support a claim for declaratory relief.¹⁷⁷ The *Altavater* Court observed that the licensee in such a case would risk an infringement suit if it defied the injunction.¹⁷⁸ The *MedImmune* Court adopted the general rule from *Altavater*, which held:

[T]he requirements of [a] case or controversy are met where payment of a claim is demanded as of right and where payment is made, but where the involuntary or coercive nature of the exaction preserves the right to recover the sums paid or to challenge the legality of the claim.¹⁷⁹

The *MedImmune* Court found that the circumstances of the license between Genentech and MedImmune suggested the possibility of coercion, such that MedImmune remained free to pursue its declaratory judgment action without first breaching the license.¹⁸⁰

3. Willful Infringement

Most of the recent Supreme Court opinions limiting remedies in patent cases are responses to a perceived expansion of patent-holders' rights by the Federal Circuit. On the question of willful infringement, however, the Federal Circuit itself limited what patent owners can recover. *In re Seagate Technology, LLC*¹⁸¹ addressed the scope of discovery when a non-infringement and/or enforceability opinion is obtained, as well as the requirements for proving "willfulness."¹⁸²

Prior to the litigation, the defendant in *Seagate* had obtained three written opinions from patent counsel concerning the patents ultimately at issue in the lawsuit.¹⁸³ The patent counsel's opinions and work product were disclosed in the ordinary course of discovery.¹⁸⁴ The plaintiff also demanded discovery of the work product and communications of defendant's trial and in-house

¹⁷⁴ *Id.* at 777.

¹⁷⁵ *Id.* at 772.

¹⁷⁶ 319 U.S. 359 (1943).

¹⁷⁷ *MedImmune*, 127 S. Ct. at 773 (citing *Altavater*, 319 U.S. at 365).

¹⁷⁸ *Id.* at 774.

¹⁷⁹ *Id.* at 773 (quoting *Altavater*, 319 U.S. at 365).

¹⁸⁰ *Id.* at 777.

¹⁸¹ 497 F.3d 1360 (Fed. Cir. 2007).

¹⁸² *See id.* at 1365. As the court observed, "willfulness" is a judicial gloss on the Patent Act's statutory provision for enhanced damages. *See id.* at 1383.

¹⁸³ *Id.* at 1366.

¹⁸⁴ *Id.* at 1367.

counsel relating to the non-infringement opinions.¹⁸⁵ The trial court permitted discovery of this information under the subject matter waiver doctrine.¹⁸⁶ The Federal Circuit issued a writ of mandamus to review the scope of subject matter waiver concerning non-infringement opinions and the relationship of existing willfulness doctrine to the discovery issue.¹⁸⁷

Prior to *Seagate*, the Federal Circuit imposed an “affirmative duty to exercise due care” on a potential infringer who has actual notice of another’s patent rights “to determine whether or not he is infringing.”¹⁸⁸ This included “the duty to seek and obtain competent legal advice from counsel *before* the initiation of any possible infringing activity.”¹⁸⁹ The court noted that this standard was created shortly after the Federal Circuit was established, “when widespread disregard of patent rights was undermining the national innovation incentive.”¹⁹⁰ This standard for willfulness created numerous issues relating to the attorney-client privilege and work product doctrines, as accused willful infringers came to rely heavily on the advice of defense counsel.¹⁹¹

The court surveyed the meaning of “willfulness” in connection with punitive damage claims in other contexts and concluded that “willful” typically means “reckless,” a standard higher than the mere negligence standard previously adopted by the Federal Circuit in the patent context.¹⁹² The court therefore overruled its prior precedent and held that “proof of willful infringement permitting enhanced damages requires at least a showing of objective recklessness.”¹⁹³ Under this recklessness standard, alleged infringers are not obligated to obtain an opinion of counsel, and the patentee “must show by clear and convincing evidence that the infringer acted despite an objectively high likelihood that its actions constituted infringement of a valid patent.”¹⁹⁴ Given this higher standard, the patentee is not usually entitled to discovery concerning the communications or work product of trial counsel.¹⁹⁵

In a concurrence, Judge Gajarsa, joined by Judge Newman, argued that the determination of enhanced damages should be left to the discretion of the trial court, without any further judicial gloss on the statutory language.¹⁹⁶ Judges Gajarsa and Newman were concerned that any judicial limitation on enhanced

¹⁸⁵ *Id.* at 1366-67.

¹⁸⁶ *Id.*

¹⁸⁷ *Id.* at 1367.

¹⁸⁸ *Id.* at 1368.

¹⁸⁹ *Id.* at 1368-69.

¹⁹⁰ *Id.* at 1369 (quoting *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337, 1343 (Fed. Cir. 2004)).

¹⁹¹ *Id.* at 1368-70.

¹⁹² *Id.* at 1370-72.

¹⁹³ *Id.* at 1371.

¹⁹⁴ *Id.*

¹⁹⁵ *Id.* at 1372-77.

¹⁹⁶ *Id.* at 1377 (Gajarsa, J., concurring).

damages – based on willfulness or negligence – unduly restricts the trial court’s ability to craft appropriate remedies.¹⁹⁷ Enhanced damages can serve a remedial purpose by affording the trial court with flexibility over a damage award when other forms of relief cannot be precisely determined.¹⁹⁸

Judge Newman also wrote a separate concurrence expressing a strong view of patents as akin to ordinary property.¹⁹⁹ According to Judge Newman, “[i]ndustrial innovation would falter without the order that patent property contributes to the complexities of investment in technologic R & D and commercialization in a competitive marketplace.”²⁰⁰ Because of this innovation concern, she agreed that a “rule that every possibly related patent must be exhaustively studied by expensive legal talent, lest infringement presumptively incur treble damages,” is unworkable.²⁰¹ Instead, damages rules should promote “standards of fair commerce” and courts should not “tolerate the intentional disregard or destruction of the value of the property of another, simply because that property is a patent.”²⁰²

4. Exhaustion of Remedies

The final case in this group, *Quanta Computer, Inc. v. LG Electronics, Inc.*, was decided in June 2008 and concerned the exhaustion of remedies.²⁰³ Exhaustion, a doctrine dating to the nineteenth century, provides that the first authorized sale of a patented item terminates any patent rights to that item.²⁰⁴ The issue in *Quanta* was whether exhaustion applies to the sale of a component of a patented method when the component must be combined with other components in order to practice the method.²⁰⁵

The patents at issue in *Quanta* related to data transfer and management in a computer.²⁰⁶ LG Electronics licensed the patents to Intel, a computer chip maker, as part of a patent portfolio.²⁰⁷ The LG-Intel license prohibited the combination of licensed products with third-party products in a manner that would infringe any of the patent rights granted under the license.²⁰⁸ Further, Intel was required to give notice to its own customers that the LG license

¹⁹⁷ *Id.* at 1378-79.

¹⁹⁸ *Id.* at 1378-84.

¹⁹⁹ *Id.* at 1385 (Newman, J., concurring).

²⁰⁰ *Id.*

²⁰¹ *Id.*

²⁰² *Id.*

²⁰³ *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2115 (2008).

²⁰⁴ *Id.* at 2115.

²⁰⁵ *Id.* at 2113.

²⁰⁶ *Id.* In particular, the patents covered management of data in a computer’s cache memory, coordination of memory read and write requests, and allocation of access among various devices to buses that connect different computer components. *Id.*

²⁰⁷ *Id.* at 2114.

²⁰⁸ *Id.*

prohibits such combinations.²⁰⁹ However, the LG license stated that the agreement was not intended to limit the doctrine of exhaustion.²¹⁰

Quanta Computer and other computer makers purchased “chipsets” from Intel and received the notice from Intel required under the LG-Intel license.²¹¹ Nevertheless, Quanta combined the chipsets with third-party components in finished computers in ways covered by the LG patents.²¹² When LG sued for infringement, the district court granted summary judgment based on exhaustion.²¹³ The Federal Circuit reversed in part and held that exhaustion does not apply to method claims and that, in any event, the LG-Intel license did not permit combinations with non-licensed products.²¹⁴

The Supreme Court reversed the Federal Circuit. The Court held that there is no meaningful distinction between method and apparatus claims for exhaustion purposes, and that engrafting such a distinction into the exhaustion doctrine would allow patentees to game the system by drafting their claims to cover a method rather than an apparatus.²¹⁵

As to the combination of components, the Court relied on *United States v. Univis Lens Co.*²¹⁶ In *Univis*, the Court held that the sale of an uncompleted article, which embodies the essential features of the patented invention and is intended to be finished by the purchaser, exhausts any patent rights in that article.²¹⁷ The patent at issue in *Univis* covered finished bi- and tri-focal eyeglass lenses.²¹⁸ The patent rights expired when unfinished blanks were sold by the patentee to wholesalers and retailers who ground the blanks into lenses.²¹⁹ The *Univis* Court held that “the authorized sale of an article which is capable of use only in practicing the patent is a relinquishment of the patent monopoly with respect to the article sold.”²²⁰

The Court found the *Univis* facts essentially indistinguishable from the incorporation of the LG patented methods into finished computers.²²¹ The only “reasonable and intended use” of the Intel chipsets, the Court found, was to incorporate them into computers that would practice the LG patents, and that

²⁰⁹ *Id.*

²¹⁰ *Id.*

²¹¹ *Id.*

²¹² *Id.*

²¹³ *Id.* at 2114-15.

²¹⁴ *Id.* at 2115.

²¹⁵ *Id.* at 2118.

²¹⁶ *Id.* at 2119 (citing *United States v. Univis Lens Co.*, 316 U.S. 241, 249-51 (1942)).

²¹⁷ *Univis*, 316 U.S. at 250-51 (“[W]here one has sold an uncompleted article . . . he has sold his invention so far as it is or may be embodied in that particular article.”).

²¹⁸ *Id.* at 247.

²¹⁹ *Id.* at 250.

²²⁰ *Id.* at 249.

