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The Economics of Reasonable Royalty Damages: The Limited, Proper Role of the So-Called “Analytical Method”, 49 J. Marshall L. Rev. 1 (2015)

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THE ECONOMICS OF REASONABLE ROYALTY DAMAGES: THE LIMITED, PROPER ROLE OF THE SO-CALLED “ANALYTICAL METHOD”

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I. INTRODUCTION

The patent statute directs that “[u]pon finding for the claimant the court shall award the claimant damages *adequate to compensate for the infringement*, but in no event less than a reasonable royalty *for the use made of the invention by the*

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infringer”¹ The statute, therefore, defines two general categories of damages recoverable for patent infringement—lost profits or a reasonable royalty. The requirements for legal causation (as well as the express language of the statute) compel that both forms of damages are properly tied and limited to the infringing activity.

Upon proper proof, lost profits are recoverable, but those profits are only to “compensate for the infringement.”² The task of the trier of fact, and the lawyers and experts who inform the trier of fact, is to reconstruct the “but for world.” What would the patent owner’s financial condition have been had the infringer not infringed? The patent owner is only to be compensated for the infringement, not for factors extraneous to use of the patented invention.

Reasonable royalty damages are similarly properly limited to compensate “for the use made of the invention by the infringer.”³ Both the royalty base and the royalty rate must be circumscribed by the value added by the patented invention. Values attributable to non-claimed features of a product or method of manufacture, or to any other extraneous factor (e.g., business acumen, advertising, reputation) are properly excluded from the calculus. And it is the duty of the judge to make sure that reasonable royalty damages models presented to triers of fact are properly so circumscribed.

While both forms of damages are properly limited to the value added by the patented invention, they do differ in terms of their focal point. Lost profits damages look to the benefit lost by the patent owner. Accordingly, it is the patent owner’s “but for” price, sales volume, manufacturing and marketing capacity, and profit margin—not those of the infringer—that are most relevant.⁴ In contrast, reasonable royalty damages focus on the value of “the use made of the invention by the infringer”⁵—or perhaps, more accurately, the anticipated value of the use to be made of the invention at the time the infringement began, for it is that anticipated value that drives half of the willing licensor/willing licensee analysis. Accordingly, the evidentiary and expert inquiry is properly focused on the infringer’s anticipated price, sales volume, cost structure, and profit margin. Microeconomic principles inform both of these inquiries and triers of fact confronted with either (or both) type of damages will benefit from cogent analysis from economic professionals.

¹ 35 U.S.C. § 284 (West 2012) (emphasis added).

² *Id.*

³ *Id.*

⁴ *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978).

⁵ 35 U.S.C. § 284.

But, how does one go about determining what is “adequate to compensate for the infringement” or a “reasonable royalty for the use made of the invention by the infringer”? In recent years, the Federal Circuit has significantly reshaped the law of lost profits in a direction aligned with microeconomic principles.⁶ More recently, the Federal Circuit appears to have initiated a similar overhaul of the rules for calculating a reasonable royalty.⁷ That process is at an earlier stage of development, however, and, at least in our view, could benefit from a more fulsome understanding of the underlying microeconomic principles and a more careful application of their teachings. We offer this modest contribution to that quest. In particular, our thesis is that the so-called “analytical method” approach to a reasonable royalty, as applied by some damages experts and some courts, cannot be reconciled with basic economic principles. We argue that, once the economic flaws in that method are corrected, the analytical method is not, as some have professed, an entirely separate methodology from the willing licensor/willing licensee paradigm,⁸ but rather resolves down to basically one of the steps in the willing licensor/willing licensee analysis—a step in which the upper boundary of the reasonable royalty range is identified. As a consequence, the analytical method in our view makes no independent contribution to the law of patent damages separate from the willing licensor/willing licensee framework.

In pursuit of this thesis, we first discuss the emergence of the so-called analytical method and identify its various iterations. We next identify the economic deficiencies of the analytical method as applied in the case law, and contrast that with the more economically robust Federal Circuit law developed in lost profits cases. Finally, we discuss the properly limited use of the analytical method and its contribution towards arriving at an appropriate reasonable royalty. Although Federal Circuit law on calculating a reasonable royalty is in flux, we contend that its general direction is consistent with our argument and hope that our modest contribution will advance the law’s development in this area.

⁶ See discussion at section III, *infra*.

⁷ See discussion at section IV, *infra*.

⁸ John Skenyon, Christopher Marchese & John Land, *Patent Damages Law & Practice* § 3:8 (West 2015) (describing the “analytical approach” as “really ha[ving] little to do with any hypothetical licensing negotiation”); DANIEL JACKSON, AICPA, *Calculating Intellectual Property Infringement Damages*, BUSINESS VALUATION & FORENSIC & LITIGATION SERVICES SECTION PRACTICE AID 06-1, at 59-60 (Daniel L. Jackson ed. 2006).

II. THE ANALYTICAL METHOD

A. Pre-Federal Circuit Roots

The first appearance of what would later be called the “analytical method” was in the Second Circuit’s opinion in *Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers*,⁹ the same case that, at the district court level, spawned the now famous 15 factors.¹⁰ In that appeal, Georgia Pacific (“GP”) challenged the

⁹ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 446 F.2d 295 (2d Cir. 1971), *cert. denied*, 404 U.S. 870 (1971).

¹⁰ The fifteen factors are:

1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.
2. The rates paid by the licensee for the use of other patents comparable to the patent in suit.
3. The nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold.
4. The licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly.
5. The commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promoter.
6. The effect of selling the patented specialty in promoting sales of other products of the licensee; that existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales.
7. The duration of the patent and the term of the license.
8. The established profitability of the product made under the patent; its commercial success; and its current popularity.
9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.
10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.
11. The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.
12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions.
13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.
14. The opinion testimony of qualified experts.

reasonableness of the district court's awarded royalty resulting from application of the "willing buyer-willing seller" analysis and the fifteen *Georgia Pacific* factors.¹¹ The district court awarded a royalty of \$50 per thousand square feet on GP's infringing striated plywood.¹² According to GP, that royalty left it with virtually no profits on the sale of the product.¹³ The record evidence showed that a thousand square feet of striated plywood sold for \$159.41.¹⁴ After costs were subtracted, the expected profit was \$50.00, thus leaving no profit after application of a \$50.00 royalty.¹⁵ GP contended that such a royalty was per se unreasonable because no rational licensee would agree to a royalty that left it with no profit in the voluntary negotiation posited by the willing buyer-willing seller framework.¹⁶ The Second Circuit agreed, finding that "the royalty imposed . . . gobbles up all of GP's expected profit"¹⁷ and "fails to leave GP a reasonable profit on its sale of striated plywood."¹⁸

To remedy this deficiency, the Second Circuit looked to GP's financials, which revealed that GP's average profit margin¹⁹ for all its products was approximately 9%. The court reasoned that, in the hypothetical willing licensor/willing licensee negotiation, "GP would have been willing to pay a royalty which, after payment of its other costs, would leave it nine per cent profit on sales of the licensed

15. The amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement; that is, the amount which a prudent licensee—who desired, as a business proposition, to obtain a license to manufacture and sell a particular article embodying the patented invention—would have been willing to pay as a royalty and yet be able to make a reasonable profit and which amount would have been acceptable by a prudent patentee who was willing to grant a license.

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

As we develop below, it is appropriate that the analytical method would trace its roots back to *Georgia Pacific*, as in our view the method is best viewed as a support to, not a separate test from, the willing licensor/willing licensee paradigm.

¹¹ *Georgia-Pacific*, 446 F.2d at 296.

¹² *Georgia-Pacific*, 318 F. Supp. at 1143.

¹³ *Georgia-Pacific*, 446 F.2d at 299.

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ Interestingly, the original application of the fifteen *Georgia-Pacific* factors led to an insupportable and unrealistic result.

¹⁷ *Georgia-Pacific*, 446 F.2d at 299.

¹⁸ *Id.* at 297.

¹⁹ *Id.* at 299-300. Profit margin is defined as the gross or net profits on a firm's income statement divided by its sales for some period of time.

item”²⁰—the average margin it earned on its other products.²¹ The court accordingly reduced the awarded per unit royalty by 9% or \$14.35, leaving a unit royalty of \$35.65 or 22%.²² Thus, the court effectively assumed that GP’s average profit margin on all of its products was a suitable proxy for a “normal” profit margin on non-patented striated plywood, and that any margin above that average was appropriately attributed to the patented invention.

Accordingly, even in its first application, what would later be termed the “analytical method” was used in the context of the willing licensor/willing licensee framework. How that analysis would later morph into a purportedly independent, alternative method of calculating a reasonable royalty remains a mystery.

It took six years for the analytical method, albeit still unnamed, to reemerge in a published opinion—the Court of Claims’ decision in *Tektronix, Inc. v. United States*.²³ The plaintiff in that case, Tektronix, manufactured oscilloscopes, instruments used to observe changes in an electrical signal over time. The U.S. Government (itself a named defendant) procured 17,542 infringing scopes over a ten-year period from the other defendants. That the competing scopes infringed was not subject to reasonable dispute.²⁴ Indeed, the court found that the government, “unable to obtain comparable, noninfringing scopes from alternative sources, tailored its procurement specifications in such a way as to make infringement of plaintiff’s patents a virtual prerequisite for obtaining the Government contracts.”²⁵

Tektronix maintained that “reasonable compensation” to it under 28 U.S.C. § 1498 would be lost profits on the scopes it could have produced and sold, and a reasonable royalty on the remaining sales.²⁶ The court rejected Tektronix’s request for lost profits and instead held that it was entitled only to a reasonable royalty on all of the infringing sales.²⁷ To calculate the resulting damages, the court adopted the method used by the Second Circuit in *Georgia-Pacific*, characterizing it as the “willing-buyer/willing-seller concept”:

In *Georgia-Pacific*, the court reasoned that had the infringer taken a license rather than infringe, the infringer would have been willing to

²⁰ *Georgia-Pacific*, 446 F.2d at 300.

²¹ The court did not, at least expressly, analyze the other half of the hypothetical negotiation—whether 9 percent would have been acceptable to the licensor.

²² *Georgia-Pacific*, 446 F.2d at 300 n.3.

²³ *Tektronix, Inc. v. United States*, 552 F.2d 343 (Ct. Cl. 1977).

²⁴ *Id.* at 345.

²⁵ *Id.* In fact, one competing bidder was so bold as to respond to the invitation to bid by offering a “Tektronix, Inc. Model 535 as manufactured by Hickok.” *Id.*

²⁶ *Id.* at 346.

²⁷ *Id.* at 348-49. The court found that Tektronix failed to show it would have procured those contracts but for the infringement. *Id.* at 349.

pay as a royalty the sale price of the patented article as sold by the infringer, minus the cost of manufacturer [sic] of the article and minus the infringer's usual profit. In that case, the infringer's usual profit was 9% so that 9% of the selling price was deducted from the profit pool generated by the sale of the patented article and awarded to the infringer, while the remainder of the profit constituted the royalty to be remitted to the patentee. On the facts in that case, the royalty, expressed as a percentage, was 22.36% of the infringer's sale price.²⁸

Applying that approach, the Court of Claims calculated the damages to be awarded to Tektronix as follows: "Start with the infringer's selling price, deduct its costs in order to find its gross profit, then allocate to the infringer its normal profit,²⁹ and end up with the residual share of the gross profit which can be assigned to the patentee as its royalty."³⁰ This resulted in a calculated royalty rate of 7.65%. The court then increased the rate to 10% because, according to the court, "[t]his represents our best judgment, on the material we have before us, of what reasonable 'parties might well have agreed upon.'"³¹

In our view, the *Tektronix* court's articulation and application of the test has important implications for proper application of the analytical method today. First, the court described the process as a "negotiation formula,"³² reinforcing its legal moorings to the hypothetical willing licensor/willing licensee approach, not professing to provide any basis for a separate approach. Indeed, in increasing the royalty to 10% from the calculated rate of 7.65%, the court expressly applied the willing-buyer/willing-seller construct, which it, quoting Judge Learned Hand, described as a "device in aid of justice"³³:

We do not, however, stop with the 7.65% of unit price which our own calculation produces for plaintiff's residual share. We think that a reasonable patentee in the position of plaintiff, which was realizing a profit in excess of 25% on its own non-Government sales of oscilloscopes, would have insisted on a somewhat higher royalty than 7.65%, and that a reasonable potential licensee would have agreed, in order to be able to sell the item without legal question—even if at a somewhat higher price than if no royalty were to be paid. Such a potential licensee, if reasonable, would recognize that plaintiff, which took the risks and bore the expense of developing the scopes and creating a market for them, was entitled to substantial compensation

²⁸ *Id.* at 349.

