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Keeping Up with the Game: The Use of the Nash Bargaining Solution in Patent Infringement Cases

Lance Wyatt

KEEPING UP WITH THE GAME: THE USE OF THE NASH BARGAINING SOLUTION IN PATENT INFRINGEMENT CASES

Lance Wyatt[†]

Determining damages is an integral stage in the patent litigation process. Since 1970, reasonable royalty damages have been calculated using the factors set forth in the seminal decision Georgia-Pacific Corp. v. United States Plywood Corp. *However, these factors are prone to manipulation and abuse by damages experts. To address this abuse, damages experts have utilized a solution to a two-person bargaining situation, the Nash Bargaining Solution (NBS), as a method to calculate reasonable royalty damages in patent infringement cases. Since the introduction of NBS in patent infringement cases, courts have been reluctant to admit the use of the NBS to calculate reasonable royalty damages because damages experts often fail to apply the specific facts of the case to their calculations or adequately explain the NBS.*

This article argues that courts should allow the use of the NBS by damages experts as a viable method to calculate a reasonable royalty in patent infringement cases, despite recent backlash at the Federal Circuit Court of Appeals. First, the NBS, if properly used, adequately applies the facts of each specific case to its analysis. Second, the NBS is grounded in sound, unmanipulable economic theory that can be adequately explained. Finally, the NBS is more impartial than the Georgia-Pacific *analysis.*

TABLE OF CONTENTS

INTRODUCTION

Determining damages is an integral stage in the patent litigation process. Reasonable royalty damages are the prevalent form of relief in patent cases.[1] Section 284 of the Patent Act governs damages in these cases and provides that, at a minimum, a patent holder should receive a reasonable royalty for the use of the invention by the infringer upon a finding of infringement.[2] The Court of Appeals for the Federal Circuit has defined a reasonable royalty as:

> [T]he amount of money which the owner of a patent would accept who is desirous of licensing another to use her patent in return for a royalty, but is not forced by financial need or other compulsion to

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1.   John C. Jarosz & Michael J. Chapman, *The Hypothetical Negotiation and Reasonable Royalty Damages: The Tail Wagging the Dog*, 16 STAN. TECH. L. REV. 769, 769 (2013).
    2.   35 U.S.C. § 284 (2006).

do so, and the amount which a person would be willing to pay as a royalty who is desirous of obtaining a license to use the invention, but who is not compelled to do so.[3]

Since 1970, reasonable royalty damages have been calculated using the factors set forth in the seminal decision, *Georgia-Pacific Corp. v. United States Plywood Corp.*[4] These factors are used to

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3.   Maxwell v. Baker, Inc., 86 F.3d 1098, 1108 (Fed. Cir. 1996).

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

(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; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales.

(7)   The duration of the patent and the term of the license.

(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.

(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.

Id. at 1120.

construct a hypothetical negotiation between a patent holder and an infringer at the time the patent was first infringed.[5] However, these factors are prone to manipulation and abuse by damages experts.[6] Because of these problems with existing methods, damages experts have introduced alternative methods to calculate a reasonable royalty.

In 1950, John Nash, Jr., developed a solution to a two-person bargaining situation.[7] While its soundness in economic theory has been established for over 60 years, the Nash Bargaining Solution (NBS) has only recently burst onto the scene in the calculation of reasonable royalty damages in patent infringement cases. In its simplest terms, the NBS "compares the profits for each party—proceeding rationally, competently, and fully informed—both in entering and not entering into the completed transaction. Relative bargaining positions determine how the parties split the gains provided by the contemplated agreement."[8]

Economists William Choi and Roy Weinstein tailored the NBS in 2001 for the calculation of reasonable royalty damages in patent infringement cases.[9] Additionally, Mark Lemley and Carl Shapiro tailored the NBS as a method to calculate reasonable royalty damages in 2007.[10] Since then, countless legal scholars have examined the NBS in relation to reasonable royalty damages. The NBS first found its way onto the patent infringement landscape in 2011.[11]

Since its introduction in patent infringement cases, district courts have been reluctant to admit the use of the NBS to calculate reasonable royalty damages. Two reasons have fueled this reluctance. First, damages experts often use the NBS improperly, failing to apply the specific facts of the case to their calculations.[12] Second, damages experts typically fail to adequately explain the NBS to courts and

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5.   *See* Jarosz & Chapman, *supra* note 1, at 772.

6.   *See infra* Part IV.C.

7.   *See* John F. Nash, Jr., *The Bargaining Problem*, 18 ECONOMETRICA 155 (1950).

8.   John. B. Scherling & Ryan M. Sullivan, *Rational Reasonable Royalty Damages: A Return to the Roots*, 4 LANDSLIDE, Nov.–Dec. 2011, at 56, 57–58.

9.   *See* William Choi & Roy Weinstein, *An Analytical Solution to Reasonable Royalty Rate Calculations*, 41 IDEA 49 (2001).

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

11.   *See* Oracle Am., Inc. v. Google Inc., 798 F. Supp. 2d 1111 (N.D. Cal. 2011).

12.   *See id.* at 1119 ("In particular, Dr. Cockburn glossed over the axioms underlying the Nash solution without citing *any* evidence to show that those assumptions were warranted in the present case. In this respect, his analysis was not based on sufficient facts.") (internal citation omitted).

juries.[13] While most district courts have not allowed the use of the NBS in patent cases, some district courts have allowed its use.[14] However, the Federal Circuit recently expressed disdain toward the NBS, agreeing "with the courts that have rejected invocations of the Nash theorem without sufficiently establishing that the premises of the theorem actually apply to the facts of the case at hand."[15]

Despite this distaste, courts should allow the use of the NBS by damages experts as a viable method to calculate a reasonable-royalty rate in patent infringement cases for three reasons. First, if properly used, the NBS adequately applies the facts of each specific case to its analysis. Second, the NBS is grounded in sound, unmanipulable economic theory that can be adequately explained. Third, the NBS is more impartial than the *Georgia-Pacific* analysis.

While many legal scholars have examined the NBS in relation to patent damages, few scholars have examined it in light of the Federal Circuit's recent *VirnetX* opinion and subsequent district court opinions. Even fewer scholars have advocated for the use of the NBS as a viable method for calculating a reasonable-royalty rate in patent cases. This article analyzes the recent court decisions regarding the NBS and advocates for its use, despite significant judicial hostility.

Many methods have been used to calculate reasonable royalty damages, including the longstanding *Georgia-Pacific* analysis, the analytical approach, the entire-market-value rule, the established royalty for the patent, the cost-savings approach, and the rule-of-thumb approach.[16] In 2011, the 25% rule of thumb, used by courts as a tool to determine reasonable royalty in patent cases, was held inadmissible by the Federal Circuit.[17] The rule presumed that a licensee in a hypothetical negotiation would be willing to pay a royalty rate of 25% of the profits from the product that incorporated the patent at issue.[18] However, in *Uniloc*, the Federal Circuit abolished the rule as a "fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation."[19] The court reasoned that "[e]vidence relying on the 25 percent rule of thumb is thus inadmissible under

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13.   *See id.* ("He did not, however, adequately explain this method or tie it to facts in the record.")

14.   *See infra* Part III.

15.   *Virnetx, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1332 (Fed. Cir. 2014).

16.   *See Methodologies for Determining Reasonable Royalty Damages*, FISH & RICHARDSON, http://www.fr.com/reasonableroyalty/ (last visited May 19, 2015).

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

18.   *Id.* at 1312.

19.   *Id.* at 1315.