²²¹ *Quanta*, 228 S. Ct. at 2120.

the chipsets “embodie[d] essential features of [the] patented invention.”²²² The Court further held that nothing in the LG-Intel license agreement prohibited Intel from selling to manufacturers who intended to combine the license with third-party products.²²³ The LG-Intel license required only that Intel give notice that LG did not license customers who mixed components to practice the LG patents – and Intel had provided this notice to its customers.²²⁴ LG’s permission or lack thereof to the customers was irrelevant because the first sale to Intel exhausted LG’s patent rights.²²⁵

IV. WHAT SHOULD SHAPE PATENT LAW?

A. *Property or Liability Rules?*

The scope of a patent grant is usually analyzed according to statutory subject matter, novelty and non-obviousness, claim construction, and the range of equivalents permitted given the prior art and prosecution history.²²⁶ However, the scope of available remedies also affects the shape of the patent grant.

²²² *Id.* at 2119 (quoting *Univis*, 316 U.S. at 249-51).

²²³ *Id.* at 2122.

²²⁴ *Id.* at 2122-23.

²²⁵ *Id.* at 2122.

²²⁶ The meaning of a patent’s claims is essentially indeterminate until interpreted by a court. It is the function of the trial court to construe the claims based on the intrinsic evidence of the claims themselves, the patent specification, and the prosecution history, with reference to extrinsic evidence such as dictionaries, published literature, and expert testimony only when the intrinsic evidence is ambiguous. *See Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996) (“[C]onstruction of a patent, including terms of art within its claim, is exclusively within the province of the court.”); *Finisar Corp. v. DirecTV, Inc.*, 523 F.3d 1323, 1328 (2008). The “range of equivalents” refers to the doctrine of equivalents, under which, an accused device or process can infringe, even if not literally within the scope of the claims, if it performs substantially the same function in substantially the same way to reach substantially the same result. *See, e.g., Festo Corp. v. Shoketsu Kogyo Kabushiki Co.*, 535 U.S. 722, 730-33 (2002) (stating that “the clearest rule of patent interpretation, literalism, may conserve judicial resources but is not necessarily the most efficient rule. The scope of a patent is not limited to its literal terms but instead embraces all equivalents to the claims described.”); *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1518-20 (Fed. Cir. 1995) (en banc) (explaining that the doctrine only applies if the “differences between the claimed and accused processes are insubstantial”), *rev’d on other grounds*, 520 U.S. 17 (1997).

Remedies can reflect either a “property rule” or a “liability rule.”²²⁷ Under a property rule, a person “who wishes to remove the entitlement from its holder must buy it from him in a voluntary transaction in which the value of the entitlement is agreed upon by the seller.”²²⁸ Under a liability rule, a person “may destroy the initial entitlement if he is willing to pay an objectively determined value for it.”²²⁹ The objectively determined value might equal the amount a willing seller would have paid a willing buyer in a fictional market transaction, but it need not equal what the seller would actually have charged in a particular transaction.²³⁰

The nature of a patent system depends not only on the classification of remedies as “property” or “liability” rules, but also on the requirements for validity and infringement. In the United States, the scope of the patent grant was expanded throughout the 1980s and 1990s in decisions concerning patentable subject matter,²³¹ defenses to infringement liability,²³² and the doctrine of equivalents.²³³

These two elements of a patent system – the scope of the right reflected in validity and infringement standards, and the nature of the remedy as a property or liability rule – can be plotted as follows:

²²⁷ For a discussion of property and liability rules, see generally Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972) (presenting a unified approach to property and tort law); Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 713 (1996) (discussing whether to protect property rights through tort rules or property rules).

²²⁸ Calabresi & Melamed, *supra* note 227, at 1092.

²²⁹ *Id.*

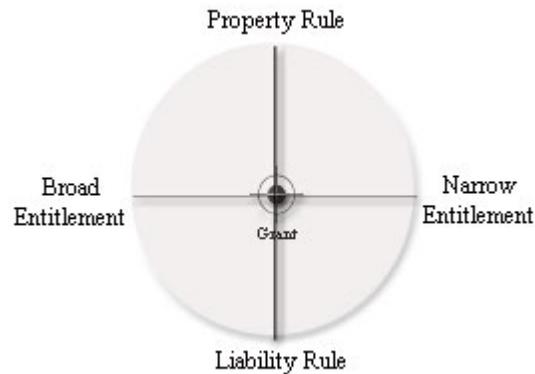
²³⁰ *Id.*

²³¹ See, e.g., *Diamond v. Chakrabarty*, 447 U.S. 303, 318 (1980) (finding patentable subject matter includes genetically engineered living microorganisms).

²³² See, e.g., *Madey v. Duke Univ.*, 307 F.3d 1351, 1362 (Fed. Cir. 2002) (holding the experimental use exemption does not automatically apply to academic research institutions).

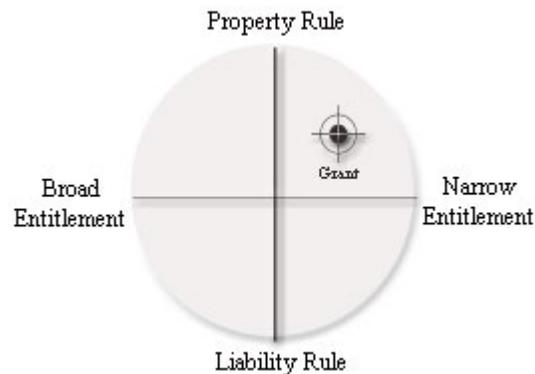
²³³ See, e.g., *Festo Corp. v. Shoketsu Kogyo Kabushiki Co.*, 535 U.S. 722, 730-33 (2002) (holding that prosecution history does not bar “the inventor from asserting infringement against any equivalent to the narrowed element” and is therefore not a complete bar to claims based on equivalents). For a general discussion of the expansion of the patent grant since the 1980s, see generally David W. Opperbeck, *The Penguin’s Genome, or, Coase and Open Source Biotechnology*, 18 HARV. J.L. & TECH. 167 (2004).

Range of Options:



The classical incentive theory of patents assumes a relatively narrow and well-defined privilege – Thomas Jefferson’s “embarrassment” of the patent monopoly²³⁴ – with relatively broad property-like remedies, including readily available injunctive relief.²³⁵ We could plot this as follows:

Incentive theory:

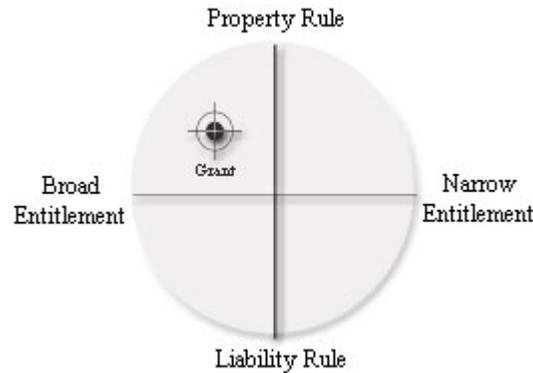


²³⁴ See Adam Mossoff, *Who Cares What Thomas Jefferson Thought About Patents? Reevaluating the Patent “Privilege” in Historical Context*, 92 CORNELL L. REV. 953, 954 (2007).

²³⁵ See Ian Ayers & Gideon Parchomovsky, *Tradeable Patent Rights*, 60 STAN. L. REV. 863, 870 (2007) (explaining that “[p]atents confer on their holders property rule protection, namely, the power to exclude others from the underlying invention. Any person who wishes to improve upon a patented invention must either secure permission from the patentee or risk harsh consequences.”).

In contrast, for example, prospect theory assumes a broad entitlement, but also with broad property-like remedies, which could be plotted as follows:²³⁶

Prospect Theory:



Taking together the various opinions in the Federal Circuit’s *Rite Hite* decision, the Supreme Court’s recent patent law jurisprudence, and the damages reform proposals before Congress, it seems that patent law in the United States over the past few years has begun progressing fitfully from a property rule to a liability rule.²³⁷ This is surprising, because the story of patents in the 1980s and 1990s was one of apparently unchecked and explosive growth.²³⁸ This explosive growth was attributable in many ways to the influence of the Federal Circuit, but it also reflected a Supreme Court that was willing to read the subject matter requirement very broadly.²³⁹ It appears now

²³⁶ Prospect theory, which draws on the metaphor of “prospecting” rights to a mining claim, suggests that the patent system should afford very broad rights to patentees so that patentees can develop their inventions without concern that third parties will be able to free ride on unpatentable collateral information related to the development and commercialization of the invention. See John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 440 (2004) (defining “prospect” patents as “broad patents issued in the very early stages of technical development” and stating that such patents are “socially beneficial” because they “encourage investment in a technological prospect after the property right has been granted”); Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 265-66, 268 (1977) (“The patent system . . . award[s] exclusive and publicly recorded ownership of a prospect shortly after its discovery. The patent system so viewed is closely analogous to the American mineral claim system for public lands.”).

²³⁷ See *supra* note 227 and accompanying text.

²³⁸ See, e.g., Opderbeck, *supra* note 233, at 170 (pointing to examples of the expansion of what is patentable and the widening of what is subject to patent infringement claims).

²³⁹ See *Diamond v. Chakrabarty*, 447 U.S. 303, 303 (1980).

that the Supreme Court wishes to check this trend and in particular to limit the power of the Federal Circuit.

At first blush, the clearest evidence of this shift is the *eBay* Court's holding that permanent injunctive relief is not automatic in patent cases.²⁴⁰ However, the *eBay* opinion sends mixed signals to trial courts. Justice Roberts's concurrence suggests courts should continue to issue injunctive relief in most cases to protect the patentee's exclusionary interest.²⁴¹ Justice Kennedy's concurrence, in contrast, suggests trial courts should carefully scrutinize cases involving patent trolls and method patents.²⁴² In fact, trial courts thus far have reached very different conclusions about *eBay*'s implications.²⁴³

MedImmune, however, should have the effect of reducing the holdup problem described by Lemley and Shapiro.²⁴⁴ The payoffs and risks in a bargaining game should change if the party being "held up" knows it can hand over its money without getting shot and safely retrieve the money later. In fact, this could prove to be the most significant patent reform development in favor of prospective infringers against patent trolls.

It is unclear, however, whether *MedImmune* is limited by the fact that the dispute was framed in terms of contract claims.²⁴⁵ The Court stressed that *MedImmune* had never promised not to challenge the patent, and that it was not repudiating the license agreement by doing so because the agreement contained no express promise about challenging the patent.²⁴⁶ If the license agreement had contained an express waiver of future invalidity claims, the Court explained, Article III jurisdiction would still exist, but *MedImmune* would necessarily lose on the merits.²⁴⁷ It may be that the *MedImmune* opinion simply teaches licensors to include strong "no invalidity challenge" clauses in their agreements.