²⁹ The infringer's "normal profit" was based on an eight-year average profit margin of 2.7%. *Id.* at 350, n.10.

³⁰ *Id.* at 349.

³¹ *Id.* at 351.

³² *Id.* at 349.

³³ *Id.* (citing *Cincinnati Car. Co. v. N.Y. Rapid Transit Corp.*, 66 F.2d 592, 595 (2d. Cir. 1933)).

for those efforts and for its ingenuity in creating this important and effective instrument.³⁴

Second, the court recognized that fair compensation was appropriately limited to the value added by the patented invention:

[W]e do not believe that such a reasonable potential licensee would be willing, or could be expected to be willing, to pay as a royalty the 25% or so plaintiff was making in profit on its own non-Governmental sales of scopes. A portion of that 25% profit represented compensation, not for the patented idea itself, but for the efficiencies and risks of manufacture as well as the investment of other capital. Certainly that portion of the plaintiff's profit is separate and apart from any compensation due it for use of its patents. In any event, a royalty of 25% is very high and unlikely to be paid by a willing licensee which is content to make a very low profit for itself.³⁵

Thus, the pre-Federal Circuit cases from which subsequent decisions purport to draw support for the “analytical method” provide no sure footing for its now-claimed status as a purportedly wholly separate method for arriving at “a reasonable royalty for the use made of the invention by the infringer” as required by the patent statute. Rather, those cases properly limit the analytical method to help define the bounds, or at least a starting point, for application of the traditional willing licensor/willing licensee construct.

B. *Post-Federal Circuit Creation Applications of the Analytical Method*

As far as we can ascertain, the title “analytical approach” or “analytical method” traces its origin to the Federal Circuit’s 1986 decision in *TWM Mfg. Co., Inc. v. Dura Corp.*³⁶ In that case, the Federal Circuit reviewed a special master’s report (adopted in full by the district court) over challenges by the infringer that the resulting damages were “grossly excessive.”³⁷ The Federal Circuit referred to the special master’s damage method as the “analytical approach”:

The special master, citing *Georgia-Pacific* and *Tektronix*, used the so-called “analytical approach,” in which she subtracted the infringer’s usual or acceptable net profit from its anticipated net profit realized from sales on infringing devices.³⁸

³⁴ *Tektronix*, 552 F.2d at 350. Of course, by raising the reasonable royalty 2.35% to 10%, the court essentially took all of the infringer’s “normal profit,” leaving it a scant .35% margin.

³⁵ *Id.* at 350-51.

³⁶ *TWM Mfg. Co., Inc. v. Dura Corp.*, 789 F.2d 895 (Fed. Cir. 1986).

³⁷ *Id.* at 898.

³⁸ *Id.* at 899. The Special Master’s report appears to have coined the phrase. See Report of Special Master Pursuant to F.R.C.P. 53 at 3, *TWM Mfg. Co. v. Dura Corp., Inc.*, No. 74-72852, 1985 WL 72665 (E.D. Mich. Oct. 29, 1984) (“For

As explained by the special master, “[t]his analytical approach takes the anticipated net profit realized by the infringer from sales of the infringing device and subtracts the usual or acceptable net profit of the infringer.”³⁹

The special master’s calculation began with the selling price of the infringing device:

Relying principally on a memorandum written by [the infringer’s] ‘top management’ before the initial infringement, the special master found that [the infringer] projected a gross profit averaging 52.7% from its infringing sales. From that figure, she subtracted overhead expenses to get an anticipated net profit in the range of 37% to 42%. Subtracting the industry standard net profit of 6.56% to 12.5% from that anticipated net profit range, she arrived at a 30% reasonable royalty.⁴⁰

The Federal Circuit upheld the 30% royalty under the applicable abuse of discretion standard, concluding that the infringer had “not persuaded this court that a 30% royalty does not reflect what a willing licensor and licensee would have agreed to in 1967, based on the present record.”⁴¹

Far from endorsing a new and separate approach for calculating reasonable royalty damages as some have argued,⁴² both the *TWM Mfg.* court⁴³ and the parties⁴⁴ acknowledged that the willing licensor/willing licensee construct was the governing test and that the analytical approach was being applied in support of, not as a substitute to, that test. Moreover, the court’s affirmance of a 30% royalty rate is likely more attributable to the infringer’s failure to engage on the specifics of the special master’s analysis (e.g., using an industry standard net profit as the proxy measure for “normal profit”) and the underlying record in light of the governing abuse of discretion standard,⁴⁵ as it is to a full-throated

the reasons stated below this Magistrate agrees that the analytical approach cited in *Georgia-Pacific, supra*, and *Tektronix, supra*, is appropriate to the case at bar.”).

³⁹ Report of Special Master, *supra* note 38, at 3.

⁴⁰ *TWM Mfg.*, 789 F.2d at 899.

⁴¹ *Id.* at 900.

⁴² Patent Damages Law & Practice at § 3:8.

⁴³ *TWM Mfg.*, 789 F.2d at 900.

⁴⁴ *Id.* at 898.

⁴⁵ *See id.* at 899 (“On appeal, an infringer cannot successfully argue that the district court abused its discretion in awarding a ‘high’ royalty by simply substituting its own recomputation to arrive at a lower figure.” “Dura’s pointing to facts that might have supported a lower royalty does not sustain its burden of showing that the district court abused its discretion in adopting the facts found by the special master. Nor does it establish that the special master’s findings were clearly erroneous.”), 900 (“The special master properly rejected Dura’s effort to downplay the significance of its pre-infringement internal memorandum, because it was more probative than profits realized shortly after the infringement, because Dura’s loss of its documents precluded TWM from showing lost profits, and because Dura used the figures in the memorandum in

endorsement of the analytical approach, let alone any suggestion that such approach may stand independent of the willing licensor/willing licensee construct.

In 1990, Judge Mazzone of the District of Massachusetts was tasked with calculating an appropriate award of damages arising out of a 14-year patent infringement dispute between Polaroid and Kodak involving Kodak's infringement of multiple Polaroid instant photography patents.⁴⁶ At the conclusion of a ninety-six day bench trial, the court awarded a hybrid lost profits/reasonable royalty award that, with a pre- and post-judgment interest award essentially equivalent to the calculated royalty damages, totaled over \$900 million⁴⁷—which, incidentally, was only a fraction of what Polaroid sought.⁴⁸

The court's analysis of the reasonable royalty portion of the damages is of most interest to our discussion. First, the court identified "two generally accepted approaches to the determination of a reasonable royalty"⁴⁹: (1) the "analytical approach" of *TWM Mfg.*, which the court described as "requir[ing] an analysis of evidence bearing on Kodak's entry into the market, including its own internal profit projections";⁵⁰ and (2) "the construction of a hypothetical negotiation between a willing licensor and willing licensee," with the court citing *Georgia-Pacific* and *Panduit* as examples of this second approach.⁵¹ As far as we can ascertain, this is the first instance of a court identifying the analytical approach of *TWM* as a *separate* method for determining a reasonable royalty. Although, interestingly, the *Polaroid* court arrived at the same "reasonable" royalty rate using each approach, and expressed its ultimate conclusion in terms of what the parties "would have agreed upon":

Considering all the factors applicable to *either* approach, and taking into account all of the facts and circumstances, I conclude Polaroid and Kodak would have negotiated in good faith and, taking into account all of the information available to both sides, would have agreed upon a royalty of ten percent, or slightly more than sixty percent of Kodak's anticipated profits through 1986 on those sales of camera and film on which lost profits were not sufficient or could not be proved. I also conclude that, independently of any negotiated royalty rate, and after an analysis of Kodak's February 1976

deciding whether to manufacture and market the infringing device." "The special master properly resolved the difficulty in determining the royalty figure against Dura as an infringer which had lost its records.").

⁴⁶ *Polaroid Corp. v. Eastman Kodak Co.*, No. 76-1634-MA, 1990 WL 324105 (D. Mass. Oct. 12, 1990).

⁴⁷ *Id.* at *84.

⁴⁸ *See id.* at *31, *36 (Polaroid's experts testified that expected profits without the infringement were between \$3.1 and \$3.9 billion).

⁴⁹ *Id.* at *72.

⁵⁰ *Id.*

⁵¹ *Id.*

projections, a royalty rate of ten percent is fair compensation. In my judgment, under either approach a ten percent royalty will “adequately compensate” Polaroid under section 284.⁵²

Fifteen years passed before the analytical method was again discussed in a published opinion. In *Fresenius Med. Care Holdings, Inc. v. Baxter Int’l, Inc.*,⁵³ Judge Sandra Brown Armstrong of the Northern District of California was confronted with a *Daubert*⁵⁴ challenge to the rebuttal expert damages report of Professor Daniel L. Rubinfeld of the University of California, Berkeley. Fresenius filed a declaratory judgment action that it did not infringe five hemodialysis related patents owned by Baxter, and/or that those patents were invalid. Baxter asserted infringement counterclaims against Fresenius on all five patents.⁵⁵ The matter progressed through discovery and the filing of expert reports.

Baxter challenged the admissibility of Dr. Rubinfeld’s expert report on several grounds. Both sides agreed that that the proper damages model was a reasonable royalty and that the willing licensor/licensee approach was the proper methodology to arrive at the reasonable royalty.⁵⁶ Baxter’s expert argued for a reasonable royalty of \$86 million, while Dr. Rubinfeld opined that the reasonable royalty ranged from approximately \$2 to \$4 million.⁵⁷ While difficult to discern from the court’s opinion, it appears that Dr. Rubinfeld arrived at this range by first estimating the incremental profits attributable to the infringement by contrasting Fresenius’ expected profits using the patented invention from what its profits would have been had it used the next-best, non-infringing alternative.⁵⁸ Dr. Rubinfeld then offered three possible apportionments of these incremental profits, depending on whether the trier of fact determined that the patented invention was responsible for 100%, 50%, or 25% of the additional profits.⁵⁹

Fresenius defended Dr. Rubinfeld’s methodology claiming that he used “an ‘analytical approach’ that has been expressly approved by the American Institute of Certified Public Accountants (‘AICPA’),”⁶⁰ described by that organization as follows:

⁵² *Polaroid*, 1990 WL 324105, at *75 (emphasis in original).

⁵³ *Fresenius Med. Care Holdings, Inc. v. Baxter Int’l, Inc.*, No. C03-1431SBA, 2006 WL 1390416 (N.D. Cal. May 18, 2006).

⁵⁴ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993).

⁵⁵ *Fresenius*, 2006 WL 1390416, at *1.

⁵⁶ *Id.* at *4. According to the court, “A reasonable royalty is the amount that ‘a person, desiring to manufacture, use, or sell a patented article, as a business proposition, would be willing to pay as a royalty and yet be able to make, use, or sell the patented article, in the market, at a reasonable profit.’” *Id.* (quoting *Trans-World Mfg. Corp. v. Al Nyman & Sons, Inc.*, 750 F.2d 1552, 1568 (Fed. Cir. 1984)).