Daubert and the *Federal Rules of Evidence*, because it fails to tie a reasonable royalty base to the facts of the case at issue."[20] Although *Uniloc* attempted to apply the *Georgia-Pacific* factors to adjust the 25% baseline rate up or down, the court explained that, because the analysis started from a fundamentally flawed premise, "adjusting it based on legitimate considerations specific to the facts of the case nevertheless results in a fundamentally flawed conclusion."[21]

Since 2011, courts have been quick to reject the NBS for the same reasons articulated by the Federal Circuit in abolishing the 25% rule of thumb in *Uniloc*.[22] Most courts quickly assume that the NBS is a 50% rule of thumb shrouded in complex mathematics.[23] However, as this article will demonstrate, the NBS is a sound economic theory that often produces royalty rates other than 50%. While most courts have not allowed the use of the NBS in patent cases, some courts have allowed its use under very narrow circumstances. For example, one court allowed a damages expert to use the NBS "as a check on the reasonableness of the rate reached through his *Georgia-Pacific* analysis."[24]

In patent cases, courts have generally stated that the use of the NBS to calculate a reasonable royalty is impermissible because it cannot be adequately explained and it does not apply the specific facts of the case to its calculations.[25] However, this article will demonstrate that the NBS can become a viable method for calculating reasonable royalty without running afoul of the concerns expressed by the Federal Circuit.

The NBS has been in existence for over 50 years and, since then, has been peer-reviewed by countless economists and legal theorists. Working from this foundation, economists and damages experts William Choi and Roy Weinstein developed equations that tailored the NBS to the reasonable-royalty calculation.[26] The variables in these equations force damages experts to apply the specific facts of a case to the NBS. These variables include the disagreement payoff for the patent holder, representing the profit the patent holder/licensor expects

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20.   *Id.*

21.   *Id.* at 1317.

22.   *See infra* Part III.A.

23.   *See* Oracle, *supra* note 10.

24.   Mformation Techs., Inc. v. Research in Motion Ltd., No. C-08-04990 JW, 2012 U.S. Dist. LEXIS 56784, at *15–16, n.19 (N.D. Cal. Mar. 29, 2012), *aff'd*, 764 F.3d 1392 (Fed. Cir. 2014).

25.   *See infra* Part III.A.

26.   *See* Choi & Weinstein, *supra* note 9.

to receive if the negotiation fails, the disagreement payoff for the infringer, the feasible payoff from licensing, which is the total profit from licensing, and the profit for the patent holder and infringer, respectively, from licensing.[27] Finally, utilization of these formulas provides impartial results, which are favorable when compared to the easily-manipulable *Georgia-Pacific* analysis.

Proper utilization of the NBS as a viable method used to calculate a reasonable royalty in patent cases would have many positive implications. For example, it would provide impartial results that would be difficult to manipulate. Moreover, it would ground the damages calculation in sound economic theory, rather than in manipulable factors that are burdensome and difficult to explain.

This article will demonstrate why courts should allow the use of the NBS as a viable method to determine reasonable royalties in patent infringement cases. Part I of this article provides an overview of the NBS and its relation to determining reasonable royalty damages. Part II examines cases that have either allowed or rejected the use of the NBS. Part III explains why courts should use the NBS by demonstrating its incorporation of the facts of each case, its ability to be adequately explained, and its impartiality compared to the *Georgia-Pacific* factor analysis. Finally, Part IV concludes the article by urging damages experts and courts alike to utilize the NBS to determine reasonable royalty damages.

I.   OVERVIEW OF THE NASH BARGAINING SOLUTION

In 1950, John Nash, Jr. developed a solution to a two-person cooperative-bargaining situation.[28] This area of economics is known as game theory, and Nash was eventually awarded a Nobel Prize in 1994 for his solution.[29] Nash described his solution as "a determination of the amount of satisfaction each individual should expect to get from the situation, or, rather, a determination of how much it should be worth to each of these individuals to have this opportunity to bargain."[30] For more than 60 years, Nash's solution has garnered praise throughout the

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27.   *See id.* at 54–55.

28.   *See* Nash, *The Bargaining Problem*, *supra* note 7.

29.   Press Release, The Royal Swedish Academy of Sciences, The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1994 (Oct. 11, 1994).

30.   *See* Nash, *The Bargaining Problem*, *supra* note 7, at 155.

economic community and has been widely accepted as a sound economic theory.[31]

An understanding of the NBS is enhanced by a cursory overview of the theory of bilateral monopoly, a market with one buyer and one seller. This theory teaches that a negotiated price between one buyer and one seller cannot be precisely specified, but rather will be found in an indeterminate range.[32] As economists, Roy Weinstein, Frank Stabile, and Ken Romig, explain:

> This range is determined by each party's "walk away" price. For the buyer (i.e. the defendant or hypothetical licensee), this price represents any price above the highest possible price it is willing to pay. For the seller (i.e. the plaintiff or hypothetical licensor), the walk-away price represents any price below the lowest possible price it is willing to accept. The range of prices between the seller's minimum price and the buyer's maximum price constitute a range of mutually acceptable prices.[33]

The NBS, therefore, allows one to narrow or, in some cases, eliminate this range of indeterminacy by providing "a generally accepted framework for identifying and evaluating factors that influence negotiation outcomes between parties."[34]

In 2001, economists William Choi and Roy Weinstein realized that the NBS could be used to calculate reasonable royalty damages in

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31. The following is a list of recommended reading regarding the economics and mathematics behind the NBS: John Nash, *Two-Person Cooperative Games*, 21 ECONOMETRICA, 128 (1953); Kenneth Chan, *Trade Negotiations in a Nash Bargaining Model*, 25 J. INT'L ECON. 353 (1988); Mark Gertler & Antonella Trigari, *Unemployment Fluctuations with Staggered Nash Wage Bargaining*, 117 J. POL. ECON. 38 (2009); Eric Greenleaf et al., *Guarantees in Auctions: The Action House as Negotiator and Managerial Decision Maker*, 39 MGMT. SCI. 1130 (1993); Eran Hanany et al., *Final-Offer Arbitration and Risk Aversion Bargaining*, 53 MGMT. SCI. 1785 (2007); Lawrence Kahn, *Free Agency, Long-Term Contracts and Compensation in Major League Baseball: Estimates from Panel Data*, 75 REV. ECON. & STAT. 157 (1993); Amitava Krishna Dutt & Anindya Sen, *Union Bargaining Power, Employment, and Output in a Model of Monopolistic Competition with Wage Bargaining*, 65 J. ECON. 1 (1997); Alvin E. Roth, *Axiomatic Models of Bargaining*, (M. Beckmann & H. P. Kunzi eds., 1979); PAUL SAMUELSON & WILLIAM NORDHAUS, ECONOMICS (William Nordhaus ed., 12th ed. 1985); ROGER B. MYERSON, GAME THEORY: ANALYSIS OF CONFLICT (1991); Ken Binmore et al., *The Nash Bargaining Solution in Economic Modeling*, 17 RAND J. ECON. 176 (1986); Ariel Rubenstein et al., *On the Interpretation of the Nash Bargaining Solution and Its Extension to Non-Expected Utility Preferences*, 60 ECONOMETRICA 1171 (1992).

32. Roy Weinstein et al., *Taming Complex Intellectual Property Compensation Problems*, 22 FED. CIR. B.J. 547, 554 (2013).