²⁴⁰ See *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 393-94 (2006).

²⁴¹ *Id.* at 395 (Roberts, J., concurring).

²⁴² *Id.* at 396-97 (Kennedy, J., concurring).

²⁴³ Compare *Fresenius Med. Care Holdings, Inc. v. Baxter Int'l, Inc.*, No. C 07-1359 PJH, 2008 WL 928496, at *3 (N.D. Cal. Apr. 4, 2008) (following *eBay* but stating that "[c]ourts routinely find irreparable harm, and therefore grant permanent injunctions where, as here, the infringer and the patentee are direct competitors"), with *Sun Optics, Inc. v. FGX Int'l, Inc.*, No. 07-137, 2007 WL 2228569, at *3 (D. Del. Aug. 2, 2007) (concluding that a "presumption [of irreparable harm] did not survive the Supreme Court's analysis in *eBay*").

²⁴⁴ See *supra* Part II.A.3 (describing the Lemley and Shapiro study, which identified a holdup problem resulting from the threat of injunctive relief).

²⁴⁵ See *MedImmune, Inc. v. Genentech, Inc.*, 127 S. Ct. 764, 769-70 ("All we need determine is whether petitioner has alleged a contractual dispute.").

²⁴⁶ *Id.* at 776.

²⁴⁷ *Id.* (stating that "[o]f course even if respondents were correct that the licensing agreement or the common-law rule precludes this suit, the consequence would be that respondents win this case *on the merits* – not that the very genuine contract dispute disappears, so that Article III jurisdiction is somehow defeated").

The *Quanta* decision might also relieve holdup problems, particularly when they are tied to patent stacking in industries such as computers, cell phones, and the like, in which discrete components are assembled into chipsets, circuit boards, hardware and software that is in turn sold to finished product manufacturers. This, of course, is exactly the sort of industry targeted by the congressional reform proposals.²⁴⁸ In one sense, *Quanta* does not break any new ground – the exhaustion doctrine is well established in patent law.²⁴⁹ The ambiguity introduced by *Quanta* concerning exactly when the sale of an unfinished component could exhaust a patent right, however, might force greater transparency in upstream license terms.²⁵⁰

Finally, the Federal Circuit's *Seagate* decision certainly should mitigate holdup problems.²⁵¹ An ordinary negligence duty of care probably requires accused infringers to obtain an opinion of counsel even when the claim is tenuous, as when a non-practicing entity urges a broad range of equivalents on a method patent. Rarely, however, can prudent (and risk-averse) patent counsel offer an unqualified opinion of invalidity or non-infringement. Upon receiving a qualified opinion, it is often unclear whether moving forward with the accused device or method satisfies a duty of ordinary care.²⁵² Rarely, however, will a merely qualified opinion give rise to a finding of recklessness.

²⁴⁸ See, e.g., *Hearings, supra* note 50, at 16 (testimony of Mary E. Doyle, Senior Vice-President and General Counsel, Palm, Inc.).

²⁴⁹ *Quanta Computer, Inc. v. LG Elecs., Inc.*, 128 S. Ct. 2109, 2115 (2008).

²⁵⁰ One possible effect of the *Quanta* opinion might be to adopt license terms that require express licensor permission, or provide for contractual penalties, if a subsequent purchaser intends to combine patented and unpatented components. Such restrictions, however, could potentially run afoul of the antitrust laws. See U.S. DEP'T OF JUSTICE & FED. TRADE COMM'N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROP. § 3.4 (1995) ("The Agencies' general approach in analyzing a licensing restraint under the rule of reason is to inquire whether the restraint is likely to have anticompetitive effects and, if so, whether the restraint is reasonably necessary to achieve procompetitive benefits that outweigh those anticompetitive effects.").

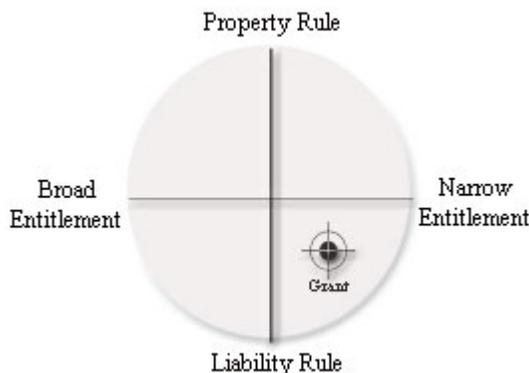
The potential antitrust problem is particularly acute in the market for personal computer processors, where there is a dominant supplier of a critical upstream component. There was no way to produce a PC using Intel chips without violating the notice Intel provided to its customers, since buses and such are generic parts that certainly would not have been manufactured by Intel. Essentially, Intel hung the computer manufacturers out to dry, leaving LG Electronics free to use Intel's license fees to fund the holdup of those manufacturers it chose to sue for infringement. The Court's opinion solves this problem to some extent by keeping any potential claims in the realm of contract. *Quanta*, 128 S. Ct. at 2116. Perhaps the opinion's most significant effect will be to encourage clearer language in agreements between upstream parties that will impact downstream users.

²⁵¹ See *In re Seagate Tech., LLC*, 497 F.3d 1360, 1376 (Fed. Cir. 2007).

²⁵² See *SRI Int'l, Inc. v. Advanced Tech. Labs., Inc.*, 127 F.3d 1462, 1467 (Fed. Cir. 1997).

These cases represent a clear shift towards limiting the patent grant. If the congressional damage reform proposals are added to this mix,²⁵³ the shift becomes even more dramatic. The trajectory of this move is not surprising, but the extent of the move, particularly if the congressional proposals become law, would represent a more severe contraction of the patent grant than might otherwise be expected or perhaps necessary. The new heuristic could be represented as follows:

Recent Case Law and Congressional Reform Proposals:



The next Section presents evidence that the contraction might be happening too rapidly and therefore threatens to deform the overall shape of patent law.

B. *Popping the Balloon: Moving Towards a Liability Rule by Restricting Damages to the “Economic Value of the Invention” as Against the Prior Art*

It has become common to view a legal-regulatory system such as patent law as a sort of Newtonian machine with “levers” that can be tweaked in order to produce differing results.²⁵⁴ Using this metaphor, it might be sensible to pull the validity, liability, and damages levers in different directions. However, opening up the throttle while closing the choke valve and pulling the emergency brake might not produce a smooth-running machine. Perhaps a more apt metaphor is that of a balloon. Pinching off one part of the balloon’s surface forces more air into other parts of the balloon and causes those other parts to expand. Too much pressure on both sides of the balloon will cause it to pop.

²⁵³ See *supra* Part I.B.

²⁵⁴ See, e.g., Dan Burk and Mark Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1641-75 (2003).

Recent case law limiting the availability of injunctive relief, broadening a licensee's ability to challenge validity, and constricting the standard for enhanced damages has moved patent jurisprudence sharply in the direction of a liability rule. The congressional reform proposals, while dealing specifically with damages, would also move the jurisprudence towards a narrower entitlement. In particular, limiting damage awards to the economic value of the claimed invention over the prior art upsets the balance reflected in the subject matter, novelty, obviousness, and utility requirements for obtaining a patent. As such, utility, novelty, and non-obviousness must be reconsidered after the patent has been found valid and infringed.

1. Utility

Courts have long recognized that an invention need not be "better" than the prior art to qualify for patent protection.²⁵⁵ The patent bargain is not really a reward for "progress" in an absolute sense. The patent system makes no judgment about whether an invention represents an advance over the prior art; rather, the inventor is rewarded for disclosing something new. The scientific community and the market are left to decide whether the invention is more desirable than what was available before the disclosure.²⁵⁶ Mandatory apportionment of damages against the prior art, in contrast, suggests that the inventor can only collect an award if the patented invention is, in fact, better.

In many fields of art, it is difficult to see how this requirement could apply without rewriting the utility rules. Consider, for example, chemical compounds developed in the early stages of drug development. Such compounds are not patentable unless the applicant demonstrates some specific utility for the compound.²⁵⁷ That a compound could conceivably be used to treat an unspecified condition is not sufficient.²⁵⁸ Justice Fortas's famous line from *Brenner v. Manson*, a germinal case regarding chemical utility, says it best: "[A] patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion."²⁵⁹

The Federal Circuit has construed *Brenner*, in connection with the new drug approval process under the Federal Food, Drug and Cosmetics Act of 1964,²⁶⁰ to permit the patenting of early stage drug candidates that are shown to have some effect in laboratory or animal testing, even if the compound may never

²⁵⁵ See *Lowell v. Lewis*, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (No. 8568) ("[W]hether [the invention] be more or less useful is a circumstance very material to the interests of the patentee, but of no importance to the public. If it be not extensively useful, it will silently sink into contempt and disregard.").

²⁵⁶ See *id.*

²⁵⁷ *Brenner v. Manson*, 383 U.S. 519, 519 (1966).

²⁵⁸ *Id.*

²⁵⁹ *Id.* at 536.

²⁶⁰ Federal Food, Drug, and Cosmetic Act, 21 U.S.C. §§ 301-399a (2000).

succeed as a treatment for humans.²⁶¹ In *In re Brana*, the Federal Circuit stated that “[u]sefulness in patent law, and in particular in the context of pharmaceutical inventions, necessarily includes the expectation of further research and development.”²⁶² Using this reasoning, the *Brana* court held that a compound proven effective against tumors in mice but not yet tested on humans was patentable.²⁶³

It is helpful to examine how the *Brana* Court valued the new invention against the prior art. When the patent application was filed, the claimed compound did nothing more than “exhibit[] some desirable pharmaceutical property in a standard experimental animal.”²⁶⁴ In absolute terms, then, the *Brana* compound performed only a tiny function in the overall progress of drug discovery, and represented a very modest difference from the prior art. This backwards-looking view suggests that the economic value of this innovation over the prior art is small. However, a forward looking view offers a dramatically different result. It is possible – though not likely – that the *Brana* compound could lead to a commercial cancer treatment after many additional years of development and testing. Alternatively, the *Brana* compound could materially assist in the development of other medically useful and commercially successful chemical variants, either through positive association or by identifying research dead-ends. In the long chain of drug discovery causation, it is conceivable that something like the *Brana* compound could be a but-for cause of the development of a blockbuster drug worth billions of dollars.²⁶⁵

Given all these uncertainties, the economic value assigned an early-stage research candidate must reflect the potential of a high reward in the future, discounted by the probability of achieving that level of reward without the improvement. It is difficult, if not impossible, to calculate a precise royalty based on the invention’s “specific contribution” over the prior art by looking backwards.