⁵⁷ *Id.* at *1.

⁵⁸ *Id.* at *7.

⁵⁹ *Id.*

⁶⁰ *Id.*

Another measurement methodology is the analytical method. The royalty calculation under this method is based on the infringer's own internal profit projection for the infringing item at the time the infringement began. The analytical method is based on the premise that any rate of return in excess of a normal rate of return can be attributed to the patent. This method takes the profits of the infringer, subtracts the infringer's normal profit, and awards some portion of the remainder to the patent owner.⁶¹

Baxter argued that Dr. Rubinfeld had not followed the AICPA's guidance by deducting Fresenius' profits under the "next-best alternative" rather than using a "normal rate of return" as outlined by the AICPA and endorsed by the Federal Circuit in *TWM Mfg.*⁶² The district court dismissed these concerns, stating that "*TWM* does not convincingly show that Dr. Rubinfeld's Rebuttal Expert Report impermissibly deviates from the analytical method in a way contrary to law" and characterizing Baxter's argument as "mere quibbling over whether Dr. Rubinfeld has used precise enough terminology."⁶³

Indeed, as we detail below, Dr. Rubinfeld's use of incremental profits over the next-best alternative more precisely measures the value attributable to the patented invention, which after all is what the patent statute dictates, than had he used Fresenius' or some industry average rate of return, as was deemed acceptable in *Georgia Pacific*, *Tektronix*, and *TWM*. In any event, while permitting (appropriately in our view) some flexibility in application of the so-called analytical method, the method was still employed in the context of the willing licensor/willing licensee paradigm. Thus, *Fresenius* likewise provides no support for the notion that the analytical method is a separate, alternative test.

The analytical approach was next mentioned just a year later, in 2007, in the District of Delaware case *Novozymes A/S v. Genencor Int'l, Inc.*⁶⁴ In that case, Genencor was held to have infringed a Novozymes patent covering an alpha-amylase enzyme principally used in the production of fuel ethanol.⁶⁵ Novozymes's damages expert, Julie L. Davis, argued for a royalty of 25% for infringing enzyme sales within the fuel ethanol market and 8% for sales in other markets.⁶⁶ Ms. Davis, a CPA and frequent damages expert in high-profile patent cases, defended those rates as the likely outcome of a hypothetical negotiation between Novozymes and Genencor at the time the infringement began employing two methodologies: (1) the "rule of thumb" that "the parties would expect to split the expected profit margin of the infringing product,

⁶¹ *Id.*

⁶² *Id.* n.5.

⁶³ *Id.*

⁶⁴ *Novozymes A/S v. Genencor Int'l, Inc.*, 474 F. Supp. 2d 592 (D. Del. 2007).

⁶⁵ *Id.* at 610.

⁶⁶ *Id.* at 606.

with the patentee taking one quarter to one third of that margin as a royalty”;⁶⁷ and (2) the “analytical method,” in which “the parties would compare the expected profit margin of the infringing product to the typical profit margin for the relevant business” and “[t]he difference in those margins would be used to estimate an appropriate royalty.”⁶⁸

Genencor’s expert, Dr. David J. Teece, an economist and professor at the University of California, Berkeley’s Haas School of Business, criticized the “rule of thumb” approach for having “no analytical justification,” and Ms. Davis’s application of the analytical method for relying on an industry typical profit margin, rather than Genencor’s profit margin on its next-best non-infringing alternative to calculate the incremental profits to be split between the parties in the hypothetical license negotiation.⁶⁹ Correcting Novozymes’s calculations for those and other errors, Dr. Teece arrived at an across the board 8% reasonable royalty, as opposed to Ms. Davis’s proposed 25% rate within the fuel ethanol market, where the bulk of the infringing sales had occurred.⁷⁰

The court gave credence to both experts’ opinions, but ultimately sided more with Ms. Davis, awarding a royalty of 20% within the fuel ethanol market and 8% in other markets.⁷¹ Importantly, the court’s discussion of the competing expert opinions under both the analytical method and the more traditional *Georgia-Pacific* factors made frequent reference to what the parties to the “hypothetical negotiation” would consider relevant and important, reinforcing that the analytical method was being used as an aid to, not a substitute for, the willing-licensor/willing-licensee approach.⁷²

The analytical method was next mentioned in the Federal Circuit’s 2009 opinion in *Lucent Techs., Inc. v. Gateway, Inc.*⁷³ There the Federal Circuit reversed and remanded for a new trial a jury award of lump-sum reasonable royalty damages of \$357,693,056.18 for an admittedly minor feature of Microsoft’s Outlook program—a “date-picker” feature.⁷⁴ The court found the jury award unsupported by substantial evidence.⁷⁵ Both sides’ experts had relied on the willing-licensor/willing licensee approach to calculating reasonable royalty damages.⁷⁶ Lucent’s experts argued for an 8% running royalty on sales of Microsoft Outlook, while Microsoft’s expert

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ *Id.* at 606-07.

⁷⁰ *Id.* at 607.

⁷¹ *Id.* at 608-09.

⁷² *Id.* at 607-08.

⁷³ *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301 (Fed. Cir. 2009).

⁷⁴ *Id.* at 1308.

⁷⁵ *Id.* at 1335.

⁷⁶ *Id.* at 1325.

opined that the parties would have agreed to a lump-sum payment of \$6.5 million.⁷⁷

While neither side had used the analytical method in arriving at its proposed reasonable royalty, the court nonetheless identified the analytical method as one of several approaches “routinely adopt[ed]” by litigants “for calculating a reasonable royalty.”⁷⁸ The court further implied that the analytical method was a separate and distinct approach from what it characterized as the “more common . . . hypothetical negotiation or the ‘willing licensor-willing licensee’ approach.”⁷⁹ Thus, there is at least Federal Circuit dictum for the analytical method to be applied outside of the willing licensor/willing licensee framework, as a separate test focused on “calculating damages based on the infringer’s own internal profit projections for the infringing item at the time infringement began, and then apportioning the projected profits between the patent owner and the infringer.”⁸⁰ But how does one go about apportioning the projected profits other than by positing a hypothetical negotiation between a willing licensor and a willing licensee, and analyzing the strength of their respective bargaining positions?

C. Increased Incidence of Use of the Analytical Method

The frequency of references to the analytical method within published cases has increased in recent years, as more and more patentees appear to be relying on such theories in pursuing reasonable royalty damages.⁸¹ This phenomenon is, in our view,

⁷⁷ *Id.* at 1323.

⁷⁸ *Id.* at 1324.

⁷⁹ *Id.*

⁸⁰ *Id.* (quoting John Skenyon et al., *Patent Damages Law & Practice* § 3:4, at 3-9 to 3-10 (2008)).

⁸¹ See, e.g., *Kimberly-Clark Worldwide, Inc. v. First Quality Baby Prods., LLC*, 2011 WL 3240452, at *1 (E.D. Wisc. July 27, 2011) (holding on motion for reconsideration of order compelling production of company-wide financial documents that information regarding the net profits alleged infringer received on its earlier products was “relevant to the analytical method of computing a reasonable royalty” and determining “what it would have been willing to pay as a royalty”); *Apple, Inc. v. Samsung Elecs. Co., Ltd.*, 2012 WL 2571332, at *8 (N.D. Cal. June 30, 2012) (noting on motions to exclude expert testimony that “[c]ourts accept a variety of methods for determining a reasonable royalty,” and listing the “analytical method” as an example); *JS Prods., Inc. v. Kabo Tool Co.*, 2012 WL 5288175, at *6, *7 (D. Nev. Oct. 23, 2012) (identifying on motion to compel discovery the “analytical method” as one of “two approaches for calculating a reasonable royalty,” and noting that evidence of the “prices at which [alleged infringer] sells open-end ‘conventional’ wrenches, and the profits it derives from the sale of those wrenches, may provide part of the foundation for determining what, if any, increase in sales value or profit is added to a wrench product by use of the invention”); *Apple, Inc. v. Samsung Elecs. Co.*, 2014 WL 794328 at *3 (N.D. Cal. Feb. 25, 2014) (noting expert’s comparison of profits from products incorporating the patented technology to profits that

likely the result of reactions to the Federal Circuit's tightening of legal principles applicable to lost profits damages, like the entire market value rule, which has caused more and more patentees to resort to reasonable royalty damages theories. It may also be the result of an increased incidence of infringement suits brought by non-practicing entities, for whom reasonable royalty damages are the only form of damages available.

The analytical approach surfaced in February of 2012 in the *Daubert* context in a non-practicing entity case, *Caluori v. One World Technologies, Inc.*⁸² The case concerned a patented device that projected light on to an object to be cut by a rotary saw. Plaintiff's expert testified in deposition and later submitted a supplemental damage report in which he purported to employ the "analytical approach" using cost data provided by the defendant's expert.⁸³ In that report, plaintiff's expert subtracted the infringer's median profit from its prior product using non-infringing laser guides (\$3.65 per unit) from its median profit earned on sales of infringing laser guides (\$7.31), to arrive at an incremental profit purportedly attributable to the patented invention.⁸⁴ Plaintiff's expert then applied the "fifteen qualitative factors" from *Georgia-Pacific*, opining that 12 of those factors were neutral and the other three would have an upward impact on the royalty rate, to arrive at a royalty of \$3.75 per unit.⁸⁵ The court denied the defendant infringer's motion to exclude such testimony finding plaintiff's expert's "application of the analytical approach . . . not so unreliable as to require . . . exclusion at trial," and concluding that defendant's challenges to the validity of the expert's assumptions underlying his calculations were "better suited to cross-examination rather than a motion to disqualify."⁸⁶

would have been obtained using the next-best alternative); *Viasat, Inc. v. Space Sys./Loral, Inc.*, 2014 WL 3896073, at *7 (S.D. Cal. Aug. 8, 2014) (granting new trial on damages over patentee's argument that "the analytical method provides an independent basis for the jury's verdict" awarding more than six times infringer's anticipated profits); *Ultratec, Inc. v. Sorenson Commc'ns, Inc.*, 2014 WL 5080411, at *4 (W.D. Wisc. Oct. 9, 2014) (identifying deficiencies in defendant's damages expert Keith Ugone's profit margins analysis purportedly performed under the analytical approach).

⁸² *Caluori v. One World Techs., Inc.*, No. CV 07-2035-CAS, 2012 WL 2004173 (C.D. Cal. June 4, 2012), *aff'd*, 555 Fed. App'x 995 (Fed. Cir. 2014), *cert. denied*, 135 S. Ct. 213 (2014).

⁸³ *Caluori*, 2012 WL 2004173, at *8.

⁸⁴ *Id.*

⁸⁵ Civil Minutes for Def.'s Motion to Exclude Stephen P. Heath at 3-5, *Caluori v. One World Techs., Inc.*, 2012 WL 2004173 (C.D. Cal. Feb. 27, 2012) (available on Pacer). The expert also referenced an earlier license agreement reached by the patent owner in settlement of prior litigation with an effective royalty range of \$6.09 to \$3.50 per unit, which the expert opined "constitutes a reliable benchmark for determining a reasonable royalty rate under a hypothetical license agreement . . . in this case." *Id.* at 3.

⁸⁶ *Caluori*, 2012 WL 2004173, at *8.

Thus, the Central District of California permitted expert damages testimony premised in part on the analytical method, but again, like many of the earlier cases, the expert used that analysis in support of, not separate from, opinions expressed within the willing licensor/willing licensee framework.