33. *Id.*

34. *Id.* at 555.

patent infringement cases.[35] First, they noted the conditions, or axioms, that Nash used in his theory.[36] These axioms are as follows:

(1) Pareto efficiency; that is, there should be no other feasible allocation that is (a) better than the solution for one negotiator and (b) not worse than the solution for the other negotiator.

(2) Negotiators must collectively behave in a rational manner such that neither side gets less in the bargaining solution than could be obtained in disagreement.

(3) The solution is independent of any numeric specification; that is, if we change the way we measure the payoffs when we construct a two-person bargaining problem, then the solution corresponds to the same outcome.

(4) Eliminating alternatives other than the disagreement profits (opportunity costs from licensing) that would not have been chosen should not affect the solution.

(5) If the disagreement profits of the two parties are equal in the bargaining problem, then the solution also should treat them equally.[37]

With these conditions as a foundation, the authors noted that "Nash demonstrated that satisfying these conditions yields a unique solution . . . where the bargaining outcome rests simply on each negotiator's alternative to negotiating and the potential benefits of cooperation."[38] In other words, the satisfaction of these conditions results in an outcome dependent upon the bargaining parties' back-up alternatives and the benefits arising from a mutual cooperation.

The authors then applied Nash's theory to reasonable royalty damages, stating that "the NBS requires only knowledge or estimation of (1) the 'disagreement' profits of both the licensee and licensor; and (2) the total profits from a licensing agreement."[39] First, the authors defined the variables necessary to perform the NBS in a reasonable-royalty context.[40] One of the variables included the disagreement profits of the patent holder.[41] Disagreement profits represent the profits a patent holder expects to receive in the event that negotiation fails.[42]

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35. *See* Choi & Weinstein, *supra* note 9.
36. *Id.* at 53.
37. *Id.*
38. *Id.*
39. *Id.*
40. *See id.* at 54.
41. *Id.*
42. *Id.*

The authors defined this variable as d_1.[43] Next, the authors defined the variable of the disagreement profits of the infringer/licensee as d_2.[44] This variable represents the profits that an infringer/licensee expects to receive in the event that negotiation fails.[45] The disagreement profits are representative of each party's relative bargaining position.[46] If either party has backup plans in the event that negotiation fails, their bargaining position increases, relative to the value of the backup plans.[47] Additionally, the authors defined the variable Π as the total incremental profit from licensing.[48] Finally, the authors defined the variables π_1 and π_2 "as profit for the patent holder and infringer/licensee, respectively, from licensing."[49]

After defining the variables, the authors developed equations combining the defined variables and the Nash axioms.[50] First, the authors explained that Nash's theory demonstrated that the only point that satisfies his axioms is the one obtained by solving the following maximization problem:

$$\max\nolimits_{\pi_1,\pi_2} (\pi_1 - d_1)(\pi_2 - d_2) \qquad (1)$$

subject to the following conditions:

$$\pi_1 \geq d_1, \qquad (2)$$

$$\pi_2 \geq d_2, \qquad (3)$$

$$\pi_1 + \pi_2 \leq \Pi \qquad (4)^{[51]}$$

From there, the authors examined the effects of transfer payments being permitted between the two parties.[52] This examination provided the authors with three factors that fully characterized the bargaining problem: (1) the disagreement payoff for the patent holder; (2) the disagreement payoff for the infringer/licensee; and (3) the total

43.   *Id.*
44.   *Id.*
45.   *Id.*
46.   *Id.*
47.   *Id.*
48.   *Id.*
49.   *Id.*
50.   *Id.*
51.   *Id.*
52.   *Id.*

transferable wealth available to the two parties from licensing.[53] The authors then established the conditions for the equilibrium payoffs as:

$$\pi_1^* - d_1 = \pi_2^* - d_2, \qquad (5)$$

$$\pi_1^* + \pi_2^* = \prod, \qquad (6)$$

where π_i^* represents the equilibrium payoff for firm i.[54]

Next, the authors solved the conditions for the equilibrium payoffs, yielding the NBS:

$$\pi_1^* = d_1 + \frac{1}{2}(\Pi - d_1 - d_2), \qquad (7)$$

$$\pi_2^* = d_2 + \frac{1}{2}(\Pi - d_1 - d_2), \qquad (8)$$

$$\pi_1^* + \pi_2^* = \Pi \qquad (9)^{55}$$

The authors then explained the implications of these equations. First, the authors noted that equations (7) and (8) demonstrate that the parties "bargain over the partition of total profits (Π); they first agree to give each other the payment that they respectively would obtain from not reaching agreement; then, they split the remaining profits equally."[56] For either party, the agreement payoff is greater when its disagreement point is higher than the disagreement point of the opposing party.[57] Therefore, the relative bargaining power is dependent upon either side's "respective outside opportunities."[58]

The authors concluded their development of the NBS for the calculation of reasonable royalty damages by noting:

> The fundamental insight of the NBS is that the alternatives to agreement that are available to each side limit how good a bargain the other partner can obtain. These alternatives set a lower limit on the share each side willingly will accept. Under the NBS, the two sides called upon to split a pie will divide the bargaining surplus— which is bounded by each bargainer's threat point or reservation price—down the middle, so that each has an equal share.
> An alternative way of thinking about the NBS is in the framework of an implicit arbitrator who tries to distribute the gains from trade or, more generally, from cooperation in a manner that reflects fairly

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53.   *Id.*
54.   *Id.* at 55.
55.   *Id.*
56.   *Id.*
57.   *Id.*
58.   *Id.*

the bargaining strength of the two negotiators. Once each side's disagreement payoffs are determined, an arbitrator applies the NBS to obtain an efficient and fair solution. In the following section, we apply the NBS to the calculation of a reasonable royalty.[59]

Choi and Weinstein's development of the NBS in the context of patent damages provides a useful method for calculating reasonable royalty damages that is grounded in sound economic theory. Other scholars have applied the NBS in the context of patent damages as well.[60] For instance, in 2007, Mark Lemley and Carl Shapiro, developed mathematical equations that applied the theory of the NBS to reasonable-royalty calculations.[61] These equations were more simplified than those developed by Weinstein and Choi. First, Lemley and Shapiro defined the variables of their equations.[62] The noteworthy variables included:

V: The Value per unit of the patented feature to the downstream firm in comparison with the next best alternative technology. For example, if the patented feature enhances the value of the product to consumers by \$1 over the next best alternative, then V = \$1. Similarly, if it reduces the cost of manufacturing the good by \$1, then V = \$1. . . .

θ: The Strength of the patent, i.e., the probability that litigation will result in a finding that the patent is valid and infringed by the downstream firm's product. . . .

B: The Bargaining skill of the patent holder, as measured by the fraction of the combined gains from settling, rather than litigating,

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59.   *Id.* at 55–56 (citation omitted).

60.   Legal commentators have analyzed the method and applicability of the NBS in patent damages calculations but have not commented on the legal aspects of its use. *See, e.g.*, RICHARD F. CAULEY, WINNING THE PATENT DAMAGES CASE 26–31 (2d ed. 2011); John C. Jarosz & Michael J. Chapman, *Application of Game Theory to Intellectual Property Royalty Negotiations*, *in* LICENSING BEST PRACTICES 241–65 (Robert Goldscheider & Alan H. Gordon eds., 2006); Jonathan D. Putnam & Andrew B. Tepperman, *Bargaining and the Construction of Economically Consistent Hypothetical License Negotiations*, THE LICENSING JOURNAL, Aug. 2004, at 7; Elizabeth M. Bailey, *Making Sense of "Apportionment" in Patent Damages*, 12 COLUM. SCI. & TECH. L. REV. 255 (2011); A. Frank Adams, III et al., PATENT ROYALTY RATES: A LOOK AT RECENT COURT DECISIONS (2008); Chester C. McGuire, *Simulation Modeling in Forensic Economics: The Example of Reasonable Royalty Negotiations*, 4 LITIGATION ECONOMICS DIGEST 15 (1999); T. PAUL TANPITUKPONGSE & KANAV HASIJA, GAME THEORY: A ZOOMING AND SLIDING METHOD FOR THE DETERMINATION OF REASONABLE ROYALTIES IN PATENT DAMAGES (2011).