²⁶¹ *In re Brana*, 51 F.3d 1560, 1568 (Fed. Cir. 1995).

²⁶² *Id.*

²⁶³ *Id.*

²⁶⁴ *Id.* at 1567 (quoting *In re Krimmel*, 292 F.2d 948 (Ct. Cust. App. 1961)).

²⁶⁵ As the *Brana* court stated, “[w]ere we to require Phase II testing in order to prove utility, the associated costs would prevent many companies from obtaining patent protection on promising new inventions, thereby eliminating an incentive to pursue . . . potential cures in many crucial areas such as the treatment of cancer.” *Id.* at 1568. For a discussion of contemporary drug discovery processes, see generally *Focus on Drug Discovery*, 2 NATURE CHEMICAL BIOLOGY 645 (2006) (describing the development and future of a multidisciplinary approach to drug discovery).

2. Novelty and Non-Obviousness

The novelty and non-obviousness requirements ensure that patents are rewarded only for “inventions.”²⁶⁶ A claimed invention is novel only if no single prior art reference contains, expressly or inherently, all the elements of the claimed invention.²⁶⁷ A claimed invention is non-obvious only if, given the state of all the relevant prior art at the time of the invention, a person of ordinary skill in the art would consider the invention non-obvious.²⁶⁸ To assist in the non-obviousness determination, the patent examiner or the court can evaluate circumstantial evidence of “secondary considerations,” including “commercial success, long felt but unsolved needs, failure of others, etc., to give light to the circumstances surrounding the origin of the subject matter sought to be patented.”²⁶⁹ Under both the novelty and non-obviousness inquiries, the patent examiner or the court is required to put itself into the shoes of a person of ordinary skill in the art at the time of the invention in order to make the required determination.²⁷⁰

The novelty and non-obviousness requirements compel a backward-looking analysis of the claimed invention’s “specific contribution” over the prior art. If there is enough of a specific contribution that the invention is deemed novel and non-obvious, assuming the other requirements of patentability are met, the reward for that contribution is the grant of a patent. The value of the patent grant, however, is not determined a priori by this process. The economic tool of the patent can be put to use in whatever manner the market will support. If the patent is infringed, the economic remedy involves some kind of rough reconstruction of the market loss.

The damages reform proposals, in contrast, seem to require the court to return to the time of invention and evaluate the quantum of novelty and non-obviousness above the minimum required for patenting in order to determine the invention’s a priori economic value.²⁷¹ Here, the analysis would not ask

²⁶⁶ See 35 U.S.C. § 103(a) (2000) (“A patent may not be obtained . . . if the differences between the subject matter . . . and prior art are such that the subject matter as a whole would have been obvious . . .”); *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1734 (2007) (discussing the obviousness requirement); *Graham v. John Deere Co.*, 383 U.S. 1, 12-17 (1966) (evaluating Congress’s intentions in adding non-obviousness to the Patent Act).

²⁶⁷ *KSR Int’l*, 127 S. Ct. at 1739-41 (examining cases in which the product at issue contained some or all of the same elements of the prior art); *Graham*, 383 U.S. at 5-12 (citing *Hotchkiss v. Greenwood*, 52 U.S. 248 (1850)) (recounting the development of patent law and the *Hotchkiss* case which held that a mere substitution of materials was not patentable).

²⁶⁸ *Graham*, 383 U.S. at 17-18.

²⁶⁹ *Id.*

²⁷⁰ *Id.*

²⁷¹ In fact, neither proposal is clear on whether this determination should be made from the date of invention, the patent application, the patent grant, the filing of a lawsuit, the

whether the invention cleared the initial hurdle of patentability, but would seek to define how far down the track the invention proceeded from the prior art starting gate.²⁷²

Again, *In re Brana*²⁷³ provides a useful example from the chemical/pharmaceutical arts to illustrate the confusion the congressional proposals would cause. The Brana compound was initially rejected by the patent examiner as obvious over a prior art compound.²⁷⁴ The applicant admitted the physical differences between the claimed and prior art compounds were “slight,” but overcame the obviousness rejection because the claimed compound showed unexpectedly improved results during *in vitro* tests.²⁷⁵

It is unclear how the “economic value” of the Brana compound over the prior art can be measured when the physical differences between the compounds are “slight” but the therapeutic difference, after initial *in vitro* testing, is potentially significant. As noted above, it might not become clear for many years whether the new compound produces significantly different results, or is even safe and effective, for use in humans. Moreover, it may never become clear exactly *why* the new compound produces better results. The difference might be due to some inherent differences in the way the new and prior art compounds interact with disease vectors or are absorbed by the human body. It might result largely from more careful testing and measurement rather than from deep functional differences between the compounds. Perhaps differences that seemed highly significant *in vitro* will turn out to be relatively minor in humans outside of laboratory conditions. Any number of these or other possibilities might explain the different results, but it will likely be impossible to know exactly which one is the ultimate cause.

It seems impossible to determine whether, or why, the “economic value” of the invention over the prior art under any of these scenarios should differ from whatever value the market puts on the patent. To the extent the difference in the claimed compound over the prior art is significant, the market will value the patent accordingly, in the amount the patentee is able to charge above a competitive price, in licensing rates, or both.²⁷⁶ If the invention meets the

entry of judgment, or some other time. *See* Patent Reform Act of 2008, S. 1145, 110th Cong. § 4 (2008); Patent Reform Act of 2007, H.R. 1908, 110th Cong. § 5 (2007).

²⁷² Patent Reform Act of 2008, S. 1145, 110th Cong. § 4 (2008); Patent Reform Act of 2007, H.R. 1908, 110th Cong. § 5 (2007). Once that distance is determined, it would have to be quantified in economic terms, which presents its own set of problems, as discussed in Part V.B.2.

²⁷³ 51 F.3d 1560 (Fed. Cir. 1995).

²⁷⁴ *Id.* at 1563.

²⁷⁵ *Id.*

²⁷⁶ As discussed in Part V, the amount the patentee can charge above competitive prices is a function of price elasticity of demand, and the valuation of a license is a function of anticipated returns in light of risk. *See infra* Part V.B.1.

basic threshold of utility, novelty, and non-obviousness, the “economic value” of the invention should be determined in accordance with market principles. However, as discussed in the next Part, consideration of the key market factor of price elasticity of demand leads to different conclusions than either current damages rules or any existing proposals, which in turn leads to a different, more balanced approach to the shape of patent law as a whole.

V. PRICE ELASTICITY AS THE MISSING FACTOR

This Article has so far demonstrated: (1) the empirical evidence on patent cases does not reveal any sustained trend towards excessive verdicts; (2) the congressional reform proposals for determining remedies in patent cases are too extreme; and (3) the courts have made some changes to help mitigate occasional holdup problems. If all this is true, perhaps the best course is to leave the calculation of lost profit or reasonable royalty damages where it now lies: in the discretion of the trial court, based on general principles of foreseeability. To the extent a verdict in a particular case is excessive, the ordinary tools of judgment notwithstanding the verdict, remittitur, and appeal can remedy the problem.²⁷⁷ In fact, some commentators suggest this very approach.²⁷⁸

While there are merits to this approach, it too raises some thorny jurisprudential concerns, because patents are *not* just like any other common law tort or property right. It is better to recognize that a unique factor relating to patents – price elasticity of demand – should inform any damage analysis.

A. *Squeezing Too Hard, Too Soft, or Just Right: Assessing Foreseeability-Based Approaches*

Some commentators argue that Judge Lourie’s “functional unit” application of the entire market value rule in *Rite-Hite* was essentially correct.²⁷⁹ Roger Blair and Thomas Cotter suggest the Federal Circuit has properly cast patent damages generally in terms of tort-like causation and foreseeability, with limitations on “remote” harms.²⁸⁰ Blair and Cotter argue that alternative proposals that would restrict damage awards to something less than all foreseeable losses are too difficult to administer and would adversely affect ex ante incentives to innovate.²⁸¹

²⁷⁷ See FED. R. CIV. P. 50 (permitting judgment as a matter of law if “there is no legally sufficient evidentiary basis for a reasonably jury to find for that party on that issue”); FED. R. CIV. P. 59 (permitting a new trial or allowing a judge to alter a judgment).

²⁷⁸ Robert D. Blair & Thomas F. Cotter, *Rethinking Patent Damages*, 10 TEX. INTELL. PROP. L.J. 1, 4 (2001) (arguing that patent infringement is no different from other torts and therefore proximate cause is an appropriate way to determine damages).

²⁷⁹ *Rite-Hite Corp. v. Kelley Co., Inc.*, 56 F.3d 1538, 1542 (Fed. Cir. 1995).

²⁸⁰ Blair & Cotter, *supra* note 278, at 4.

²⁸¹ See *id.* at 62-84.

Trade secret infringement is the most closely analogous common law tort claim.²⁸² Under the common law of trade secrets in most jurisdictions, the plaintiff can recover its own lost profits and profits made by the defendant, subject only to the ordinary rules of certainty of proof and proximate cause.²⁸³ The same is true under the Uniform Trade Secrets Act.²⁸⁴ Recovery of a defendant's profits is usually allowed under the theory that a person who misappropriates a trade secret holds any profits resulting from the exploitation of the secret in trust for its legitimate owner.²⁸⁵ Damages for trade secret infringement therefore extend far beyond what is permitted under the Patent Act, which does not provide for disgorgement of a defendant's profits.²⁸⁶ Blair and Cotter propose a trade secret-like rule for patent damages.²⁸⁷

One problem with the tort-based foreseeability approach is the holdup problem noted by Lemley and Shapiro.²⁸⁸ This problem is compounded by the uncertainty surrounding most assertions of patent infringement. The boundaries of the patent right often cannot be determined before a court construes the claims and determines the permissible range of equivalents.²⁸⁹ A patent is not like a real property deed, which contains a precise *ex ante*

²⁸² For a discussion of the similarities and differences between trade secret and patent claims, see, for example, *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 482 (1974) (observing that "trade secret law protects items which would not be proper subjects for consideration for patent protection," while acknowledging that the goals of the laws are similar); KIM LANE SCHEPPELLE, *LEGAL SECRETS* 245 n.46 (1988) (discussing the primary difference between patents and trade secrets as being the fact that trade secrets protect against "abuses of trust" not the underlying information); Robert G. Bone, *A New Look at Trade Secret Law: Doctrine in Search of Justification*, 86 CAL. L. REV. 241, 241 (1998) (claiming that among intellectual property claims, "trade secret law is an anomaly").