In December 2012, in *Energy Transportation Group, Inc. v. William Demant Holdings A/S*,⁸⁷ the Federal Circuit considered the request of a defendant for a new trial on damages after a jury found that it infringed two hearing aid patents and awarded lump sum damages equating to effective royalty rates in the range of 4-5%.⁸⁸ Noting the heavy burden that a party challenging a jury's verdict on damages bears to "show that the award is, in view of all of the evidence, either so outrageously high or so outrageously low as to be unsupported as an estimation of a reasonable royalty,"⁸⁹ the court, somewhat surprisingly, denied a new trial on damages even though the plaintiff's expert, Terry Musika, had employed the 25% rule of thumb the court had held to be unreliable less than two years earlier.⁹⁰ The court held that "Mr. Musika's references to the 25% 'rule' (which is no longer a 'rule') did not irretrievably damage the reasonableness of his method" because he "relied more prominently on other factors," including factors identified in *Georgia-Pacific*, which the court hastened to add it "does not endorse . . . as setting forth a test for royalty calculations, but only as a list of admissible factors informing a reliable economic analysis."⁹¹

The court also recognized that Mr. Musika had "performed an *entirely separate analysis* of a reasonable royalty using the method set forth in *TWM Mfg. Co. v. Dura Corp.*,"⁹² which the court described as follows:

This analysis compared the average expected profit margin on the infringing products, as set forth in Defendants' expert reports, to the industry average expected profit margin. Mr. Musika testified this analysis showed the infringing products garnered a 6.4% increase in expected profit margin based on the technology in the ETG Patents.

⁸⁷ *Energy Transp. Grp. Inc. v. William Demant Holdings A/S*, 697 F.3d 1342 (Fed. Cir. 2012).

⁸⁸ *Id.* at 1357.

⁸⁹ *Id.* at 1356 (quoting *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1554 (Fed. Cir. 1995) (en banc)).

⁹⁰ *Id.* (citing *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1315 (Fed. Cir. 2011)).

⁹¹ *Id.* at 1356-57. The Federal Circuit's distancing of itself from *Georgia-Pacific* as a "test," and its endorsement of "economic analysis" is, in our view, indicative of the court's effort to overhaul patent damages, including reasonable royalty damages, to more closely align with recognized economic principles. That effort appears to have been a particular crusade of Judge Rader, the author of the *Energy Transportation Group* opinion and a panel member in the *Uniloc* case. Whether that effort continues at the same pace after Judge Rader's retirement from the court, remains to be seen.

⁹² *Id.* at 1357 (emphasis added).

Mr. Musika’s suggested reasonable royalty rates were thus tied to the benefit accorded by the patents at issue. Thus, this case is not like *Uniloc*, where the plaintiff’s expert did not offer acceptable alternative methods to support his damages calculation. Cf. *Uniloc*, 632 F.3d at 1318. ETG’s expert provided an ***entirely separate damages analysis*** that supported the jury’s verdict.⁹³

The court, noting that the jury “did not adopt either expert’s damages analysis wholesale,” nonetheless concluded “that the record supports the jury’s award with substantial evidence based on Mr. Musika’s [sic] *TWR* analysis and discussion of the premium on operating profits enjoyed by the accused products.”⁹⁴

As we detail below, the Federal Circuit’s characterization of the “analytical method,” or what it terms “the method set forth in *TWM*,” as “an entirely separate analysis of a reasonable royalty”⁹⁵ is, in our view, unfortunate.⁹⁶ The approach is more properly viewed as a support to, not a substitute for, the willing licensor/willing licensee construct—one that, like the operating profit premium calculated by Mr. Musika and also endorsed by the court in *Energy Transportation Group*, helps inform “the top end of a range of possible royalties the parties would have considered in a hypothetical negotiation.”⁹⁷

In *NetAirus Technologies, LLC v. Apple, Inc.*,⁹⁸ Judge John A. Kronstadt of the Central District of California excluded portions of opinions offered by plaintiff’s damages expert Joseph Gemini claimed to have been arrived at under the “analytical approach” endorsed by the Federal Circuit in *TWM*. Gemini opined that, “at the time of the hypothetical negotiation, the parties would consider the effect of removing the patented feature on the gross profit of the accused device.”⁹⁹ He then purported to calculate the reduced gross profit that would result from removing the patented feature by deducting the incremental cost of that feature from its assumed contribution to the overall price of the device, and used that difference as the reasonable royalty amount, reasoning that “Apple would be willing to pay a royalty that would maintain the gross

⁹³ *Id.* (emphasis added).

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ Even more recently, in a slip opinion issued on September 21, 2015, a Federal Circuit panel identified “the analytical method,” focusing on the infringer’s projections of profit for the infringing product” as “one reliable method for estimating a reasonable royalty.” *Summit 6, LLC v. Samsung Elecs. Co., Ltd.*, Appeal Nos. 2013-1648, 2013-1651 (Fed. Cir. Sept. 21, 2015) (found at http://scholar.google.com/scholar_case?case=4448565805055669812&q=Summit+6+LLC+v.+Samsung&hl=en&as_sdt=6,45).

⁹⁷ *Energy Transportation Group*, 697 F.3d at 1356.

⁹⁸ Civil Minutes for Order re Apple’s *Daubert* Motion to Exclude Opinions of Joseph Gemini, *NetAirus Techs., LLC v. Apple, Inc.*, No. LA CV10-03257 JAK (C.D. Cal. Oct. 23, 2013) (available on Pacer).

⁹⁹ *Id.* at 4.

profit it would have received without the feature.”¹⁰⁰ The court excluded the proffered opinion, not because of any doctrinal problem with the analytical method, but rather because Gemini’s calculations were based on assumptions unsupported by record evidence.¹⁰¹

In March of 2014, in *Sloan Valve Co. v. Zurn Industries, Inc.*,¹⁰² Judge St. Eve of the Northern District of Illinois excluded the patentee’s expert’s damages opinions under *Daubert*. The case involved a patent on a dual mode toilet flush valve that permitted the user to select between two different water quantities depending upon the type and amount of waste being flushed. The court identified three “ways . . . to calculate a reasonable royalty”: (1) “the analytical method, which focuses on the infringer’s projections of profit for the infringing product”; (2) “bas[ing] the calculation on an established royalty, if there is one”; and (3) “[i]f there is not an established royalty, a reasonable royalty may be calculated based on the supposed result of hypothetical negotiations between the plaintiff and defendant.”¹⁰³

Sloan’s damages expert, Richard Bero, a CPA who had testified as an expert more than 100 times, calculated reasonable royalty damages at \$106 per unit for a total amount of \$7.8 million. Mr. Bero arrived at this amount through several means more commonly employed in lost profits analysis, like the entire market value rule, price erosion, and convoyed sales.¹⁰⁴

Purporting to base his analysis on a hypothetical negotiation between Sloan and Zurn at the time the infringement began, Mr. Bero first attempted to identify the range in which the parties would be negotiating. Mr. Bero reasoned that Sloan would not be willing to license its patents for less than the profit Sloan would anticipate making had it made the sales itself:

[C]alculate[d] [] at the time of the hypothetical negotiation, \$141 per Accused Product unit was Sloan’s floor—that is, the lowest price it was willing to accept—for its expected royalty rate per unit. . . . Conversely, Mr. Bero found that Zurn’s ceiling—the most it would be willing to pay—for a royalty payment entering the hypothetical negotiation was \$60 per Accused Product unit. Mr. Bero opined that in entering into such a license, ‘Zurn would be unwilling to pay a royalty amount more than the profits it would expect to make if no license was entered into.’ Mr. Bero identified the difference in Sloan’s floor of \$141 and Zurn’s ceiling of \$60 as the ‘negotiation gap.’¹⁰⁵

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² *Sloan Valve Co. v. Zurn Indus., Inc.*, 33 F. Supp. 3d 984 (N.D. Ill. 2014).

¹⁰³ *Id.* at 990.

¹⁰⁴ *Id.* at 991-92.

¹⁰⁵ *Id.* at 992-93.

Bero's hypothetical negotiation analysis is obviously hopelessly flawed. No negotiation, hypothetical or otherwise, can take place if there is no overlap in the parties' negotiation ranges. How Bero could arrive at a negotiated rate of \$106 per unit when Zurn would pay no more than \$60 per unit and Sloan would take no less than \$141 per unit defies comprehension. Granted, the "willing buyer-willing seller" construct is a legal fiction, a "device in aid of justice,"¹⁰⁶ but it cannot be supported by a logically impossible result—improbable, maybe, but not impossible—and still retain any rhetorical value.

Surprisingly, the court mentioned this logical impossibility only in passing¹⁰⁷ in granting the motion to exclude Mr. Bero's testimony. Instead, the court focused on Bero's faulty application of the entire market value rule, his unsupported inclusion of price erosion effects and anticipated profits on convoyed sales, and misapplication of several *Georgia Pacific* factors—attempting to apply them quantitatively rather than qualitatively—in his reasonable royalty analysis.¹⁰⁸ The sum total of these errors, the court found, rendered "Mr. Bero's methodology . . . unreliable and it bears no resemblance to a reasonable royalty analysis."¹⁰⁹

Ironically, *Sloan Valve* appears to be a case where the plaintiff's expert could have appropriately applied the analytical method. The very data that Mr. Bero relied on to arrive at the infringer's ceiling royalty rate, which he effectively described as the incremental profit attributable to the patented invention,¹¹⁰ could have supported a defensible starting point for valuing "the use made of the invention by the infringer"¹¹¹ through the willing licensor/willing licensee construct. But, it also likely would not support the extent of damages plaintiff was seeking.

In August of 2014, in *Linear Group Services, LLC v. Attica Automation, Inc.*,¹¹² Judge Gershwin A. Drain of the Eastern District of Michigan denied an alleged infringer's motion to preclude testimony from the patentee's president, William Bennett, that 20% of the alleged infringer's sales would be a reasonable royalty under

¹⁰⁶ *Supra*, note 33, discussion.

¹⁰⁷ *Sloan Valve*, 33 F. Supp. 3d at 1000 (noting the arbitrariness of Bero's selection of \$100 per unit, the midpoint of his "negotiation gap," as the starting point for the hypothetical negotiation, "considering that Mr. Bero also determined that \$60 was the maximum price Zurn would be willing to pay for such a license").

¹⁰⁸ *Id.* at 995-1001.

¹⁰⁹ *Id.* at 1002.

¹¹⁰ *Id.* at 992-93 ("Zurn would be unwilling to pay a royalty amount more than the profits it would expect to make if no license was entered into.") (quoting Bero Report at 50).

¹¹¹ 35 U.S.C. § 284.

¹¹² *Linear Grp. Servs., LLC v. Attica Automation, Inc.*, 2014 WL 4206871 (E.D. Mich. Aug. 25, 2014).

the analytical method.¹¹³ The court described the “analytical method” as “focus[ing] on the infringer’s projections of profits [on] the infringing product, regardless of what the parties might have hypothetically agreed to had they successfully negotiated before the infringement began.”¹¹⁴ The court permitted the testimony despite the fact that Mr. Bennett was neither an accountant nor a damages expert, had no licensing expertise or experience, and had no knowledge of the alleged infringer’s net profits from sales of the accused machines¹¹⁵:

Bennett will be permitted to testify as to his personal knowledge that calculates reasonable royalty damages as 20% (i.e. his personal knowledge as to what he believes [his company’s] profit levels to be and what he believes [the alleged infringer’s] profit to be . . .). [Defendant] will have the opportunity to cross examine Bennett and question the weight of his argument.¹¹⁶

The court further precluded the alleged infringer from presenting evidence it argued was relevant to various *Georgia-Pacific* factors because the patentee’s reasonable royalty damages claim was based on the analytical method, not the *Georgia-Pacific* factors.¹¹⁷ In our view, *Linear Products* is a good example of the mischief that can result from an overly literal view of the analytical method as a separate method for determining reasonable royalty damages.