61.   Lemley & Shapiro, *supra* note 10.

62.   *Id.* at 1996–97.

that are captured by the patent holder. This variable falls between 0 and 1. Equal bargaining skill, $B = 0.5$, is a common assumption.[63]

Using these variables, Lemley and Shapiro explained that "the benchmark royalty rate for an ironclad patent is equal to B x V."[64] Additionally, the authors demonstrated that "[m]ore generally, the benchmark royalty rate is given by θ x B x V."[65] While Lemley and Shapiro's equations can be useful, the analysis of this article will focus solely on the equations developed by Choi and Weinstein. This reasoning is based upon Choi and Weinstein's use of more fact-specific variables than the equations set forth by Lemley and Shapiro.

II. PATENT DAMAGES CASELAW PRIOR TO THE INTRODUCTION OF THE NASH BARGAINING SOLUTION

Before an in-depth analysis of the caselaw surrounding the NBS, it is useful to provide a brief overview of patent-damages caselaw prior to the introduction of the NBS. This overview will highlight alternative damages models that have been used, without providing a detailed analysis of each method, and will help to frame the forthcoming analysis of the article.

The predominant method for calculating a reasonable-royalty rate has been the use of the *Georgia-Pacific* factors to construct a hypothetical negotiation.[66] Other methodologies have been used with varying success.[67] For example, one methodology that has been used is the analytical approach.[68] This approach:

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63. *Id.*

64. *Id.* at 1999.

65. *Id.*

66. Christopher Marchese et al., *Methodologies for Determining Reasonable Royalty Damages*, FISH & RICHARDSON, http://www.fr.com/reasonableroyalty/ (last visited Mar. 14, 2014).

67. *See id.*

68. *Id.* ("The Federal Circuit approved this method in *TWM Manufacturing Co. v. Dura Corp.*, 789 F.2d 895 (Fed. Cir. 1986), *cert. denied*, 479 U.S. 852 (1986). There, the infringer had an internal memo just before infringement began projecting a gross profit of about 50% for each infringing sale, from which the projected net profit was computed to be about 40% of the anticipated sales price. As the standard industry net profit was about 10% of the sales price, the special master awarded the patentee a reasonable royalty damages rate of the difference—30%. This rate was then applied to the infringer's actual sales figures to calculate the reasonable royalty damages. It had nothing to do with any hypothetical negotiation. Instead, it was strictly an apportionment based on the infringer's projections. The Federal Circuit not only affirmed, but it also expressly rejected the infringer's contention that the *Georgia-Pacific* approach was the only possible approach to computing reasonable royalty damages. The Federal Circuit made it clear that other approaches were possible, and this one was proper.").

> [I]nvolves calculating damages based on the infringer's own internal profit projections for the infringing item at the time the infringement began, and then apportioning the projected profit between the parties as a percentage of sales. The patentee's percentage is then applied to the sales dollars for the actual infringing sales to determine the reasonable royalty damages.[69]

Additionally, patent infringement plaintiffs began using the 25% rule of thumb to calculate a reasonable-royalty rate.[70] The 25% rule of thumb "presumed that a licensee in a hypothetical negotiation would be willing to pay a royalty rate of 25 percent of profits on the product that incorporated the patent at issue."[71]

In 2011, the 25% rule of thumb was held inadmissible.[72] In *Uniloc*, the Federal Circuit abolished the rule as a "fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation," holding that "[e]vidence relying on the 25 percent rule of thumb is thus inadmissible under *Daubert* and the *Federal Rules of Evidence*, because it fails to tie a reasonable royalty base to the facts of the case at issue."[73] Although *Uniloc* attempted to apply the *Georgia-Pacific* factors to bring the 25 % royalty rate up or down, the court explained that, because the analysis started from a fundamentally flawed premise, "adjusting it based on legitimate considerations specific to the facts of the case nevertheless results in a fundamentally flawed conclusion."[74] After the 25% rule was stricken, damages experts began utilizing the NBS to calculate reasonable royalty damages.[75]

III. PATENT CASES ADDRESSING THE NASH BARGAINING SOLUTION

The cases that follow demonstrate how courts have treated the NBS in patent infringement cases since its introduction in 2011. While some courts have allowed damages experts to use the NBS to calculate a reasonable royalty, many courts have not. Even still, most courts that have allowed damages experts to use the NBS have only allowed its use in conjunction with other methods. This Part revolves primarily around the Federal Circuit's *VirnetX* opinion, which precluded

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69. *Id.* The authors also mention four other possible methodologies for calculating a reasonable royalty. These methodologies include "Rule of Thumb," "Established Royalty for the Patent," "Many Licenses in a Small Range of Rates," and "Cost Savings." *Id.*

70. *Id.*

71. *See* Uniloc USA, Inc. v. Microsoft Corp., 632 F.3d 1292, 1312 (Fed. Cir. 2011).

72. *Id.*

73. *Id.* at 1315.

74. *Id.* at 1317.

75. *See infra* Part III-B.

plaintiff's use of the NBS, as well as the treatment of the NBS before and after *VirnetX*.

A. *Pre-*VirnetX *Cases Excluding the Use of the Nash Bargaining Solution by Damages Experts*

The United States District Courts for the Northern District of California and the Eastern District of Virginia are hotbeds of patent litigation.[76] However, both courts have excluded the use of the NBS by damages experts.[77] For example, in *Oracle*, the District Court for the Northern District of California rejected the use of the NBS in determining a reasonable royalty in patent damages.[78] The court explained that, although the damages expert "purported to use the Nash bargaining solution to project bargaining outcomes and calculate the resulting payments and royalties in the hypothetical negotiation," he did not adequately explain this method or tie it to the facts of the case.[79] More specifically, the court held that the damages expert "glossed over the axioms underlying the Nash solution without citing any evidence to show that those assumptions were warranted in the present case," and therefore, allowing the expert to testify would have risked misleading the jury "as to the soundness of the foundation for his conclusions."[80] Further, the court explained that, because the NBS involves complex mathematics, "no jury could follow this Greek or testimony trying to explain it . . . [and the NBS] would invite a miscarriage of justice by clothing a fifty-percent assumption in an impenetrable facade of mathematics."[81] Therefore, the court excluded the expert's testimony under Rule 403 of the *Federal Rules of Evidence* and advised the use of the *Georgia-Pacific* factors to guide a royalty analysis.[82]

Additionally, in *Suffolk*, the District Court for the Eastern District of Virginia, pursuant to Rule 702 of the *Federal Rules of Evidence* and *Daubert*, excluded the testimony of plaintiff's damages expert, Roy

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76. *See* PRICEWATERHOUSE COOPERS, 2014 PATENT LITIGATION STUDY (2014), http://www.pwc.com/en_US/us/forensic-services/publications/assets/2014-patent-litigation-study.pdf

77. *See* Oracle Am., Inc. v. Google Inc., 798 F. Supp. 2d 1111 (N.D. Cal. 2011); Suffolk Techs., LLC v. AOL Inc., No. 1:12-cv-625, 2013 U.S. Dist. LEXIS 64630 (E.D. Va. Apr. 12, 2013).