²⁸³ See Douglas G. Smith, *Application of Patent Law Damages Analysis to Trade Secret Misappropriation Claims: Apportionment, Alternatives, and Other Common Limitations on Damages*, 25 SEATTLE U. L. REV. 821, 826-27 (2002).

²⁸⁴ UNIF. TRADE SECRETS ACT § 2(b) (amended 1985), 14 U.L.A. 437 (1990); Roger D. Blair & Thomas F. Cotter, *An Economic Analysis of Damages Rules in Intellectual Property Law*, 39 WM. & MARY L. REV. 1585, 1600 (1998) ("[T]he court may award 'both the actual loss caused by misappropriation and the unjust enrichment caused by misappropriation that is not taken into account in computing actual loss.'" (quoting UNIF. TRADE SECRETS ACT § 2(b))).

²⁸⁵ HENRY H. PERRITT, *TRADE SECRETS, A PRACTITIONER'S GUIDE* 545 (1994).

²⁸⁶ Blair & Cotter, *supra* note 284, at 1647-48.

²⁸⁷ *Id.* at 1641-42 (arguing that patent infringers should have to disgorge profits just like trade secret infringers do).

²⁸⁸ Lemley & Shapiro, *supra* note 93, at 2030; see *supra* notes 102-105.

²⁸⁹ See, e.g., Gregory J. Wallace, Note, *Toward Certainty and Uniformity in Patent Infringement Cases After Festo and Markman: A Proposal for a Specialized Patent Trial Court with a Rule of Greater Deference*, 77 S. CAL. L. REV. 1383, 1387-89 (2004) (discussing the uncertainty of patent rights given the flexibility of the doctrine of equivalents and the frequency of appeals in patent cases).

statement of the metes and bounds of the entitlement. *Every* patent litigation involves an ex post judicial determination of metes and bounds, including the highly indeterminate penumbral range of equivalents.

A tort-based measure of damages theoretically promotes economic efficiency because it deters over- and under-enforcement of the property right and thereby encourages Coasian bargaining.²⁹⁰ The indeterminacy of patent entitlements, however, can allow patentees to engage in strategic behavior by demanding licenses based on very aggressive claims of equivalence and/or expansive claim interpretations.

Some commentators have suggested that uncertainty in patent enforcement is a good thing.²⁹¹ Professors Ayres and Klemperer apply a Ramsey pricing model to uncertainty and patent term.²⁹² They conclude that the marginal increase in infringing activity that results from a degree of uncertainty concerning whether a patent is enforceable can increase social welfare by driving down price; the resulting marginal reduction in rents to the patentee will not significantly impact ex ante incentives, provided the patent term is long enough to provide the patentee with an adequate return.²⁹³ They offer a number of ways in which policymakers could tweak this balance of uncertainty and patent term, including reducing the prevalence of injunctive relief and applying the *Panduit* factors²⁹⁴ strictly so that a reasonable royalty, rather than recovery of full lost profit damages, is the typical remedy for infringement.²⁹⁵

Ayers and Klemperer's analysis is helpful, but they limit their application of Ramsey pricing to its implications for patent duration. They do not address in any detail the important aspect of Ramsey pricing concerning the price

²⁹⁰ Blair & Cotter, *supra* note 284, at 1618-42 (stating that "courts should award the prevailing patentee either her own lost profit attributable to the infringement or the defendant's profit attributable thereto . . . for the purpose of achieving optimal deterrence").

²⁹¹ See Ian Ayres & Paul Klemperer, *Limiting Patentees' Market Power Without Reducing Innovation Incentives: The Perverse Benefits of Uncertainty and Non-Injunctive Remedies*, 97 MICH. L. REV. 985, 986 (1999) ("Uncertainty and delay in patent litigation may have unforeseen virtues.").

²⁹² *Id.* at 1000. "Ramsey pricing" refers to a type of differential pricing in differing markets, in which the seller's price at least equals marginal cost in all markets and exceeds marginal cost in some markets. See Patricia M. Danzon & Adrian Towse, *Differential Pricing for Pharmaceuticals: Reconciling Access, R&D and Patents*, 3 INT'L J. OF HEALTH CARE FIN. & ECON. 183, 183 (2003).

²⁹³ See Ayres & Klemperer, *supra* note 291, at 1007 ("[E]ven modest increases in patent length can allow sufficient price reductions to substantially reduce the deadweight loss of monopoly.").

²⁹⁴ For a discussion of the *Panduit* factors, see *infra* note 320 and accompanying text.

²⁹⁵ See Ayres & Klemperer, *supra* note 291, at 1030-32. Their other proposals include increasing uncertainty by limiting the use of preliminary injunctions, making decision-making less specialized, preferring underinclusive standards to overinclusive rules, and permitting patent licenses to extend beyond the patent term. *Id.* at 1032-42.

elasticity of demand.²⁹⁶ Likewise, Lemley and Shapiro's holdup model does not consider the effect of demand elasticity. As discussed in Section B below, when demand elasticity is considered, another provocative possibility emerges: it might be efficient to do away with reasonable royalty damages altogether.²⁹⁷

A second unexplored aspect of the tort-based view of patent damages is how the economic-loss rule would factor into the tort analysis. Stated in its most narrow form, the economic-loss rule precludes recovery for "purely economic losses" in product liability claims.²⁹⁸ In this context, the doctrine is an effort to police the boundary between contract and tort law.²⁹⁹ Claims over product defects that produce only economic losses are subject to limitations for breach of warranty claims that might be negotiated by the parties or implied in law.³⁰⁰

However, the doctrine has been applied in many contexts besides product liability, most notably in the law of negligence, strict liability, and fraud.³⁰¹ Courts that apply the doctrine in these circumstances are concerned about efforts to circumvent limitations on contractual remedies by dressing up contract claims as tort claims.³⁰²

The economic-loss rule raises some difficult questions about the tort analogy regarding proximate cause and damages in patent cases. In a sense, a patent infringement case is a contract-based claim because the patent grant is viewed as a social bargain between the public and the patentee.³⁰³ A person who infringes a patent effectively violates the social bargain giving the patentee the exclusive right to practice the claimed invention.³⁰⁴

In this context, we could say that the patentee is entitled in damages to the benefit of his or her bargain and that the infringer is required to restore the patentee, on behalf of the public, to the position the patentee would have occupied had the bargain been performed.³⁰⁵ Ordinarily, benefit-of-the-

²⁹⁶ See *id.* at 991-92.

²⁹⁷ See *infra* Part V.B.3.

²⁹⁸ See *Saratoga Fishing Co. v. J.M. Martinac & Co.*, 520 U.S. 875, 885 (1997) (Scalia, J., dissenting).

²⁹⁹ See *E. River S.S. Corp. v. Transamerica Delaval, Inc.*, 476 U.S. 858, 866-75 (1986) (pointing out that the economic-loss rule intentionally separates products liability and contract law and limits damages realistically).

³⁰⁰ *Id.*

³⁰¹ See *Giles v. Gen. Motors Acceptance Corp.*, 494 F.3d 865, 874-88 (9th Cir. 2007) (discussing the application of the economic-loss rule in multiple cases).

³⁰² See *id.* ("Where such tort claims have been barred, they have usually amounted to nothing more than a failure to perform a promise contained in a contract. In such cases, the plaintiff has been held to be entitled only to ordinary contract damages.").

³⁰³ See Adam Mossoff, *supra* note 234, at 953.

³⁰⁴ *Id.* at 993-95.

³⁰⁵ See DAN B. DOBBS, HANDBOOK ON THE LAW OF REMEDIES § 12.1, at 786 (1973) (describing the "benefit of the bargain" principle in contract remedies).

bargain damages include reasonably foreseeable consequential damages.³⁰⁶ However, “foreseeability” for this purpose usually refers to what was reasonably in the contemplation of the parties at the time of contracting, and might be construed more narrowly than the similar concept of proximate cause in tort law.³⁰⁷ Moreover, the contract itself might limit the availability or amount of recovery for certain claims, including breach of warranty claims. If the economic-loss rule is a limitation on tort recovery, the tort analogy for patent damages may be begging the question: what does the statutory framework suggest about limitations on “consequential” damages for patent infringement?

If the tort-based analogy for patent damages is complicated, a property-based foreseeability analogy is even trickier. The general measure of damages for harm to a property interest is the diminution of value of the property caused by the injury, the cost to repair any damage to the property, or the value of an unlawful use of the property.³⁰⁸ The “value of unlawful use” measure is approximated by the baseline provision of reasonable royalty damages in the Patent Act.³⁰⁹ The “cost to repair” measure, of course, has no analog in the Patent Act, as the patent right is inchoate and cannot be physically damaged.

The “diminution of value” measure is perhaps partially captured by allowing recovery for lost profits. The profits made by selling patented products represent some of the patent’s value to the enterprise and adjust the balance between static and dynamic efficiency. Lost profits alone, however, are a somewhat crude measure of a patent’s overall value. As discussed in the next Section, there are a number of more sophisticated measures of a patent’s value that could be employed in a damages analysis, but that are not provided for under the present statute.

B. *Profits and Price Elasticity of Demand*

The foregoing analysis highlights flaws in both a narrow, “value over the prior art” approach and a broad, generalized “foreseeability” approach to patent damages. This Section explains how considering price elasticity of demand should help move the discussion towards a middle ground. Consideration of these two factors supports a damages regime in which a restitutionary award, rather than a reasonable royalty, would be the usual measure of damages. This kind of remedial scheme, together with the raft of recent judicial decisions on patents,³¹⁰ could moderate the shift towards a

³⁰⁶ *Id.* at 786-87.