In summary, three tests have been identified in the case law for determining a reasonable royalty to fairly compensate a patent owner for the infringer’s use of the patented invention: (1) an established royalty rate; (2) the analytical method, where a normal profit margin is deducted from the profit margin obtained by the infringer from the infringing sales; and (3) a hypothetical negotiation between a willing licensor and a willing licensee. But are these really three separate tests? We think not. Properly viewed, the first two tests are simply parts of the willing licensor/willing licensee paradigm. When record evidence shows an established royalty rate for the patent in suit, it is logical for the trier of fact to conclude that any hypothetical negotiation between a willing licensor and a willing licensee would have arrived at that established rate. As for the analytical method, the incremental profit margin attributable to use of the patented invention is clearly a factor that rational licensors and licensees would consider in negotiating a royalty rate. In our view, neither of these so-called alternative tests are truly alternatives to the willing licensor/willing

¹¹³ *Id.* at *11.

¹¹⁴ *Id.* at *5, *9 (citing *TWM Mfg.*, 789 F.2d at 899).

¹¹⁵ *Id.* at *9.

¹¹⁶ *Id.* at *10.

¹¹⁷ *Id.* at *5 & *7.

licensee framework. Rather, they are relevant evidence to be applied within that framework.

Further, some commentators and courts have criticized reasonable royalty damages as not imposing a sufficient burden on infringers to discourage patent infringement.¹¹⁸ After all, such detractors would reason, why would a rational competitor avoid infringing on a patent if the worst outcome they could suffer is a royalty equivalent to what they would have paid had they done the socially responsible thing and negotiated a license prior to commencing the infringement?¹¹⁹ But such reasoning ignores the fact that a reasonable royalty is not the only form of redress. Lost profits are available on proper proof. Up to treble damages can be awarded upon proof of willful and deliberate infringement, and attorneys' fees are awardable in exceptional cases. Injunctive relief is available in appropriate cases. Accordingly, reasonable royalty awards should not be viewed as a means to a compulsory license, but rather as a means of fashioning fair compensation for pre-injunction sales in circumstances when lost profits damages are not available or provable. Further, it is wrong to assume that all ultimately held liable for patent infringement set out with a plan to infringe on known patent rights. And there are positive societal and macroeconomic benefits from encouraging competitors to design-around existing patents.

With this background, we now turn to a discussion of the pitfalls that can result from an overbroad application of the analytical method untethered from the analytical construct of a hypothetical negotiation between a willing licensor and a willing licensee.

¹¹⁸ See e.g. *Fromson v. Western Litho Plate & Supply Co.*, 853 F.2d 1568, 1574 (Fed. Cir. 1988) (recognizing little disincentive to disregarding patent rights if, once “the case [is] lost, a license can be compelled, probably at the same royalty that would have been paid if the patentee’s rights had been respected at the outset”), *overruled by* *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337 (Fed. Cir. 2004); *Panduit*, 575 F.2d at 1158 (“setting of a reasonable royalty after infringement cannot be treated . . . as the equivalent of ordinary royalty negotiations among truly ‘willing’ patent owners and licensees” without “mak[ing] an election to infringe a handy means for competitors to impose a ‘compulsory license’ policy upon every patent owner”; “the infringer would have nothing to lose, and everything to gain if he could count on paying only the normal, routine royalty non-infringers might have paid”).

¹¹⁹ See Jerry A. Hausman, Gregory K. Leonard & J. Gregory Sidak, *Patent Damages and Real Options: How Judicial Characterization of Noninfringing Alternatives Reduces Incentives to Innovate*, 22 BERKELEY TECH. L.J. 825, 830 (2007) (categorizing the incentive to infringe on the patent until sued as the “free option”).

III. ECONOMIC DEFICIENCIES OF THE “ANALYTICAL METHOD”

As developed above, the basic idea behind the analytical method is that one can estimate value attributable to a patented invention by deducting a company or industry average profit margin from the profit margin obtained using the patented invention. Using language familiar to antitrust law, the patent (presuming it covers useful subject matter) confers some market power and this market power results in higher profit margins. Identifying and quantifying those greater than competitive returns attributable to the patented technology, provides a basis for determining the value attributable to the infringer’s use of the patented invention and, therefore, for calculating damages. To isolate those excess returns, the analytical method directs that the expert identify the profit margin of the infringing product and then subtract the “normal” profit margin. The difference is assumed to be attributable to the infringement.

But how does one ensure that the excess returns are truly attributable to the patented technology? And what is the appropriate “normal profit margin” that should be deducted? In the discussion that follows, we describe the problems that render the analytical method (as traditionally applied) unreliable as an independent means to calculate patent damages. To do so we assume that the analytical method is being applied in a situation where infringement has been found and the entire infringing product is based on one patent so that no patent stacking or entire market rule issues arise. Even in this simple situation, we demonstrate how the analytical method fails to reliably value “the use made of the invention by the infringer.”¹²⁰ We identify two fundamental complications: selecting an appropriate proxy for “normal” profits and ensuring that any “excess” profit margin is truly attributable to the patented invention.

A. *Ascertaining an Appropriate Proxy for “Normal” Profits*

A first limitation of the analytical method involves the proxy for “normal” profits. Other commentators have noted the difficulty in measuring “normal” or “competitive” profits.¹²¹ In our view, normal profits cannot be reliably proxied by a market average or

¹²⁰ 35 U.S.C. § 284.

¹²¹ See e.g. DENNIS CARLTON & JEFFREY PERLOFF, MODERN INDUSTRIAL ORGANIZATION 247 (4th ed., 2005) (“Economic profit equals revenue minus labor, material, and an appropriate measure of capital cost.”).

the profit margin of a comparable firm, as is implicit in common articulations of the analytical method.¹²²

Economic theory beginning as far back as Adam Smith in 1776 has posited that competition equalizes *rates of return* on investment, not *profit margins*. But, the analytical method relies on differences in profit margins, not rates of return on investment, to attribute value to the patented invention. The profit margin is defined as profit divided by sales and is a “flow” measure of profits. Return on investment, in contrast, is the firm’s profit divided by the total investment required to achieve that profit. In this sense it compares profit flows to the amount of investment required to generate those profits.

When empirically studying firm profits over long periods of time, economists use the rate of profit as an average measure of rates of return on investment.¹²³ The profit rate is defined as profits divided by total assets. Economic theory holds that if the rate of return on investment or the rate of profit is persistently high in one area, it will create strong incentives for others to divert investment from elsewhere and enter the high return industry. The additional investment expands supply in the market and tends to lower the rate of return. This process also works in reverse. If the rate of return on investment in an industry falls, firms will exit that market over time. This exit will shrink supply, thereby raising prices and profits. This process continues until rates of return tend to be equalized across different industries. As a result, barring significant barriers to entry, economists expect rates of return on investment to equalize among markets. This is the essence of Adam Smith’s “invisible hand.”

In contrast, there is no theory that holds that profit margins in perfectly competitive markets will be equal. Instead, profit margins should differ between sectors. High capital intensity sectors will require higher margins to equalize rates of return. To see this, take the simple example of two profit rates that are equal in two markets:

¹²² See MARC E. ACKERMAN ET AL., ECONOMIC DAMAGES IN INTELLECTUAL PROPERTY, A HANDS-ON GUIDE TO LITIGATION 182 (Daniel Slottje ed., 2006) (“Ideally, the only difference between the infringing or patented product and the ‘normal’ product is the patented technology or features. In other words, the operating costs (selling, general, and administrative), distribution channels, and the like are identical.”).

¹²³ We use rate of return on investment and the rate of profit as conceptually the same, although in some empirical contexts a distinction can be made between the two. Technically, return on investment is the present value of all of the future cash flow that results from an investment in a project (adjusted for risk) divided by the amount of the investment that generates these cash flows. In essence, the difference between the ROI and the rate of profit can be thought of as the difference between the marginal rate of profit and the average rate of profit. The ROI is the rate of return on the last investment, while the rate of profit is an average over many investments.

$$\frac{P_1}{A_1} = \frac{P_2}{A_2}$$

“P” refers to profit and “A” denotes total assets. Now divide each variable by “S,” which represents sales:

$$\frac{\frac{P_1}{S_1}}{\frac{A_1}{S_1}} = \frac{\frac{P_2}{S_2}}{\frac{A_2}{S_2}}$$

The term P/S is the profit margin. It becomes obvious from the above equation that even if nominal profit margins are equal, if the assets-to-sales ratios are unequal, the “real” profit margins are also unequal.

Assets-to-sales ratios are typically very different between markets because different production processes are employed. Moreover, within a single market, firms will have distinct asset-to-sales ratios based on their specific management processes and investment histories. Thus, any use of an “industry average profit margin,” “average profit margin on non-infringing products,” or a “comparable firm average margin” as a proxy for “normal profits” defies economic logic and will be unreliable.¹²⁴

This limitation on the use of profit margin has been recognized by the courts in the antitrust context. For example, in *United States v. Eastman Kodak Co.*,¹²⁵ the Second Circuit rejected the government’s argument that Kodak’s “excessive profits” were evidence of monopoly power, holding that “even if we were to accept the government’s contention that Kodak’s short-run marginal costs equal one-half of the product’s sales price, we do not think that it

¹²⁴ Early economists that studied the empirical relationship between profits and concentration measured profit rates, not profit margins. See generally J.S. Bain “Relation of Profit Rate to Industrial Concentration, American Manufacturing, 1936-1940,” 65 Q.J. OF ECON 293 (1951) (using profit rates as the standard of comparison between firms); GEORGE STIGLER, NATIONAL BUREAU ECON. RESEARCH, CAPITAL AND RATES OF RETURN IN MANUFACTURING INDUSTRIES 72-91 (Princeton Univ. Press 1963) (recognizing that profit rates are among the best tools for comparing firms). The reason this issue arises in econometric work but not in basic microeconomic classes is because the standard microeconomic model is a variable cost or flow model. When fixed capital is considered, the rule that competitive rates of return are zero is consistent with the rule that all positive net present value projects will be undertaken. See RICHARD BREALEY & STEWART MYERS, PRINCIPLES OF CORPORATE FINANCE 20 (2d. ed. 1981) (showing that the “prodigal” and the “miser” both want different interest rates in order to receive the best rate of return).

¹²⁵ *United States v. Eastman Kodak Co.*, 63 F.3d 95 (2d Cir. 1995).

necessarily follows that Kodak is earning monopolistic profits. Certain deviations between marginal cost and price, *such as those resulting from high fixed costs*, are not evidence of market power.”¹²⁶ In other words, “high fixed costs” that result from high capital intensity will cause margins to be higher even in competitive markets.

It follows that the only reliable proxy for “normal” profit margins must derive from the infringing firm and product at issue because, only in that situation, can capital intensities properly be assumed to be equal. This means that coherent application of the analytical method requires measuring both the profit margin of the infringing product and the “normal” profit margin from the financials of the infringer, not from market or industry averages.¹²⁷

B. Properly Attributing “Excess” Profits to the Patented Invention

Setting aside the “proper proxy” problem discussed above, advocates of the analytical method might argue that the method can be salvaged by defining excess profits as the abnormal profit rate, rather than the profit margin. But profit rates cannot confidently be measured from firm financial records with the requisite precision. This point has been made most forcefully by Franklin M. Fisher and John J. McGowan.¹²⁸ The reason is that, in any particular year, accounting revenue is simply the aggregate of the cash flow over many projects undertaken by the firm, even if a single product is assumed.

To illustrate the problem, consider a new oil drilling technology. Assume an alleged infringer’s sole product is oil from this technology and the entire oil drilling project takes ten years. In the first few years of exploration, investments are incurred but no cash flow is received. In these years, the return on investment in the accounting records is negative. In later years, most of the investment costs will have been sunk and if oil is found, cash flows begin to accrue. In these years, gross profits will be exceptionally

¹²⁶ *Id.* at 109 (emphasis added).