78. *Oracle*, 798 F. Supp. 2d at 1120 (N.D. Cal. 2011).

79. *Id.* at 1119 (internal quotations omitted).

80. *Id.*

81. *Id.* at 1120.

82. *Id.*

Weinstein.[83] Weinstein's damages opinion provided an analysis of the "revenue stream associated with the putative infringing product" under the *Georgia-Pacific* factors, and then a hypothetical negotiation under the NBS.[84] Weinstein's hypothetical negotiation resulted in a 50/50 split of the incremental profits attributed to the patent-in-suit.[85] The court held that Weinstein's 50/50 split was not tied to the facts of the case and therefore, "no different from the 25% rule of thumb rejected in *Uniloc*."[86] Although Weinstein used the *Georgia-Pacific* factors in his overall analysis, the court explained that "[t]he order in which the *Georgia-Pacific* factors are applied does not change the fundamental and fatal flow of both calculations, namely that the hypothetical rule of thumb was not tied to the facts of the case."[87]

B. Pre-VirnetX *Cases Excluding the Use of a 50/50 Split by Damages Experts*

While some damages experts have simply applied a 50/50 split without further mention of the NBS, courts have excluded this practice and likened it to the functional equivalent of the NBS. For example, in *Dynetix*, the court excluded the opinion of Plaintiff's damages expert, Dr. William H. Black. Dr. Black started his opinion with "the presumption that 'one reasonable starting place' for the licensing rate would be half of the gross margin of the infringing products."[88] The court held that Dr. Black's analysis was improper under the *Uniloc* standard.[89] The court opined that Dr. Black "considered no analogous facts of the case here other than the presumed validity of the patent [and] . . . failed to cite any evidence to support his conclusion that the 50% starting place would apply to component parts."[90] While Dr. Black did not mention the NBS in his analysis, it is worth noting that the court likened his analysis to the NBS, citing the *Oracle* decision.[91]

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    83.   Suffolk Techs. LLC v. AOL Inc., No. 1:12-cv-625, 2013 U.S. Dist. LEXIS 64630, at *6 (E.D. Va. Apr. 12, 2013).

    84.   *Id.* at *4–*5.

    85.   *Id.* at *5.

    86.   *Id.*

    87.   *Id.* at *5–*6.

    88.   Dynetix Design Solutions, Inc. v. Synopsys, Inc., No. C 11-05973 PSG, 2013 WL 4538210, at *4–5 (N.D. Cal. Aug. 22, 2013).

    89.   *Id.*

    90.   *Id.*

    91.   *Id.* at *5, n.34.

Additionally, in *Robocast*, the court excluded the testimony of Plaintiff's damages expert, Creighton Hoffman.[92] In Hoffman's expert report, he used the *Georgia-Pacific* factors to conclude "that an equal split of the benefits would be reasonable and could be negotiated by the parties to the hypothetical negotiation."[93] While Hoffman's report did not mention NBS or game theory, the court concluded that "there is no doubt that the reasoning behind [Hoffman's] purported 50/50 profit split is premised on these models."[94] From there, the court noted that Hoffman "did not discuss the relative bargaining power of Microsoft and Robocast."[95] Furthermore, the court held that "Mr. Hoffman's discussion of the facts specific to this case would be insufficient even if the 'relative bargaining power' issue did not exist."[96] Finally, the court concluded its analysis by noting that "while the Nash Bargaining Solution of a 50/50 split has a more prestigious academic pedigree than the 25% rule of thumb, both are non-starters in a world where damages must be tied to the facts of the case."[97]

C. Pre–VirtnetX *Cases Allowing the Use of the Nash Bargaining Solution*

Other courts have also allowed damages experts to use the NBS, but in these cases, the NBS is used in conjunction with other methods. For example, in *Mformation*, the Northern District of California allowed the use of the NBS as a "check" on an analysis under the *Georgia-Pacific* factors.[98] Defendants moved to exclude the testimony of plaintiff's damages expert Roy Weinstein, arguing that the NBS, used in determining a reasonable royalty, was an impermissible rule of thumb.[99] The court held that because Weinstein had performed an extensive analysis under the *Georgia-Pacific* factors, his use of the NBS "as a check on the reasonableness of the rate reached through his *Georgia-Pacific* analysis" did not constitute a ground for exclusion of his testimony.[100] The court further explained that exclusion was not

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92.   Robocast, Inc. v. Microsoft Corp., No. 10-1055-RGA, 2014 WL 350062, at *3 (D. Del. Jan. 29, 2014).

93.   *Id.* at *1.

94.   *Id.*

95.   *Id.*

96.   *Id.* at *3.

97.   *Id.*

98.   Mformation Techs., Inc. v. Research in Motion Ltd., No. C-08-04990 JW, 2012 U.S. Dist. LEXIS 56784, at *15–16, n.19 (N.D. Cal. Mar. 29, 2012), *aff'd*, 764 F.3d 1392 (Fed. Cir. 2014).

99.   *Id.* at *14.

100.   *Id.* at *15–*16, n.19.

necessary because "Weinstein used [the NBS] in addition to, rather than in lieu of, the *Georgia-Pacific* analysis."[101] This case provides an example of when courts allow the use of the NBS but only in a limited sense. This court did not allow the use of the NBS as the sole method in calculating a reasonable royalty.

Additionally, in *Summit 6*, Judge Reed O'Connor of the Northern District of Texas allowed plaintiff's use of the NBS.[102] Defendant argued that Plaintiff's damages expert, Benoit, used a flawed analysis, combining the use of a non-patent-practicing component of the device, reliance on market research surveys, and application of the NBS.[103] Defendant argued that the use of the NBS was an improper 50% rule of thumb that had been rejected by courts.[104] However, "Benoit testified that the NBS only looks to surplus profit, and allows for a variance in dividing the surplus profit where there is an otherwise unquantifiable difference in the bargaining position."[105] Accordingly, the court found that Benoit's use of the NBS was not an improper 50% rule of thumb, but actually "based on his belief that because neither party had a stronger negotiating position, they would have split the profits evenly.[106] The court also emphasized that:

> [T]he Federal Circuit's explanation that a district court should not use *Daubert* "to evaluate the correctness of facts underlying an expert's testimony. Questions about what facts are most relevant or reliable to calculating a reasonable royalty are for the jury. The jury was entitled to hear the expert testimony and decide for itself what to accept or reject."[107]

Moreover, in *Sanofi-Aventis*, the court allowed the use of the NBS by the plaintiffs' damages expert.[108] Although the court never explicitly mentioned the NBS, plaintiff's expert Mohan Rao determined his reasonable-royalty rate using game theory, which is synonymous with the NBS.[109] The defendants, Glenmark Pharmaceuticals, moved to preclude the plaintiffs from offering expert testimony utilizing the

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101.   *Id.* at *16, n.19.

102.   Summit 6 LLC v. Research in Motion Corp., No. 3:11-cv-367-O, 2013 U.S. Dist. LEXIS 95164, at *32 (N.D. Tex. June 26, 2013).

103.   *Id.*

104.   *Id.* at *36–*37.

105.   *Id.*

106.   *Id.*

107.   *Id.* (quoting i4i Ltd. P'ship v. Microsoft Corp., 598 F.3d 831, 856 (Fed. Cir. 2010)).