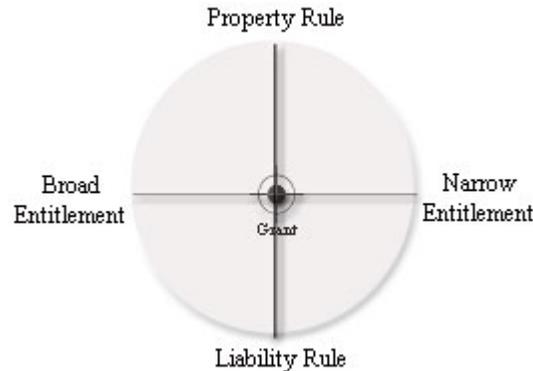
³⁰⁷ *Id.* at 787, 803-10 (discussing the limitations on recovery established by *Hadley v. Baxendale*, (1872) 156 Eng. Rep. 145 (L.R. Exch.) and describing the case as “the touchstone for setting the limits to special damages” in contract cases).

³⁰⁸ See 25 C.J.S. *Damages* §§ 133, 135 (2002); DOBBS, *supra* note 305, § 5.1, at 312.

³⁰⁹ DOBBS, *supra* note 305, § 6.2, at 438-40.

³¹⁰ See *supra* Part III.B.

narrower patent entitlement and a liability rule, resulting in a more balanced system overall:



1. Why Price Elasticity of Demand Matters

Price elasticity of demand is the measure of the sensitivity of changes in demand to changes in price.³¹¹ It is a principal driver of the patent machine because price elasticity determines the amount of rent a monopolist can extract. Price elasticity can vary significantly across product and geographic markets.³¹² With respect to price elasticity, Ramsey pricing models demonstrate it is efficient for a monopolist to price discriminate where price elasticity differs across market segments or along different points of the demand curve.³¹³

If price elasticity is small and market demand is large, the effect of some limited infringement on the patentee's rents will not be as significant – a substantial amount of consumer demand will remain at above-market prices even if an infringer can satisfy some of the demand at lower prices. If price

³¹¹ More formally, the price elasticity of demand, E_d , is the magnitude of the proportionate change in quantity demanded over the proportionate change in price. HAL VARIAN, *INTERMEDIATE MICROECONOMICS: A MODERN APPROACH* 265-71 (3d ed. 1993) (writing that in verbal discussion, elasticities have positive values even though their numerical values are usually negative). Where $E_d > 1$, price is relatively elastic; where $E_d < 1$, price is relatively inelastic. *Id.* at 267.

³¹² See Paul E. Schaafsma, *An Economic Review and Suggested Approach for Licensing Patent Applications*, 81 J. PAT. & TRADEMARK OFF. SOC'Y 340, 344 (1999) (“[T]he price elasticity of demand for a patented product is defined by several factors, including factors related to the legal, technical and marketing disciplines.”).

³¹³ See, e.g., Danzon & Towse, *supra* note 292, at 187 (“The Ramsey solution minimizes the welfare loss: more price-sensitive users should be charged a smaller mark-up over marginal cost than less price sensitive users, because the price-sensitive users would reduce their consumption by proportionately more, if faced with the same prices.”).

elasticity is large, the market demand is small, or the infringer is able to satisfy all or most of the market demand, the effect of infringement will negate the patent reward. Ayres and Klemperer's argument that the space created for infringement by uncertainty can enhance social welfare only holds for demand inelastic markets in which the infringer lacks capacity to satisfy a significant portion of overall demand.³¹⁴

This appreciation of the role of price elasticity suggests that a general, broad "lost profits" measure is not the best way to think of what constitutes "adequate remuneration" for infringement of a patent. What the patentee potentially loses as a result of infringement is rent that might be available as a result of the patent monopoly in a relatively price-inelastic market. One should think of patent remedies as a mechanism for shifting rents from the infringer back to the patentee. In other words, the optimal patent remedy should be a specific form of restitution, not a general award of lost profits.

This insight could help mitigate possible holdup problems because price elasticity is tied to necessity and substitutability. If a product is a "necessary" rather than a "luxury," it is more likely to be price inelastic.³¹⁵ If there are close substitutes for a product, there is likely to be a high cross-elasticity of demand between those products, and each individual product will be relatively price elastic.³¹⁶ If a product is a necessary and there are no close substitutes for it, demand will be relatively price inelastic.³¹⁷ It is exactly this kind of product – a necessary component for which there are no close substitutes – that can support a holdup problem. Otherwise, the party being held up could elide the component or choose a substitute.

2. Price Elasticity and Damages Where a Patent Covers Essentially the Entire Product, Method, or Process

The following examples illustrate how demand elasticity relates to damages where a patent covers essentially the entire product being sold. A patent on the formula for a pharmaceutical product is a typical real-world example of such a product.

³¹⁴ See Ayres & Klemperer, *supra* note 291, at 990 (arguing that giving patentees monopoly power for a short period is not as socially beneficial as giving the patentees limited market power for a longer period).

³¹⁵ See VARIAN, *supra* note 311, at 267-68.

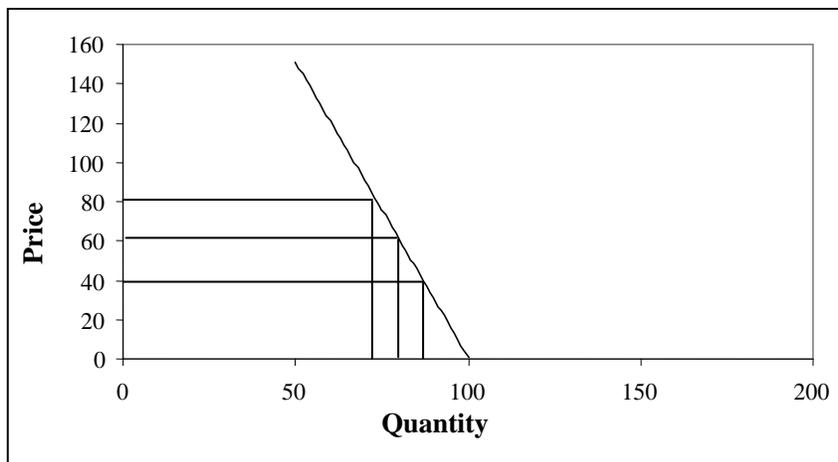
³¹⁶ *Id.* The *Panduit* factors already recognize the cross-elasticity of demand dynamic by requiring the patentee to show a lack of available market substitutes as part of the lost profits analysis. See *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978) (requiring that the patent owner must prove "absence of acceptable noninfringing substitutes" as one part of a four-factor test for recovering lost profits); *infra* note 321 and accompanying text.

³¹⁷ VARIAN, *supra* note 311, at 268.

Assume the patented product is a widget with a price elasticity coefficient of 0.33, with a quantity of one hundred demanded at a price of \$1.³¹⁸ Assume further that under perfect competition, the market price is \$40, and that the patentee can charge a monopoly price of \$80 without competition. The patentee's rent is approximately \$2500, and there are approximately ten units of unfilled demand compared to perfect competition.

Now assume that a single infringer can sell at a price of \$60, forcing the patentee also to sell at \$60. The available market rent is approximately \$1300. Compared to the circumstance in which the patentee is the only seller, there are five fewer units of unfilled demand. Figure 1 graphically illustrates this below:³¹⁹

Figure 1



But for the infringement, the patentee would have sold seventy-five units at \$80 for a profit of about \$3000 (assuming the competitive market price of \$40 per unit equals marginal cost). The following table illustrates the results of the infringer capturing different amounts of the overall market (the market size at \$60 is about eighty units):

³¹⁸ Under these circumstances, a change in price of \$3 will result in a decrease in demand of one unit.

³¹⁹ For a discussion of the relationship between revenue and price elasticity, see VARIAN, *supra* note 311, at 268-70 (suggesting that for an elasticity of -1, revenue will not change because an increase in price of one percent will result in a corresponding decrease in demand of one percent).

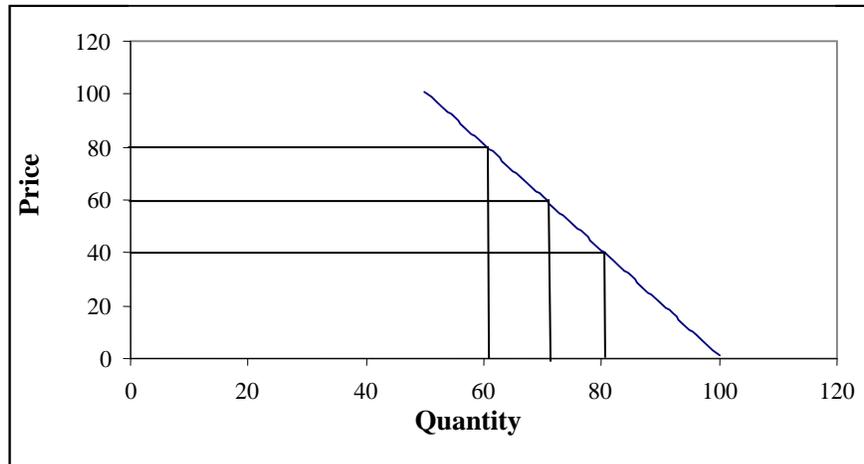
Table 6

Units Sold by Infringer	Patentee's Lost Rents	Infringer's Profits	Surplus (Loss) to Infringer After Disgorgement of Profits
10	\$400	\$400	0
20	\$800	\$800	0
30	\$1200	\$1200	0
40	\$1600	\$1600	0
50	\$2000	\$2000	0
60	\$2400	\$2400	0
70	\$2800	\$2800	0
75	\$3000	\$3000	0

As Table 6 makes clear, the measure of the patentee's lost rent is the same as the infringer's profits.

Following is another example using the same baseline but with a price elasticity coefficient of 0.5.

Figure 2



In this example, the monopoly rent is only \$26. The patentee's total rents at the monopoly price are \$2400.

Table 7

Units Sold by Infringer	Patentee's Lost Rents	Infringer's Profits	Surplus (Loss) to Infringer After Disgorgement of Profits
10	\$300	\$300	0
20	\$600	\$600	0
30	\$900	\$900	0
40	\$1200	\$1200	0
50	\$1500	\$1500	0
60	\$1800	\$1800	0
70	\$2100	\$2100	0
80	\$2400	\$2400	0

Again, the measure of the patentee's lost rents is the infringer's profits. This same pattern will hold true for any demand-elastic market. Under these circumstances, the public gains some additional welfare through the infringing use, the infringer's gain eventually transfers back to the patentee, and the infringer can stay in business because it still recovers its marginal costs.