¹²⁷ This might be accomplished by measuring a single firm’s profit margin on an infringing product before and after the infringement occurred.

¹²⁸ See generally Franklin M. Fisher & John J. McGowan, *On the Misuse of Accounting Rates of Return to Infer Monopoly Profits*, 73 AM. ECON. REV. 82 (1983) (showing that individual firms’ records do not accurately represent the profit rates used to compare companies). Economists that empirically measure profit rates consider long run averages. See generally Yale Brozen, *The Antitrust Task Force Deconcentration Recommendation*, 13 J.L. & ECON. 279 (1982) (arguing that when data for a later period are included, earlier findings about the relationship between concentration and profits no longer hold). For a review of the empirical issues, see Mark Glick & Hans Ehrbar, *Long-Run Equilibrium in the Empirical Study of Monopoly and Competition*, 38 Econ. Inq. 151 (1990).

high, but investment will be small. But the firm's accounting records represent an aggregate snapshot of investments and corresponding cash flows for all the active projects in the firm. Thus, one cannot typically reliably match infringing profits to the infringing investment to obtain the rate of return on investment by the infringer.

This problem has also been recognized in the antitrust context. In *Blue Cross & Blue Shield United of Wisconsin v. Marshfield Clinic*,¹²⁹ Judge Posner expressed skepticism about the practice of using accounting profits to infer monopoly power because "measured rates of return reflect accounting conventions more than they do real profits (or losses), as an economist would understand these terms."¹³⁰ Moreover, even if one could accurately measure excess profit margin, it is unlikely that it would be a good proxy for the impact of infringement. Excess profits are the result of market power, but patent coverage is only one potential source of such power. In fact, numerous factors can contribute to excess profits, including, the impact of rivalry in the market, advertising, location, brand names, other patents, other forms of intellectual property, and many other factors.

Rather than consider absolute profit levels, the goal of any damages analysis should be to isolate the impact of infringement by measuring the difference between the profits made by the infringer

¹²⁹ *Blue Cross & Blue Shield United of Wis. v. Marshfield Clinic*, 65 F.3d 1406 (7th Cir. 1995).

¹³⁰ *Id.* at 1412. Numerous other courts considering this issue both before and after the *Blue Cross* decision have agreed with Judge Posner's essential point about the lack of connection between profit and monopoly power. *See, e.g., Baker's Aid, a Div. of M. Raubvogel Co., Inc. v. Hussmann Foodservice Co.*, 730 F. Supp. 1209, 1218 (E.D.N.Y. 1990) ("[D]efendants assert that monopoly power is shown by plaintiff's ability to sell virtually the same ovens as HFC at a higher price. . . . The mere fact that Baker's Aid is able to sell its ovens at a higher price than HFC is not, however, evidence that Baker's Aid earns above normal profits."); *Bailey v. Allgas, Inc.*, 148 F. Supp. 2d 1222, 1245 (N.D. Ala. 2000) *aff'd*, 284 F.3d 1237 (11th Cir. 2002) ("The court is unaware of any reported federal antitrust case in which a defendant's purported high rate of return, by itself, established market power. The Seventh Circuit has expressly rejected the theory."); *Forsyth v. Humana, Inc.*, 114 F.3d 1467, 1476 (9th Cir. 1997) *overruled by* *Lacey v. Maricopa County*, 693 F.3d 896 (9th Cir. 2012) (holding that high prices with no showing of restricted output failed to establish monopoly power); *Moecker v. Honeywell Int'l, Inc.*, 144 F. Supp. 2d 1291, 1304 (M.D. Fla. 2001) ("[Defendant] is correct that a high rate of return standing alone is not determinative of market power."); *In re Remeron Direct Purchaser Antitrust Litig.*, 367 F. Supp. 2d 675, 683 (D.N.J. 2005) ("Plaintiffs' one-track focus on the price of [branded drug] compared to the price of generic [drug] says nothing about the most important factors that would allow a reasonable juror to conclude that [defendant] had monopoly power."). In *United States v. Empire Gas Corp.*, 537 F.2d 296, 306 (8th Cir. 1976), the Eighth Circuit seemed to imply that "extremely high" margins might lead it to conclude that a firm "was successful in manipulating prices or competition," but the defendant's margins, which averaged 11.1%, were not so extreme.

with the infringement, over what profit the infringer would have made had it not infringed and instead selected the next best substitute for the infringing technology. Such an incremental profits analysis avoids many of the complications identified above. Because this approach considers the infringing firm alone, it does not involve the capital intensity problem. However, as with the profit rate calculation discussed above, the costs and timing of those costs must be accurately calculated for the next best alternative situation.

In addition, this incremental profits approach controls for some but not all of the causation issues. In the simple case of a single patent covering a single complete product, the difference between what the infringer made with the infringement and would have made with its next best substitute, conforms well to the concept of “but for” causation. This is because the profits the infringer would have made with its next best alternative is another way of asking what the infringer would have made “but for” the infringement. Moreover, the difference between actual profits and profits from the next best alternative comports with the concept of economic profits because the next best alternative measures the “opportunity cost.” This is important because it is this measure of incremental profits that, applying proper economic principles, drives decision making over licensing the technology, and therefore would be considered in any negotiation between a willing licensor and a willing licensee.

As an example, consider a situation where an infringer anticipates earning 8% on sales of the infringing product. The next best alternative would allow profits of only 6%. Thus, the potential benefit due to infringement is 2%. It follows that an infringer would not pay more than 2% for use of the patented technology. Many economists and economically informed damage experts adopt this approach to measuring the benefit from infringement even outside of the analytical method context. For example, Jarosz and Chapman contend

[a]n incremental benefits analysis examines the gains enjoyed by the infringer attributable to use of the patent. Specifically, it calls for an evaluation of the benefits of practicing the patent versus the benefits of practicing the noninfringing, next best alternative. The legal and economic communities have long acknowledged the value of such an examination.¹³¹

¹³¹ John C. Jarosz & Michael J. Chapman, *The Hypothetical Negotiation and Reasonable Royalty Damages: The Tail Wagging the Dog*, 16 STAN. TECH. L. REV. 769, 813 (2013). See also Elizabeth M. Bailey, Alan Cox & Gregory K. Leonard, *Three Cases Reshaping Patent Licensing Practice*, 197 MANAGING INTELL. PROP. 121 (2010) (“The reasonable royalty analysis should seek to determine the economic value generated by the patented feature relative to the next best (non-infringing) alternative.”); Elizabeth M. Bailey, Gregory K. Leonard & Mario A. Lopez, *Making Sense of “Apportionment” in Patent Damages*, 12 COLUM. SCI. & TECH. L. REV. 255, 259 (2011) (“Under a sound

It should be recognized, however, that measuring incremental profits does not automatically solve all causation issues. The profits with infringement could be the result of several patents (patent stacking) or a combination of the patented technology with other know how that cannot be used in the next-best, non-infringing alternative. In these situations, further apportionment will be required.¹³² Analysis of this issue is beyond the scope of this paper. However, what we wish to stress here is that, even in the simple case, correcting the deficiencies in the analytical method results in a calculation of incremental profits attributable to the infringement.

As we show below, incremental profits are the focal point of current Federal Circuit law in the lost profits area, and the Federal Circuit is properly moving in that same direction in the reasonable royalty area as well. The analytical method aids in this thought progression, however, only if it is properly limited to incremental profits over the next-best alternative, not some non-descript “industry average” or “normal” profit margin; and only if it is applied within, not as a substitute for, the willing licensor/willing licensee framework.

IV. THE FEDERAL CIRCUIT’S APPLICATION OF ECONOMIC PRINCIPLES IN THE LOST PROFITS ARENA AS A PATTERN FOR FUTURE DEVELOPMENTS IN REASONABLE ROYALTY ANALYSIS

In 1978, four years before the creation of the Federal Circuit, the Sixth Circuit summarized the standard for lost profit damages up to that time in *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*¹³³ The case is still routinely cited and applied today, perhaps because it was authored by Judge Howard Markey, at that time Chief Judge

economic approach, the reasonable royalty award (in dollars) should reflect the incremental value (in dollars) of the patented technology to the defendant as compared to the next best alternative.”); Paul E. Schaafsma, *An Economic Overview of Patents*, 79 J. PAT. & TRADEMARK OFF. Soc’y 241, 250 (1997) (finding that “patent profit must be the foundation of any valuation of patent rights”); Gregory K. Leonard & Lauren J. Stiroh, *A Practical Guide to Damages*, ECONOMIC APPROACHES TO INTELLECTUAL PROPERTY: POLICY, LITIGATION AND MANAGEMENT 27, 53 (Gregory K. Leonard & Lauren J. Stiroh eds., 2005) (noting that the “minimum [royalty] could be quite low—at or near zero—if the two parties operate in different markets or locales”).

¹³² See generally Eric E. Bensen & Danielle M. White, *Using Apportionment to Rein in the Georgia-Pacific Factors*, 9 COLUM. SCI. & TECH. L. REV. 1 (2008) (arguing that “apportionment should be the *threshold* question in every reasonable royalty analysis”); Brian J. Love, *Patentee Overcompensation and the Entire Market Value Rule*, 60 STAN. L. REV. 263, 268-69 (2007) (arguing that without apportionment, patents are overvalued by attributing more credit to the infringed upon component than it is due).

¹³³ *Panduit*, 575 F.2d at 1156-57.

of the Court of Customs and Patent Appeals and who would later become the first Chief Judge of the Federal Circuit. In that case, Panduit sued Stahlin for infringement of a patent covering a duct for wiring of electrical control systems. Stahlin was enjoined and later found in contempt of the injunction. Stahlin was selling an infringing duct at a 30% discount. Judge Markey, writing for the Sixth Circuit, set forth the classic four factor test as follows:

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 non-infringing substitutes, (3) his manufacturing and marketing capability to exploit the demand, and (4) the amount of the profit he would have made.¹³⁴

The court found evidence to support factors (1), (2), and (3), but that Panduit had failed to come forward with sufficient data on fixed and variable costs to satisfy prong (4).¹³⁵ While not discussed in detail by the court, prong (2) arguably became the most important aspect of the *Panduit* test as it forced all future damage experts to provide some analysis of non-infringing substitutes. *Panduit* prong (2) set up a binary test for the award of lost profits. If non-infringing substitutes exist, the plaintiff is limited to a reasonable royalty. If the market contains only two competitive substitutes—the patented and the infringing product—then the plaintiff may proceed to the other necessary proof elements to obtain lost profits damages.

The Federal Circuit modified this strict limitation to recovery of lost profits in *State Industries, Inc. v. Mor-Flo Industries, Inc.*¹³⁶ The case involved infringement of a patent covering a method of insulating water heater tanks using polyurethane foam. The court found that Mor-Flo had literally infringed State's patent as well as infringed under the doctrine of equivalents.¹³⁷ The district court awarded State lost profits based on its market share of 40% of total sales. The Federal Circuit began its review of the district court's decision by taking a step back from the *Panduit* four factor test. The Federal Circuit then undertook its own analysis, not with *Panduit*, but using a basic "but for" test:

To get lost profits as actual damages the patent owner must demonstrate that there was a reasonable probability that, but for the infringement, it would have made the infringer's sales.¹³⁸

The Federal Circuit's retrenchment is appropriate. *Panduit's* four-factor test is one way to prove "but for" causation, but it is not the only way. The court noted the difficulty of satisfying the second

¹³⁴ *Id.* at 1156.

¹³⁵ *Id.*

¹³⁶ *State Indus., Inc. v. Mor-Flo Indus., Inc.*, 883 F.2d 1573 (Fed. Cir. 1989).

¹³⁷ *Id.* at 1577.