108.   Sanofi-Aventis Deutschland GmbH v. Glenmark Pharm., Inc., USA, No. 07-CV-5855, 2011 WL 383861, at *13 (D.N.J. Feb. 3, 2011).

109.   *Id.* at 12.

NBS.[110] Defendants argued that the NBS is indistinguishable from the 25% rule of thumb because it essentially applies a 50% rule of thumb to determine the reasonable-royalty rate.[111] Defendants argued that the damages expert "mechanically applied a 50/50 profit split" between the parties.[112] On the other hand, plaintiffs argued that the NBS is "the standard model in economics for calculating the outcome of a negotiation, is recognized as a scientific method in determining reasonable-royalty rates, and is unrelated to the 25 percent rule rejected in *Uniloc*."[113] Additionally, plaintiffs argued that the damages expert reached his result under the NBS "after considering the facts of the case, specifically the relationship between the parties and their relative bargaining power, the relationship between the patent and the accused product, the standard profit margins in the industry, and the presumed validity of the patent."[114] Ultimately, the court determined that the damages expert "did not arbitrarily apply a 50/50 profit split akin to the 25 percent rule rejected in *Uniloc* but rather based his reasonable royalty analysis on the specific facts of this case."[115]

Additionally, in *Gen Probe*, the U.S. District Court for the Southern District of California ruled on a *Daubert* motion to exclude testimony of Gen-Probe's damages expert, Michael Wagner.[116] Wagner's damages report was based on the NBS and the entire-market-value rule.[117] Becton Dickinson argued that Wagner's calculations were based on arbitrary profit splits similar to the 25% rule of thumb.[118] Gen-Probe countered that Wagner's calculations "were influenced, appropriately, by the facts of the case, including the competitive environment and Gen-Probe's policy of exploiting its own patents—considerations approved in *Rite-Hite Corp. v. Kelley Co.*"[119] The court agreed with Gen-Probe, holding that Wagner's analysis was tied to the

110.   *Id.*

111.   *Id.*

112.   *Id.*

113.   *Id.* at *13.

114.   *Id.*

115.   *Id.*

116.   Gen-Probe Inc. v. Becton Dickinson & Co., No.3:09-cv-02319-BENNLS, 2012 WL 9335913 (S.D. Cal Nov. 26, 2012).

117.   *See* TWM Mfg. Co., Inc. v. Dura Corp., 789 F.2d 895, 901 (Fed. Cir. 1986) ("The entire market value rule allows for the recovery of damages based on the value of an entire apparatus containing several features, when the feature patented constitutes the basis for customer demand.").

118.   *Id.* at *3.

119.   *Id.* (quoting Rite-Hite Corp. v. Kelley Co., 56 F.3d 1538, 1554 (Fed. Cir. 1995)).

facts of the case and that his testimony would not be excluded on those grounds.[120]

Finally, in *VirnetX*, Judge Leonard Davis of the U.S. District Court for the Eastern District of Texas allowed plaintiff's use of the NBS.[121] Defendant argued that the testimony of plaintiff's damages expert, Roy Weinstein, should have been excluded because of his use of the NBS.[122] Defendant maintained that Weinstein's use of the NBS was improper because he failed to use generally accepted methods of applying the NBS, failed to explain why a 45%–55% profit split between the parties would have occurred, and arbitrarily applied a profit split "akin to the disdained 25% rule," having "no basis in reality."[123] The court held, however, that Weinstein adequately supported his NBS-based theory, providing substantial evidence to support his theory.[124] First, Weinstein calculated the contribution of the patented feature to defendant's total profits "by estimating the price differential between the accused product and the last previous version of the product not capable of supporting the feature."[125]

Next, Weinstein reduced the revenue by the percentage of the revenue associated with the addition of the patented feature, relying on the price of the technology that enabled the feature.[126] Finally, Weinstein accounted for the 45%–55% profit split, "explaining that [plaintiff] would have been in a weaker bargaining position at the time of the negotiation because of its financial situation."[127] Weinstein's use of the NBS was admissible because it was adequately applied to the facts of the case.[128] This case demonstrates that the resulting royalty rate under the NBS will not always be 50%. Instead, the bargaining power of either party has the potential to bring the rate up or down. While the examples are few and far between, Weinstein's use of the NBS was proper, and as a result, was allowed by the court.

D. VirnetX, Inc. v. Cisco Systems, Inc.

The Federal Circuit recently issued an opinion regarding the disparity among federal district courts' treatment of the Nash

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120. *Id.*
121. *See* VirnetX Inc. v. Apple Inc., 925 F. Supp. 2d 816 (E.D. Tex. 2013).
122. *Id.* at 838–39.
123. *Id.* at 839.
124. *Id.*
125. *Id.*
126. *Id.*
127. *Id.*
128. *Id.*

Bargaining Solution.[129] The Federal Circuit agreed "with the courts that have rejected invocations of the Nash theorem without sufficiently establishing that the premises of the theorem actually apply to the facts of the case at hand."[130] More specifically, the court explained:

> The problem with Weinstein's use of the Nash Bargaining Solution, though somewhat different, is related, and just as fatal to the soundness of the testimony. The Nash theorem arrives at a result that follows from a certain set of premises. It itself asserts nothing about what situations in the real world fit those premises. Anyone seeking to invoke the theorem as applicable to a particular situation must establish that fit, because the 50/50 profit-split result is proven by the theorem only on those premises. Weinstein did not do so. This was an essential failing in invoking the Solution. Moreover, we do not believe that the reliability of this methodology is saved by Weinstein's attempts to account for the unique facts of the case in deviating from the 50/50 starting point.[131]

The court further warned that "Weinstein's thin attempts to explain his 10% deviation from the 50/50 baseline in this case demonstrate how this methodology is subject to abuse. . . . Such conclusory assertions cannot form the basis of a jury's verdict."[132] Additionally, the court expressed concern that "[a]lthough the result of that equation would be mathematically sound if properly applied by the jury, there is concern that the high royalty base would cause the jury to deviate upward from the proper outcome."[133] Finally, the court did note one difference between the NBS and the 25% rule of thumb: "where the 25% rule was applied to the entire profits associated with the allegedly infringing product, the Nash theory focuses only on the *incremental* profits earned by the infringer from the use of the asserted patents."[134]

There are several key takeaways from the Federal Circuit's opinion. First, the court did not place an outright bar on the use of the NBS. Rather, it merely held that Weinstein's application of the NBS was insufficiently tied to the facts of the case.[135]

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129.   *See* VirnetX, Inc. v. Cisco Systems, Inc., 767 F.3d 1308 (Fed. Cir. 2014). This was an appeal from the VirnetX Inc. v. Apple Inc. decision discussed in Part IV-D.

130.   *Id.* at 1332.

131.   *Id.* at 1332–33.

132.   *Id.* at 1333.

133.   *Id.*

134.   *Id.*

135.   *Id.*

Second, the court provided guidance as to how an expert could properly apply the NBS, explaining that the NBS is only applicable when the facts of the case fit the premises provided by the NBS.[136] For example, one of the premises previously mentioned is that there should be no other feasible allocation that is (a) better than the solution for one negotiator and (b) not worse than the solution for the other negotiator.[137] Thus, an expert attempting to utilize the NBS must be able to demonstrate from the facts of the case, that this premise, along with the others, is met. Once this showing is made, the expert can then apply the NBS, using the model developed by Choi and Weinstein.

Third, the Federal Circuit hinted at the possibility of the exclusion of the NBS based upon the specific facts of a case. For example, if the facts of a particular case could not fit the premises of the NBS, the NBS could not be applied regardless of how clear the expert explained its methodology or how intimately the facts were tied to the application.