What about demand inelastic markets? Assume a price of \$1 results in demand of one hundred units and the demand elasticity coefficient is 2.³²⁰ If a producer's marginal cost is \$40, buyers demand twenty-two units, resulting in \$880 in gross revenues. If the patentee attempts to raise the price to \$50, buyers only demand two units, resulting in \$100 in gross revenues and a \$780 loss. Raising the price only \$1 results in \$60 less in gross revenue and thus a \$60 loss. In fact, any price above marginal cost will result in a loss.

The same will hold true for any market with elastic demand. For example, in a market with a price elasticity coefficient of 1.5 at a price of \$40, buyers demand 41.5 units, resulting in gross revenue of \$1660; at a price of \$45, buyers demand thirty-four units, resulting in gross revenue of \$1530; and so on. In price-elastic markets, therefore, *infringement will never cause lost rents*. If there is demand for the infringing product that is not satisfied by the patentee, all other things being equal, it is because the patentee lacks the capacity to satisfy all the market demand.

In this sense, what we call "lost profits" in the patent damages jurisprudence is really a proxy for a restitutionary award in which rents taken by the infringer shift back to the patentee. Under existing law, however, the patentee is only entitled to those rents it would have made but for the infringement. This is

³²⁰ In this example, a price elasticity of demand of two means that raising the price \$1 results in two less units demanded.

implicit in the *Panduit* factors that courts use in order to assess evidence of the plaintiff's lost profits:

To obtain as damages the profits on sales he would have made absent the infringement, *i.e.*, the sales made by the infringer, a patent owner must prove: (1) demand for the patented product, (2) absence of acceptable noninfringing substitutes, (3) his manufacturing and marketing capability to exploit the demand, and (4) the amount of profit he would have made.³²¹

The Federal Circuit recognizes the *Panduit* factors represent a way of determining but-for causation between the infringement and the plaintiff's loss.³²²

The need for a causal nexus is one reason the Supreme Court has long held that the Patent Act prohibits any restitution of the infringer's profits.³²³ Restitution of all the infringer's gains, under this view, would allow the patentee to recover amounts that are not attributable to the value of the patent grant.³²⁴

This view sits at the continental divide between property and liability rules. If a patent is a broader entitlement subject to a property rule, a key component of that entitlement is the right to exclude. The Supreme Court perhaps narrowed the right to exclude somewhat in *eBay*, but it nevertheless affirmed that the right to exclude remains important.³²⁵ Injunctive relief protects the right to exclude going forward, but it does not vindicate the patentee's exclusionary interest prior to the date of infringement. In contrast, restitution of all the rents obtained by the infringer, regardless of the causal nexus to the patentee's lost profits, vindicates the exclusionary right. If the patentee cannot obtain restitution of all the infringer's profits resulting from the infringement, the remedy is more of a liability rule than a property rule.

It is here that the patent damages jurisprudence begins to exhibit traits of multiple personality disorder, however. The "no less than a reasonable royalty" floor often serves to "cover" those situations in which the patentee is unable to prove but-for causation between its own losses and the infringer's gains. Thus, the law lurches between property and liability rules, and the prospect of above-market litigation royalty awards leads to holdup and stacking problems.

³²¹ *Panduit Corp.*, 575 F.2d at 1156.

³²² *See, e.g.*, *Kearns v. Chrysler Corp.*, 32 F.3d 1541, 1551 (Fed. Cir. 1994).

³²³ *See Aro Mfg. Co., Inc. v. Convertible Replacement Co., Inc.*, 377 U.S. 476, 504-13 (1964) (holding that petitioners were not liable for contributory infringement because there was no causal nexus).

³²⁴ *Id.* at 512 ("Hence we think that after a patentee has collected from or on behalf of a direct infringer damages sufficient to put him in the position he would have occupied had there been no infringement, he cannot thereafter collect actual damages from a person liable only for contributing to the same infringement.").

³²⁵ *See eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 393-94 (2006).

If the patentee is unable to show lost profits, the Patent Act mandates at least an award of a reasonable royalty.³²⁶ In the demand-elastic market, however, there seems to be little justification for the royalty in terms of static efficiency. The infringer is fulfilling unmet market demand and there are no rents to be transferred back to the patentee. Under these circumstances, everything else being equal, infringement will always *enhance* social welfare by making more of the product available to satisfy market demand.

In terms of dynamic efficiency, it might be true that a rule that does not permit the patentee to extract damages from an infringer in a demand elastic market would inhibit innovation in such markets. It may be, however, that this is exactly the right result as a first approximation. If price is elastic, the good is likely to be a luxury rather than a necessity.³²⁷ A damage rule that tends to favor innovation concerning necessities is, on the whole, likely to result in innovation that has greater social utility. If, for example, a damage rule could serve as a tool to encourage investment in cancer research (cancer patients surely would consider effective treatments a necessity) instead of an improved treatment for male pattern baldness (a luxury compared to a cancer cure), that might be socially valuable.

Of course, the fact that luxury goods remain important in developed economies suggests that the real world is not as simple as the models presented above. If luxury goods are price elastic and afford no opportunity for monopoly rents, why are they ever produced? And why is patent protection so important to firms that produce goods we might think of as luxuries, such as baldness cures?

One answer is the effect of branding and marketing on demand. Demand for “Veblen goods” increases as the price rises because price and branding are signals of status.³²⁸ This status signaling allows producers such as Lexus to charge premium prices on cars that are essentially the same as much lower-priced Toyota Camrys.

Another answer is that the models presented above employ a constant price elasticity coefficient at every point on the curve for illustrative purposes. In the real world, price elasticity can differ at different points along the demand

³²⁶ See 35 U.S.C. § 248 (2000) (“Upon 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, together with interest and costs as fixed by the court.”).

³²⁷ See VARIAN, *supra* note 311, at 267.

³²⁸ For a discussion and critique of the notion of Veblen goods, see Richard McAdams, *Relative Preferences*, 102 *YALE L.J.* 1, 39-44 (1992) (describing the underpinnings of Veblen goods by stating “(1) people compete for symbols not only to convey or exaggerate their wealth, but to display their sense of ‘fashion’ and good taste, and (2) social norms against overt status competition exist, but rather than eliminating the competition, they drive it into less obvious forms.”).

curve and across different market segments.³²⁹ This is particularly true for luxury goods and other non-necessary items, for which overall demand tends to be elastic.³³⁰

The few consumers who are willing to pay high prices for luxuries tend to have high incomes. This effect can be quantified as the “income elasticity of demand,” which is a measure of the ratio of changes in consumer income to changes in quantity of a good demanded.³³¹ Luxury goods have higher income elasticities than necessary goods.³³² Goods with negative income elasticities are “inferior” goods, because consumers will tend to switch to substitutes as their incomes rise.³³³ There are enough wealthy American and European men willing to pay premium prices for baldness cures such that substantial rents are available in the market segment.

Under either of these circumstances, however – Veblen goods, or goods for which there is demand elasticity in some market segment – the patentee would be able to obtain restitution of those rents under a rule that emphasizes demand elasticity for the portions of the market that are demand elastic. The prospect of such rents is, theoretically, what drives producers to innovate and seek patent protection in the first place. Eliminating the reasonable royalty minimum therefore should not affect dynamic efficiency with respect to such goods.

A more practical problem with using price elasticity in connection with damages is that precise elasticity data will often be difficult to obtain, although in some cases historical data or expert testimony will be available. The point, however, is not to peg damages precisely to elasticity. In typical markets, the amounts by which the patentee and the infringer are able to raise prices above their marginal costs should serve as an approximate barometer of the price elasticity of demand.³³⁴ The parties could introduce any relevant evidence to show that the market in question is atypical. In general, however, courts could presume that any amounts the infringer made on sales of the patented product, process, or method above its marginal costs are attributable to price elasticity

³²⁹ VARIAN, *supra* note 311, at 271-72.

³³⁰ *Id.*

³³¹ *Id.*

³³² Specifically, goods with income elasticities greater than 1 are luxuries, and those with income elasticities between 0 and 1 are necessities. *Id.*

³³³ *Id.*

³³⁴ *See, e.g.*, RICHARD A. POSNER, ANTITRUST LAW: AN ECONOMIC PERSPECTIVE 71-72 (2001). As Judge Posner describes:

Although elasticities of demand are difficult to measure . . . economists spend a good deal of time trying to estimate demand elasticities, with at least partial success. And even if direct measurements of the elasticity of demand are deemed hopelessly unreliable, it is often possible to estimate the elasticity indirectly If, for example, a product has no good substitutes at the current price, that is at least some evidence, albeit not conclusive, that the demand for the product is inelastic at that price.

Id.

and can be disgorged by the plaintiff. In other words, restitutionary damages will usually maximize social utility.³³⁵

It would be clean and efficient to make restitution of net profits the *only* remedy initially available to the patentee. This would properly reflect the role of price elasticity of demand in the patent system without unduly penalizing infringement that might be socially beneficial. It also would simplify the evidentiary issues relating to proof of damages and eliminate the problems caused by the entire market value and convoyed sales rules, as discussed in the next Subsection. Therefore, if Congress makes any change to § 284 of the Patent Act, it should adopt a restitutionary measure as the principal damages available to a patentee. Short of such a measure, courts should admit evidence on price elasticity of demand to help evaluate the extent to which lost profits claimed by the plaintiff are related to the specific economic benefit of the patent grant.

3. Price Elasticity and Damages Where the Patented Product Is Only a Component of a Finished Product

A restitutionary award is somewhat more complicated when the patent covers only one component of the finished product. I have argued that the patentee is entitled to any market rents made available by the patent grant. This does not, however, entitle the patentee to all the *spillover* benefits resulting from the invention covered by the patent.³³⁶ Innovation often produces spillover benefits such as synergies created when an inventor combines an innovation with other innovations and/or existing technologies.³³⁷ The patentee is not entitled to appropriate all of those spillover benefits.³³⁸ In fact, the classic “holdup” problem is an effort by a patentee to leverage potential spillovers. The patentee is entitled only to the rents attributable to her invention.