¹³⁸ *Id.*

prong by showing “the patent owner and infringer are the only suppliers in the market.”¹³⁹ While a two supplier market may be the only circumstance where the patentee could accurately be assumed to have made *all* of the infringer’s sales (presuming manufacturing and marketing capacity to have made those sales), it manifestly is not the case that the patentee would not have made *any* of the infringer’s sales simply because there were other participants in the market. The court, therefore, endorsed using market shares to divide the sales of an infringer when the market contains multiple competitors.¹⁴⁰

Mor-Flo thus took lost profits law a step closer to the economically-correct approach of reconstructing the “but for” world and determining what sales (and at what margins) the patent owner would have made had the infringement not occurred. But, it is not sufficient to simply remove the infringer from the “but for” world altogether. The infringer cannot properly be assumed to have sat idly by; it presumably would have done something if precluded from supplying the infringing product, and attempting to re-enter the competitive fray with its next-best, non-infringing alternative is the economically proper assumption to make. Blindly applying the market share approach of *Mor-Flo*, effectively assumes that the infringer would have made no sales had it adopted the next best substitute, an economically implausible assumption applicable only if the competitor’s cross elasticities with the infringer are proportional to the existing market shares.

The Federal Circuit advanced the *Mor-Flo* analysis further in 1993 in *BIC Leisure Prods., Inc. v. Windsurfing Int’l, Inc.*¹⁴¹ In that case, the patent owner sold a high-end, high-priced windsurfing board, while the infringer sold a low-priced, albeit still infringing, substitute board. The court recognized that, while both products compete, they are heterogeneous and market shares may not accurately reflect the lost sales to the patent owner absent infringement.¹⁴² That is, the court recognized that it could not properly be assumed that the infringer’s customers would have purchased the patentee’s higher-priced boards had the lower-priced infringing boards not been available. The price difference made it much more likely that a substantial number of infringer’s customers would have foregone purchasing a surf board altogether, or would have purchased something other than the patentee’s board, including whatever next-best, non-infringing alternative (if any) the infringer may have offered. The court, therefore, recognized the importance of knowing actual cross elasticity when such

¹³⁹ *Id.* at 1578.

¹⁴⁰ *Id.*

¹⁴¹ *BIC Leisure Prods., Inc. v. Windsurfing Int’l, Inc.*, 1 F.3d 1214 (Fed. Cir. 1993).

¹⁴² *Id.* at 1216.

information is available.¹⁴³

Two years later, in *Rite-Hite Corp. v. Kelley Co.*,¹⁴⁴ the Federal Circuit, sitting en banc, strongly reaffirmed that the starting point of a proper lost profits analysis is the “but for” test, when it held that lost profits damages are available for all sales the patentee would have made but for the infringement, including sales of models not covered by the patent in suit, but still only available from Rite-Hite.¹⁴⁵ As the court stated:

Panduit is not the sine qua non for proving “but for” causation. If there are other ways to show that the infringement in fact caused the patentee’s lost profits, there is no reason why another test should not be acceptable.¹⁴⁶

Another milestone advance in lost profits analysis came in 1999 in *Grain Processing Corp. v. Am. Maize-Prods., Inc.*¹⁴⁷ Grain Processing held a patent on certain types of maltodextrins (used in food processing). American Maize produced and sold an infringing product. American Maize later decided to alter its production process to avoid infringement, which it achieved after only two weeks of development work. American Maize changed no equipment or materials; it simply added another ingredient. Record evidence demonstrated that the resulting differences in the products were “irrelevant to consumers.”¹⁴⁸

The district court held that Grain Processing could not recover lost profits, and that only reasonable royalty damages were available because, in the relevant “but for” world with no infringement, the infringer would have implemented its changes earlier and retained all of its sales because consumers were indifferent to the production changes. “The district court also found that American Maize’s production cost difference between [the] infringing and [the] noninfringing [next-best substitute process] effectively capped the reasonable royalty award.”¹⁴⁹

The Federal Circuit addressed only the district court’s lost profits analysis. It explained that, to obtain lost profits, the plaintiff must “reconstruct” the “but for” market in which infringement is absent, and critically that

[A] fair and accurate reconstruction of the ‘but for’ market also must take into account, where relevant, alternative actions the infringer

¹⁴³ *Id.* at 1218; *see also* *Crystal Semiconductor Corp. v. Tritech Microelectronics, Inc.*, 246 F.3d 1336, 1360 (Fed. Cir. 2001).

¹⁴⁴ *Rite-Hite Corp. v. Kelley Co., Inc.*, 56 F.3d 1538 (Fed. Cir. 1995).

¹⁴⁵ *Id.* at 1546-48.

¹⁴⁶ *Id.* at 1548; *see also* *King Instruments Corp. v. Perego*, 65 F.3d 941, 947 (Fed. Cir. 1995) (buttressing the *Rite-Hite* decision).

¹⁴⁷ *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341 (Fed. Cir. 1999).

¹⁴⁸ *Id.* at 1348.

¹⁴⁹ *Id.* at 1347.

foreseeably would have undertaken had he not infringed. Without the infringing product, a rational would-be infringer is likely to offer an acceptable noninfringing alternative, if available, to compete with the patent owner. . . .¹⁵⁰

Thus, the Federal Circuit fully embraced the economic concept of incremental profit in upholding the district court’s reconstruction of the “but for” world. Lost profits are properly limited to the difference between the profits actually earned by the patent owner and the profit he would have made in the “but for” world where the infringer adopted his next-best substitute:

[O]nly by comparing the patented invention to its next-best available alternative(s)—regardless of whether the alternative(s) were actually produced and sold during the infringement—can the court discern the market value of the patent owner’s exclusive right, and therefore his expected profit or reward. . . .¹⁵¹

This analysis has been consistently followed in subsequent Federal Circuit lost profits opinions.¹⁵²

In the next section, we contend that the Federal Circuit is advancing in the same direction in the reasonable royalty context—and appropriately so. We then demonstrate why the analytical method, as traditionally articulated and applied without limiting it to incremental profits and using it as a substitute for, rather than an aid to the willing licensor/willing licensee framework, has no place in the new economic logic that the Federal Circuit has begun to employ.

V. ECONOMIC INROADS TO FEDERAL CIRCUIT LAW ON REASONABLE ROYALTIES: PROPERLY LIMITING THE ANALYTICAL METHOD

Though starting later, and therefore lagging a bit behind, we maintain that the Federal Circuit is making similar inroads in the application of useful economic principles to reasonable royalty damages analysis as it has with lost profits damages. As with the progression of lost profits analysis, however, progress has not proceeded in a straight line, nor has the progression been particularly rapid.

The basic paradigm for a reasonable royalty is the amount a willing licensee would pay and a willing patent owner would accept for use of the patented technology at the time the infringement

¹⁵⁰ *Id.* at 1350-51.

¹⁵¹ *Id.*

¹⁵² *Microchemical, Inc. v. Lextron, Inc.*, 318 F.3d 1119, 1123-24 (Fed. Cir. 2003); *Smith & Nephew v. Arthrex Inc.*, 603 F. App’x 981, 989 (Fed. Cir. 2015). Nonetheless, the *Grain Processing* approach to lost profits co-exists with the older approaches and has not supplanted *Panduit* and *Mor-Flo*.

began. This is often referred to as the result of a hypothetical negotiation between willing licensor and willing licensee.¹⁵³ As a matter of economic logic, the royalty rate that a patent owner and an infringer would agree to must fall within the “bargaining range” of the parties.¹⁵⁴ Further, an economically defensible royalty rate cannot exceed the incremental profits that an infringer would obtain from using the patent above the profits he would make with his next best alternative.¹⁵⁵ No rational willing licensee would agree to such a license because it would make him worse off than foregoing the license altogether. Roy Epstein and Paul Malherbe state it this way: “The maximum willingness to pay for the relevant patent rights then depends on the profitability of the infringing activity

¹⁵³ *Horvath v. McCord Radiator & Mfg. Co.*, 100 F.2d 326, 335 (6th Cir. 1938); *Wang Labs, Inc. v. Toshiba Corp.*, 993 F.2d 858, 870 (Fed. Cir. 1993); *Maxwell v. J. Baker, Inc.*, 86 F.3d 1098, 1108-09 (Fed. Cir. 1996).

¹⁵⁴ We do not consider here other assumptions that must be made, such as that a bargaining range exists, the date of the negotiation, or the informational assumptions about what each party knows. It is interesting to note, however, that courts, including the Federal Circuit, have not been consistently faithful to this logic. *Sloan Valve*, 33 F. Supp. 3d 984, is one such example. There, plaintiff’s damages expert defined a mutually exclusive “negotiation gap”—with the patentee having a royalty floor of \$141 per unit and the infringer having a royalty ceiling of \$60 per unit—yet proceeded to calculate a “reasonable royalty” between those two amounts based on a hypothetical negotiation between the two mutually exclusive positions. *Id.* at 992-93. See also *Mor-Flo*, 883 F.2d at 1580-81 (upholding award of a 3% royalty despite evidence that infringer’s net profit margin was 2.1% and despite testimony from patentee’s president that it would have required at least an 8% royalty).

¹⁵⁵ See MARK GLICK, LARA A. REYMANN & RICHARD HOFFMAN, *INTELLECTUAL PROPERTY DAMAGES: GUIDELINES AND ANALYSIS* 157-58 (John Wiley & Sons 2003) (providing a hypothetical where infringer will not pay a greater licensing fee than the difference in profit between infringing the patent and using the next best alternative); Roger D. Blair & Thomas Cotter, *Rethinking Patent Damages*, 10 TEXAS INTELL. PROP. L.J. 1, 40 n.194 (2001) (“the maximum payment that a willing licensee would pay is the difference between the maximum profit he would earn from using the invention and the maximum profit he would earn without the invention”); Christopher B. Seaman, *Reconsidering the Georgia-Pacific Standard for Reasonable Royalty Patent Damages*, 5 BYU L. REV. 1661, 1667 (2010) (“[A] reasonable royalty for patent infringement should not exceed the accused infringer’s expected costs of adopting an acceptable noninfringing substitute. This standard is based on the economic principle of substitutability: a rational actor will not pay more for a particular good or service when a lower-cost replacement is available. This standard is also supported by the negotiation theory, which explains that a rational negotiator would not agree to an outcome that would be worse than the next-best available alternative if no deal was [sic] reached. As a result, when an acceptable substitute to the patented technology exists, a rational accused infringer would pay only the amount that it would cost to obtain (or internally develop) and implement the substitute technology, as well as any lost profits or other costs incurred due to the substitute’s adoption. In fact, the Federal Circuit has already recognized an analogous limitation on damages in the context of lost profits.”).

relative to the next-best alternative.”¹⁵⁶ The incremental profit margin therefore defines the upper boundary of an economically defensible “reasonable royalty” negotiation range. This, of course, is what one calculates when applying the analytical method, properly adjusted to reflect incremental profits instead of merely offsetting some “normal” profit margin.

Similarly, the lower bound of the bargaining range is the loss to the patent owner from the infringer’s use of the invention. No rational willing licensor would accept a license fee that is below the amount that allows him to break even. The actual reasonable royalty rate then will be an amount somewhere in this range depending on the relative bargaining power of the parties.¹⁵⁷

At present, the Federal Circuit has not fully embraced this unassailable economic logic.¹⁵⁸ If and when it does, the analytical method will be relegated to its proper role—not as a separate means for calculating a reasonable royalty, but rather a useful tool in obtaining information relevant to the willing licensor/willing licensee analysis.