Fourth, the court's opinion did not render Choi and Weinstein's theory useless simply because Weinstein's application was held inadmissible. As explained above, if the facts of a case fit the premises of the NBS, Choi and Weinstein's model can be used to determine a reasonable royalty. Here, although Weinstein applied the facts of the case to his model, evidenced by the deviation from the 50/50 starting point, he failed to show that the facts of the case fit the starting premises of the NBS. Thus, Choi and Weinstein's method is still a useful method when the premises are met by the facts of a case.

Regardless, because the Federal Circuit did not place an outright bar on the use of the NBS, it still stands as a reliable method of calculating patent damages.

E. Post-VirnetX Treatment of the NBS

Since the Federal Circuit's *VirnetX* opinion, one district court has addressed the use of the NBS.[138] In *Sentius*, defendant Microsoft attempted to exclude plaintiff's damages expert, Robert Mills.[139] Mills used an approach known as "income theory" to determine the incremental profits earned by the infringer from the use of the asserted patents.[140] From there, Mills determined how the parties would divide

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136. *Id.*

137. *See supra* Part I.

138. *See* Sentius Int'l, LLC v. Microsoft Corp., No. 5:13-cv-00825-PSG, 2015 WL 451950 (Jan. 27, 2015).

139. *Id.* at *1.

140. *Id.* at *9.

these incremental profits based on their relative bargaining positions—the NBS.[141] Microsoft argued that Mills' analysis was flawed because his "analysis of the parties' relative bargaining strengths is 'hand-waving at best.'"[142]

However, the United States District Court for the Northern District of California held that Mills did not "follow an unprincipled 'rule of thumb' approach similar to the theories that the Federal Circuit rejected in *VirnetX* and *Uniloc* to reach his conclusions about the relative bargaining power of parties."[143] The court went on to explain that Mills analyzed how various factors impacted the parties' bargaining strengths and did not follow an unprincipled "rule of thumb" approach, similar to the theories that the Federal Circuit rejected in *VirnetX* and *Uniloc* to reach his conclusions about the relative bargaining power of parties, but unlike in *VirnetX*, where Weinstein "relied on 'rules of thumb' without establishing that those rules applied to the hypothetical negotiation at issue."[144]

Moreover, Microsoft attempted to argue that Mills' analysis was insufficient because his determination of the parties' bargaining strength was either generic, favored Microsoft, or did not support any quantitative value.[145] However, the court held that these complaints did not warrant exclusion of Mills' analysis because "they either mischaracterize Mills' analysis or go to weight, not admissibility."[146]

Although the court never explicitly mentions the NBS, it is clear that Mills' application of specific facts to determine the parties' relative bargaining positions is such an application. Citing the Federal Circuit's criticism of the NBS, the court found that Mills' application was admissible. This case reaffirms some of the key takeaways mentioned previously—namely, that the Federal Circuit did not place an outright bar on the NBS. Additionally, *Sentius* suggests that experts have learned from the Federal Circuit's guidance, and are more equipped to apply the NBS without judicial hostility.

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141. *Id.*
142. *Id.*
143. *Id.*
144. *Id.*
145. *Id.* at *10.
146. *Id.*

IV. THE NASH BARGAINING SOLUTION SHOULD BE A VIABLE METHOD USED IN CALCULATING REASONABLE ROYALTY DAMAGES IN PATENT INFRINGEMENT CASES

Courts should allow the use of the NBS by damages experts as a viable method for calculating a reasonable royalty in patent infringement cases for three reasons. First the NBS, if properly used, adequately applies the facts of each specific case to its analysis. Second, the NBS is grounded in sound, unmanipulable economic theory that can be adequately explained. Finally, the NBS is more impartial than the *Georgia-Pacific* factor analysis.

A. The Nash Bargaining Solution Applies the Facts of the Case

When the NBS is properly used by utilizing the equations set forth by Choi and Weinstein, it ties the specific facts of each case to its analysis.[147] One of the main criticisms by courts about the NBS is the lack of tying the specific facts of the case to its analysis.[148] However, it is noteworthy that none of the courts that have excluded the use of the NBS have explicitly held that the NBS, in and of itself, does not utilize the specific facts of the case.[149] Rather, courts have admonished damages experts' lack of tying specific facts of the case in their analysis of the NBS.[150] Therefore, it is not the NBS itself that has been criticized, but rather, experts' application of the NBS. It is evident, upon further examination, that the NBS equations developed by Choi and Weinstein require facts that are specific to the parties of the case.

First, the variables of the Choi and Weinstein equations require data that is specific to the parties involved in the hypothetical negotiation. For example, d_1 represents the disagreement profit of the patent holder.[151] To effectively utilize these equations, this variable must be satisfied with a value that is specific to the patent holder at issue. Likewise, d_2 represents the disagreement profit of the infringer/licensee.[152] This variable must also be satisfied with a value that is specific to the infringer at issue. Thus, these variables require direct use of the facts of the case.

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147. For purposes of this discussion, it is assumed that a showing that the specific facts of a case fits the premises of the NBS has already occurred. Thus, an application of the Choi–Weinstein model is all that remains to properly apply the NBS.

148. *See* VirnetX, Inc. v. Cisco Systems, Inc., 767 F.3d 1308 (Fed. Cir. 2014); *see also* Oracle Am., Inc. v. Google Inc., 798 F. Supp. 2d 1111, 1119 (N.D. Cal. 2011).

149. *See supra* Part III-C.

150. *See Oracle*, 798 F. Supp. 2d at 1119.

151. Choi & Weinstein, *supra* note 9, at 54.

152. *Id.*

As an example, we will assume that the disagreement profit for both the patent holder and infringer is zero. A value of zero for both of these variables would mean that "without a license, neither the licensor nor the licensee obtains benefits from the patented technology."[153] For purposes of the equations, d_1 and d_2 equal zero. When these values are plugged into equations (7) and (8), the result becomes:

$$\pi_1^* = \frac{1}{2}\Pi, \qquad (10)$$

$$\pi_2^* = \frac{1}{2}\Pi, \qquad (11)^{[154]}$$

These resulting equations demonstrate that when, without a license, neither party obtains benefit from the patented technology, each party receives half of the total incremental profit, Π.[155] This scenario demonstrates how the dreaded 50/50 split result from the NBS, admonished by courts, can occur.[156] However, this split did not result without the use of the facts of the case.