The congressional reform proposals seek to protect spillovers from appropriation by apportioning the value of the patented invention against the prior art. As discussed above,³³⁹ this is both practically unworkable and

³³⁵ The Supreme Court has construed the Patent Act to preclude restitutionary damages. *See Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 506 (1964) (“There can be no doubt that the amendment succeeded in effectuating this purpose; it is clear that under the present statute only damages are recoverable.”). The Court’s analysis of this issue in *Aro* is historically suspect. *See* Roger D. Blair & Thomas F. Cotter, *supra* note 284, at 1596 n.45 (discussing that the legislative history of the Patent Act’s amendments suggests that the courts are meant to refrain from awarding restitutionary damages).

³³⁶ *See* Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257, 258 (2007) (defining spillovers as “uncompensated benefits that one person’s activity provides to another”).

³³⁷ *See id.*

³³⁸ *See id.*

³³⁹ *See supra* Part IV.B.2.

doctrinally suspect. A better approach is to focus on the price elasticity of demand *for the component*.

For example, assume that the infringer sells device X, which incorporates patented widget Y. Widget Y is a simple mechanical component, for which the marginal costs of production are one dollar. It would be relatively easy under these circumstances to estimate the price elasticity of demand for the component, determine the amount above marginal cost (if any) that the price elasticity would allow the component to be priced, multiply the resulting rent by the number of infringing units sold, and require that amount of the defendant's profits to be transferred to the plaintiff.

The question is somewhat more difficult if the "component" patent relates to a method or process. Methods and processes are often licensed rather than sold, and when they are sold, they often do not function as commodities for which marginal costs or competitive market prices can be established. Moreover, the patent trolls that are the focus of much of the current reform effort often assert broad business method patents.

Under these circumstances, a good proxy for direct price elasticity data would be substitutability. In many cases, this might be shown by assessing cross price elasticity of demand for the method or process. Cross price elasticity of demand is the measure of how much a change in price for one good affects the demand for a related good.³⁴⁰ It is an important consideration in determining the relevant product market in an antitrust analysis.³⁴¹ The

³⁴⁰ See *Brown Shoe Co., Inc. v. United States*, 370 U.S. 294, 325 (1962) ("The outer boundaries of a product market are determined by the reasonable interchangeability of use or the cross-elasticity of demand between the product itself and substitutes for it."); WILLIAM C. HOLMES, INTELLECTUAL PROPERTY AND ANTITRUST LAW § 6.3 (2008) (finding that the degree of "cross-elasticity of demand" is one of the two factors in determining the "relevant product market" in antitrust disputes).

³⁴¹ See, e.g., *Brown Shoe Co.*, 370 U.S. at 325 ("However, within this broad market, well-defined submarkets may exist which, in themselves, constitute product markets for antitrust purposes."); U.S. FED. TRADE COMM'N, HORIZONTAL MERGER GUIDELINES § 1.1 (1992) [hereinafter FTC MERGER GUIDELINES]. Under the 1992 Federal Trade Commission Horizontal Merger Guidelines, in order to determine relevant product markets for purposes of assessing the economic impact of a proposed merger, the FTC will create models to determine whether consumers will switch to alternative products after a "small but significant nontransitory increase in price" (commonly called a "SSNP") by a hypothetical monopolist. *Id.* § 1.11 ("In performing successive iterations of the price increase test, the hypothetical monopolist will be assumed to pursue maximum profits in deciding whether to raise the prices of any or all of the additional products under its control."). If the reduction in the hypothetical monopolist's sales resulting from consumers switching products is sufficiently large, the alternative product will be included in the definition of the relevant market. *Id.* ("The Agency generally will consider the relevant product market to be the smallest group of products that satisfies the test.").

“absence of acceptable noninfringing substitutes” *Panduit* factor for lost profits essentially mandates this sort of analysis.³⁴²

In a merger analysis, after establishing a relevant product market, the potential of the merged firm to exercise “market power” must be assessed.³⁴³ Measuring the market shares of firms in the relevant market and assessing various factors that may bear on whether the merged firm could raise prices above competitive levels accomplishes this analysis.³⁴⁴ The Herfindahl-Hirschman Index (commonly called the “HHI”) is an empirical measure of market concentration used to gauge whether a merged firm is likely to be able to exercise market power.³⁴⁵ In antitrust cases involving patents, particularly in cases challenging tying arrangements, a similar analysis of market power over the patented product must be conducted.³⁴⁶

The degree of market power possessed by the owner of a patent on a method or process is a measure of the potential rents the patentee can control by virtue of the patent. Further, because this market definition/market power exercise focuses on substitutability, the resulting measure for a component patent is also a measure of how important the patented invention is to the infringing downstream product that incorporates it. Accordingly, a component patent that results in a high HHI in the component product market entitles the patentee to a relatively large share of the profits on the downstream product; lower HHI

³⁴² *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978).

³⁴³ See FTC MERGER GUIDELINES, *supra* note 341, § 2.

³⁴⁴ See *id.*

³⁴⁵ See U.S. Dep’t of Justice, The Herfindahl-Hirschman Index, <http://www.usdoj.gov/aatr/public/testimony/hhi.htm> (last visited Oct. 2, 2008). The Department of Justice describes the HHI as follows:

The HHI takes into account the relative size and distribution of the firms in a market and approaches zero when a market consists of a large number of firms of relatively equal size. The HHI increases both as the number of firms in the market decreases and as the disparity in size between those firms increases.

Id.

³⁴⁶ 35 U.S.C. § 271(d) (2000) (stating that a patentee shall not be denied relief if the patentee “conditioned the license of any rights to the patent or the sale of the patented product on the acquisition of a license to rights in another patent or purchase of a separate product”); *Ill. Tool Works, Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 46 (2006) (holding that “in all cases involving a tying agreement, the plaintiff must prove the defendant has market power in the tying product” because a patent “does not necessarily confer market power upon the patentee”); U.S. DEP’T OF JUSTICE AND U.S. FED. TRADE COMM’N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY § 2.2 (Apr. 6, 1995), available at <http://www.usdoj.gov/aatr/public/guidelines/0558.pdf>. It is, of course, not an antitrust violation in itself to possess market power by virtue of a patent. See *id.*

scores would entitle the patentee to smaller percentages of downstream profits.³⁴⁷

4. Price Elasticity, Entire Market Value, and Convoyed Goods

Accounting for the role of price elasticity of demand suggests refinements to the entire market value and convoyed-goods rules. Concerning the entire market value rule, courts could presume that if the infringer earned amounts above marginal cost on sales of a product, process, or method that incorporates the claimed invention as a component, those amounts are rents attributable to the patent acting in a relatively price-inelastic market which should shift back to the patentee. The infringer could offer any relevant evidence to rebut this presumption – for example, that the entire product benefits from other patents, branding, a first mover advantage, or some other factor that allows the infringer to price above marginal cost. Of course, if the infringer sells the entire product at marginal cost, this means no rents are attributable to the patent, and consequently no damages are due.

Taking price elasticity into account also helps clarify the debate about convoyed sales. Often, as in *Rite-Hite*, the convoyed products allegedly damaged by the infringement are not competitive with any products sold by the infringer.³⁴⁸ A restitutionary award will not provide any damages to the patentee under such circumstances. This may suggest that opponents of damages for convoyed sales are correct: the economic value of a patent is the ability to obtain rents on the patented product in relatively demand-inelastic markets. If the infringer has not appropriated any such rents with respect to convoyed sales, no remuneration is appropriate.

Courts could still ask whether the patent enabled the patentee to charge above-market rents for the convoyed products. Customers might be willing to pay above-market prices for the convoyed item if that is the only way to obtain the patented item as well. Under such circumstances, the infringer has deprived the patentee of rents even though the patentee did not appropriate those rents.

³⁴⁷ The Department of Justice states that “markets in which the HHI is between 1000 and 1800 points are considered to be moderately concentrated, and those in which the HHI is in excess of 1800 points are considered to be concentrated.” U.S. Dep’t of Justice, *supra* note 345.

³⁴⁸ See *Rite-Hite Corp. v. Kelley Co., Inc.*, 56 F.3d 1538, 1543 (Fed. Cir. 1995) (awarding damages for loss of sales on dock levelers that did not compete directly with restraints sold by defendant). This approach does not, of course, solve the problem of overly-broad method patents that should not have been granted over the prior art. As discussed in Part IV.B, that is an issue relating to the substantive requirements for patentability and perhaps to the efficiency of the Patent Office. Reforms in those areas may be appropriate, but they should not be approached “through the back door” via damages reform.

As policy matter, however, it is better not to require the infringer to pay damages for such losses. Absent a strict tie between the patented and unpatented products, the infringer has shifted surplus relating to the convoyed products back to consumers. If the patentee tied patented and unpatented products together, this might represent an antitrust problem.³⁴⁹ In short, attention to the dynamics of the price elasticity of demand suggests that lost convoyed sales should not be available as a component of patent damages.

CONCLUSION

The debate over patent damages reform is in reality a fight over the fundamental nature of the patent grant. The principal architects of reform are established computer technology companies for which patents are not a significant form of protection. They wish to squeeze patents further into the shape of a narrow contract-like right subject to a liability rule. The principal opponents of reform are patent-rich industries, such as pharmaceuticals and biotechnology, which wish to retain a broad patent franchise subject to a property rule.

Empirical studies of damages in patent cases do not reveal a systemic problem of the sort trumpeted by reform advocates. There are, to be sure, occasional enormous outlier verdicts, but there is no indication that these result from inflated royalty calculations, as the reformers suggest. Moreover, the reform proposals, which would require courts to apportion the economic value of a patented invention against the prior art, impinge too heavily on the utility, novelty, and non-obviousness requirements for patent validity. These proposals should be rejected.

The reformers are correct, however, in their intuition that patent damages are not properly tied to economic function of patents. In particular, current patent damages law ignores the crucial factor of price elasticity of demand. Attention to this demonstrates that the optimal patent damages regime is one in which the usual award is restitutionary. If Congress or the courts make any changes to current patent damages law, it should be to include an assessment of price elasticity in the damages calculation, and to move towards a restitutionary damages scheme. This change would help maintain the balance of a patent entitlement that is neither too expansive nor overly constricted.

³⁴⁹ For a discussion of patents and tying arrangements, see *Ill. Tool Works, Inc.*, 547 U.S. at 42 (2006) (holding that tying arrangements involving patents are subject to a rule of reason analysis).