Several cases suggest that the Federal Circuit is headed in this direction. As noted in the earlier section, the district court in *Grain Processing*, correctly in our view, held that the incremental benefit of using the infringing invention over the next best substitute “capped the reasonable royalty award.” This is because the incremental profit to the infringer is the upper bound of the bargaining range. The Federal Circuit opinion did not address this part of the district court’s decision. But in *Riles v. Shell Exploration & Prod. Co.*,¹⁵⁹ the Federal Circuit cited the district court’s opinion in *Grain Processing* favorably:

[I]n the hypothetical negotiation that characterizes the reasonable royalty calculation, Shell may have had non-infringing alternatives to installing with temporary pilings. Thus, under the constraints of

¹⁵⁶ Ray J. Epstein & Paul Malherbe, *Reasonable Royalty Patent Infringement Damages After Uniloc*, 39 AIPLA Q.J. 3, 28 (2011).

¹⁵⁷ See William Choi & Roy Weinstein, *An Analytical Solution to Reasonable Royalty Rate Calculations*, 41 IDEA 49, 59 (2001-2002) (developing an equation to represent the hypothetical negotiation); Eric A. Rudich, Lewis M. Koppel & Michael P. Padden, *Post-Uniloc Reasonable Royalty Damages*, LANDSLIDE, Jul.-Aug. 2014, at 42 (explaining that some patent owners begin litigation having no idea the market value of their patent).

¹⁵⁸ In fact, some of its decisions expressly state that reasonable royalties are not capped by the infringer’s incremental profits. See e.g., *Mor-Flo*, 883 F.2d at 1580 (“There is no rule that a royalty be no higher than the infringer’s net profit margin.”); *Douglas Dynamics, LLC v. Buyers Prods. Co.*, 717 F.3d 1336, 1346 (Fed. Cir. 2013) (“an infringer’s net profit margin is not the ceiling by which a reasonable royalty is capped”); *Monsanto Co. v. Ralph*, 382 F.3d 1374, 1384 (Fed. Cir. 2004) (“the law does not require that an infringer be permitted to make a profit”).

¹⁵⁹ *Riles v. Shell Exploration & Prod. Co.*, 298 F.3d 1302 (Fed. Cir. 2002) (J. Rader). Judge Rader was also the author of the *Grain Processing* opinion.

the hypothetical negotiation, the market could not award Riles a royalty for his method divorced of all relation to a potential non-infringing alternative method. The economic relationship between the patented method and non-infringing alternative methods, of necessity, would limit the hypothetical negotiation. See *Grain Processing*, 185 F.3d at 1347 (the difference in production costs between the infringing and non-infringing products “effectively capped the reasonable royalty award”).¹⁶⁰

Accordingly, by 2002, one could reasonably read *Grain Processing* and *Shell Exploration* together to the effect that the Federal Circuit had fully embraced the economic role of incremental profits in both the lost profits and the reasonable royalty context.

However, in 2004, another panel of the Federal Circuit arguably backtracked a bit in *Monsanto Co. v. Ralph*.¹⁶¹ The case involved an infringement suit by Monsanto for use of patented recombinant gene sequences inserted into plant seeds. The Federal Circuit considered a challenge to the jury’s reasonable royalty award. The defendant argued that “no sane farmer would ever negotiate a royalty in excess of his anticipated profits.”¹⁶² The Federal Circuit this time rejected the argument. Citing *Georgia-Pacific*, it held that anticipated profits were just one of many factors to consider and that “the law does not require that an infringer be permitted to make a profit.”¹⁶³ The court went on to object that the defendant’s argument would result in a compulsory license, and noted that Monsanto had equally manifested its unwillingness to grant licensees permitting a farmer “to save seed for replanting or transfer at any price.”¹⁶⁴ One should be careful not to read too much into the Federal Circuit’s *Monsanto* decision, however. Bad facts often can lead to bad law, and it is difficult to imagine worse facts than those at issue in *Monsanto*, where the infringing farmer was repeatedly sanctioned for discovery abuses, repeatedly lied under oath, and offered the jury no alternative damages model (voluntarily withdrawing his own expert witness on the day he was scheduled to testify).¹⁶⁵

However, legal pronouncements from cases with bad facts frequently make their way into subsequent decisions without those same bad facts. Four years after *Monsanto*, in *Mars, Inc. v. Coin Acceptors, Inc.*,¹⁶⁶ the infringer, Coin Acceptors (“Coinco”), challenged a district court’s award of a 7% royalty (which led to a total award of \$14,376,062) on the grounds that it exceeded “the cost

¹⁶⁰ *Id.* at 1312.

¹⁶¹ *Monsanto*, 382 F.3d 1374.

¹⁶² *Id.* at 1384.

¹⁶³ *Id.*

¹⁶⁴ *Id.*

¹⁶⁵ *Id.* at 1378-83.

¹⁶⁶ *Mars, Inc. v. Coin Acceptors, Inc.*, 527 F.3d 1359 (Fed. Cir. 2008), amended by 557 F.3d 1377 (Fed. Cir. 2009).

. . . of implementing acceptable non-infringing alternatives.”¹⁶⁷ In addition to criticizing Coinco’s purported evidence of an “acceptable non-infringing alternative to which Coinco could have switched at the time of the hypothetical negotiation,” the Federal Circuit, citing *Monsanto*, rejected Coinco’s legal argument, stating:

[E]ven if Coinco had shown that it had an acceptable noninfringing alternative at the time of the hypothetical negotiation, Coinco is wrong as a matter of law to claim that reasonable royalty damages are capped at the cost of implementing the cheapest available, acceptable, noninfringing alternative. We have previously considered and rejected such an argument. . . . To the contrary, an infringer may be liable for damages, including reasonable royalty damages, that exceed the amount that the infringer could have paid to avoid infringement.¹⁶⁸

Monsanto and *Mars* are difficult to reconcile with the Federal Circuit’s decisions in *Grain Processing* and *Shell Exploration*, other than with reference to *Monsanto*’s bad facts and the *Mars* court’s expressed skepticism about the infringer’s acceptable non-infringing alternative evidence.¹⁶⁹ All four decisions purport to apply the willing licensor/willing licensee framework at the time the infringement began, but reach discordant outcomes. There can be little debate, however, that the *Grain Processing/Shell Exploration* reasoning is more aligned with sound economic principles.

No subsequent Federal Circuit decision appears to have directly addressed the issue of using the incremental profit attributable to use of the patented invention over the next-best substitute as a ceiling on a reasonable royalty award.¹⁷⁰ The court has consistently reiterated, however, that reasonable royalty awards must be tied to the value of the patented invention. In *Lucent Technologies*, the court vacated and remanded a reasonable royalty award in excess of \$350 million against Microsoft because “[t]he only reasonable conclusion that can be drawn from th[e] evidence is that the infringing use of Outlook’s date-picker feature is a minor aspect of a much larger software program and that the portion of the profit that can be credited to the infringing use of the date-picker tool is exceedingly small.”¹⁷¹ Similarly, in *ResQNet.com*,

¹⁶⁷ *Id.* at 1372.

¹⁶⁸ *Id.* at 1373.

¹⁶⁹ The different makeup of the Federal Circuit panels is another possible explanation, but unsatisfying to those searching for predictive guidance from application of coherent legal principles.

¹⁷⁰ The issue was raised, but not reached by the court in *LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51 (Fed. Cir. 2012). While mentioning evidence indicating that the infringer could have switched to another product and avoided infringement at a cost of \$600,000, *id.* at 65, the court did not address what, if any, use should be made of that evidence on remand.

¹⁷¹ *Lucent Techs.*, 580 F.3d at 1333.

Inc. v. Lansa, Inc.,¹⁷² the court vacated and remanded a reasonable royalty award in excess of \$500 million holding that “the trial court must carefully tie proof of damages to the claimed invention’s footprint in the market place” and that “[a]ny evidence unrelated to the claimed invention does not support compensation for infringement but punishes beyond the reach of the statute.”¹⁷³ Use of “rules of thumb,” like the 25% rule and even the Nash Bargaining Solution, which unlike the 25% rule is applied to incremental rather than gross profits, have been rejected as insufficiently tied to the facts of the case.¹⁷⁴ Royalty rates “untethered from the patented technology,”¹⁷⁵ and damages theories lacking “sound economic and factual predicates”¹⁷⁶ have been rejected.

Most recently, in *Virnetx, Inc. v. Cisco Systems, Inc.*,¹⁷⁷ a case alleging patent infringement by Apple’s “FaceTime” feature, the Federal Circuit held that the district had erred in not excluding three separate reasonable royalty theories proffered by VirnetX’s expert because “[t]he law requires patentees to apportion the royalty down to a reasonable estimate of the value of the claimed technology, or else establish that its patented technology drove demand for the entire product. VirnetX did neither.”¹⁷⁸ “[T]he district court should have exercised its gatekeeping authority to ensure that only theories comporting with settled economic principles of apportionment were allowed to reach the jury.”¹⁷⁹

VI. CONCLUSION

We have argued in this paper that the so-called “analytical method” as a separate methodology for calculating reasonable royalty damages has shaky foundations in both pre-Federal Circuit and Federal Circuit law. Indeed, in our view, there was never a clear rationale for severing the analytical method from the willing licensee/willing licensor approach. As a consequence, the analytical method never achieved a proper grounding in the goals of patent damages or in economic principles. This has led to a situation where

¹⁷² *ResQNet.com, Inc. v. Lansa, Inc.*, 594 F.3d 860 (Fed. Cir. 2010).

¹⁷³ *Id.* at 869.

¹⁷⁴ *E.g.*, *Uniloc*, 632 F.3d at 1315 (rejecting the 25% rule of thumb and vacating \$388 million verdict against Microsoft); *Virnetx, Inc. v. Cisco Systems, Inc.*, 767 F.3d 1308, 1332 (Fed. Cir. 2014) (rejecting Nash Bargaining Solution “without sufficiently establishing that the premises of the theorem actually apply to the facts of the case at hand” in vacating \$368 million verdict against Apple).

¹⁷⁵ *LaserDynamics*, 694 F.3d at 81 (vacating jury award of \$8.5 million and remanded for a third damages trial).

¹⁷⁶ *Riles*, 298 F.3d at 1311 (vacating \$8.7 million jury award and remanding for new trial).

¹⁷⁷ *Virnetx*, 767 F.3d 1308.

¹⁷⁸ *Id.* at 1329.

¹⁷⁹ *Id.* at 1328.

damage experts can offer a range of unsound reasonable royalty opinions and claim they are rooting their analyses in a sanctioned Federal Circuit methodology. Unfortunately, this mistaken logic appears to have made its way into several district court decisions, some of which have been affirmed by the Federal Circuit.

As demonstrated above, the fundamental problem with the analytical approach is the mistaken belief that a “normal” profit margin can be identified which allows the analytical method to separate an infringer’s profits into two categories: “competitive returns” and supra-competitive, “economic rents” properly attributable to the infringement. It is a misapplication of economic theory to posit a market competitive profit margin, however. Competition equalizes rates of return on investment not profit margins. Thus, use of an industry or market or average profit margin introduces unacceptable error and speculation into the analysis.

Rather, the most accurate measure of the impact of infringement is to abandon the assumption of a “normal” margin and directly measure the incremental profits from the infringement. This is properly measured as the difference between the profits made by the infringer with the patented invention less the profits the infringer would have made had it selected the next best substitute for the infringing technology. Once this adjustment is made, however, it becomes obvious that the analytical method does nothing more than estimate the upper bound of what the infringer would be willing to pay in the traditional, hypothetical willing licensor/willing licensee negotiation at the time of infringement.

The Federal Circuit has recognized the validity of incremental profits analysis in the context of lost profits damages, as is clearly evident in the Federal Circuit’s *Grain Processing* decision. The Federal Circuit’s doctrinal evolution in calculating reasonable royalty damages, however, is in our view less definitive. We contend that once the Federal Circuit applies the same economic rigor to reasonable royalty analysis as has marked its lost profit decisions, the analytical method will be relegated to its proper role and be subsumed within the willing licensee/willing licensor approach.