The above calculation is the most simplistic use of the NBS in the patent-damages context. Obviously, we live in a world with multiple suppliers, and one or both of the parties will typically have some disagreement profit—an alternative plan in the case that licensing negotiations fail. Therefore, d_1 and d_2 will rarely ever equal zero, but there are some cases when it will.[157] For example, in a suit where infringement is found, the infringer will be required to stop utilizing the patented invention.[158] Thus, d_2 will generally equal zero.[159] Additionally, in cases where the patent holder is a non-practicing entity and does not offer products utilizing the patent, d_1 will equal zero because there will be no profit to be made in the event that a license is not executed.[160]

Even when the NBS calculation does not result in a 50/50 split of incremental profit, the calculation of the NBS still requires the application of the facts of the case. For example, Choi and Weinstein demonstrated the result of their equations in a two-supplier world, where both parties possess production capabilities.[161] There, "the

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153.   Weinstein, *supra* note 31, at 556.
154.   *Id.*
155.   *Id.*
156.   *See supra* Part III.
157.   Weinstein, *supra* note 31, at 556–57.
158.   *Id.*
159.   *Id.*
160.   *Id.*
161.   Choi & Weinstein, *supra* note 9, at 58.

disagreement payoff for the patent holder is the profit it can earn as the high-cost, sole producer of its patented product."[162] This produces the following function for solving d_1:

$$d_1 = P_1 Q_1 - C_1 Q_1 \qquad (12)^{163}$$

In this equation, $C_1(Q_1)$ is the patent holder's cost function, P_1 is the profit-maximizing price, and Q_1 is the profit-maximizing quantity, absent the infringer.[164] Furthermore, the disagreement profit for the infringer is "equal to the [infringer's] opportunity cost," which is the return foregone from manufacturing the technology.[165] This results in the following total incremental profit function from licensing:

$$\Pi = P_m Q_m - C_2 Q_m \quad (13)^{166}$$

Plugging these functions into equations (7) and (8) results in the following:

$$\pi_1^* = d_1 + \frac{P_m Q_m - C_2(Q_m) - d_1 - d_2}{2} = r Q_m, \quad (14)$$

$$\pi_2^* = d_2 + \frac{P_m Q_m - C_2(Q_m) - d_1 - d_2}{2} = P_m Q_m - C_2(Q_m) - r Q_m, \quad (15)$$

$$\pi_1^* + \pi_2^* = \Pi = P_m Q_m - C_2(Q_m) \quad (16)^{167}$$

In these equations, r represents the per-unit royalty.[168] Solving for r results in the following:

$$r = \frac{1}{2}[P_m - AC_2] + \frac{1}{2Q_m}[d_1 - d_2], \quad (17)$$

where AC_2 represents the infringer's average total cost.[169]

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162. *Id.*
163. *Id.*
164. *Id.*
165. *Id.* at 57.
166. *Id.* at 59.
167. *Id.*
168. *Id.* at 57.
169. *Id.* at 58. (The authors also develop a per-royalty function for the one-supplier world. *Id.* at 57–58. The function is as follows:

$$r = \frac{1}{2}[P_m - AC_2] + \frac{1}{2Q_m}[d_1 - d_2]$$

Id. Additionally, the authors' equations provide flexibility for other factors. *Id.* For instance, "if viable and noninfringing substitutes exist for the patented product, then the elasticity of demand for the patented product is larger," which lowers the market power and profitability associated with the patent. *Id.* at 60. Furthermore, the existence of substitute products also will have the effect of lowering d_1, which further lowers the royalty rate. *Id.*).

It is worth noting that "[i]f both sides have equal disagreement payoffs, then additional profits achieved from licensing are split equally."[170] Furthermore, the royalty rates change as the disagreement payoffs change.[171] "As one side's outside opportunity improves, the terms of the licensing agreement become more favorable."[172]

While these equations are complex, and in most cases, will require a damages expert to calculate a reasonable royalty, it is easy to see that the NBS requires the use of the specific facts of each case. When used correctly, courts should not object to damages experts' use of the NBS for the reason that it does not apply the specific facts of the case. However, courts have also complained that the NBS cannot be adequately explained.

B.   The Nash Bargaining Solution Can Be Adequately Explained

Another common complaint among courts excluding the use of the NBS is the lack of adequate explanation of its theory.[173] However, although mathematically complex, the theory behind the NBS can be adequately explained such that even a lay juryperson could understand. In the article by Weinstein, Romig, and Stabile, the authors use the equations developed by Choi and Weinstein to point out how easily understandable the NBS is in the context of reasonable royalty damages.[174] The authors explain that:

> As previously discussed, the NBS must satisfy two very simple conditions: (1) no other feasible outcome is better than one side and not worse than the other and (2) neither side is worse off reaching an agreement than if no agreement were reached. Additionally, the "complex mathematical formulas" can be reduced to a single sentence: each negotiating party receives the profit it would have made absent an agreement and splits the remaining profits equally. These concepts are easily understandable by jurors.[175]

Because the NBS can be explained in a simplified manner, as demonstrated by Weinstein, Stabile, and Romig, its inadmissibility under Rule 403 of the *Federal Rules of Evidence* is unwarranted.[176] Its simplified explanation, although grounded in complex mathematics,

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170.   *Id.* at 59.
171.   *See id.*
172.   *See id.* at 59–60.
173.   *See supra* Part III-C.
174.   *See* Weinstein, *supra* note 31.
175.   *Id.* at 560.
176.   *See* FED. R. EVID. 403.

does not pose any of the risks contained in Rule 403—unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.[177] You will recall that in *Oracle*, the court took issue with the complex mathematics involved with the NBS and excluded the expert testimony under Rule 403.[178] The court held that "[n]o jury could follow this Greek or testimony trying to explain it . . . [and the NBS] would invite a miscarriage of justice by clothing a fifty-percent assumption in an impenetrable facade of mathematics."[179] However, because the NBS does not pose any threat admonished in Rule 403, exclusion of damages expert opinion utilizing the NBS under Rule 403 is a grave misapplication of the law.

Additionally, many opponents seek to exclude expert testimony of the NBS under Rule 702 of the *Federal Rules of Evidence*. Rule 702 explains that the role of an expert witness is to "help the trier of fact to understand the evidence or to determine a fact in issue."[180] The rule ensures that the expert is credible by requiring that his testimony is based on sufficient facts or data, the testimony is the product of reliable principles and methods, and the expert has reliably applied the principles and methods to the facts of the case.[181] Nowhere in the rule does it provide that an expert's testimony may be excluded because of its complex nature. In fact, most expert testimony is complex in nature—they are, in fact, experts.

When the NBS is placed against the litmus test of Rule 702, it passes with flying colors. First, the testimony must help the trier of fact to understand evidence or determine a fact at issue.[182] Here, the NBS is used to help the trier of fact determine a reasonable royalty rate—a fact at issue. Therefore, the NBS satisfies this condition.

Next, the testimony of the expert must be based on sufficient facts or data.[183] As discussed in Part IV-A, the calculation of the NBS requires many data points that are derived directly from the facts.[184] In fact, none of the variables involve values that do not stem from the facts of the case. While an expert may attempt to apply inaccurate data that does not stem from the facts of the case, such a practice should go to

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177.   *Id.*

178.   Oracle Am., Inc. v. Google Inc., 798 F. Supp. 2d 1111, 1120 (N.D. Cal. 2011).

179.   *Id.*

180.   FED. R. EVID. 720.

181.   *Id.*

182.   *Id.*

183.   *Id.*

184.   *See supra* Part IV-A.

the weight of the testimony, not its admissibility. Therefore, the NBS also meets this condition.

Additionally, the testimony must be the product of reliable principles and methods.[185] As discussed previously, the NBS has been in existence for over 60 years.[186] Over that span, many economists have tested its theory.[187] Economic literature is replete with articles describing, testing, and commending the NBS.[188] It is now held as generally accepted economic theory.[189] This makes sense, given its receipt of a Nobel Prize in economics.[190] Therefore, the NBS also meets this condition.

Finally, the expert must reliably apply the principles and methods to the facts of the case.[191] As discussed in Part IV-A, when the values, stemming from the specific facts of the case, are inputted into the variables of the NBS, a reasonable royalty rate is calculated. Accordingly, when a practitioner uses the NBS properly, it is inevitable that the method and principles of the NBS will be applied with the specific facts of the case. Thus, the NBS meets this condition and satisfies all of the conditions of Rule 702.

However, the reliability inquiry of the NBS does not stop there. The testimony must also overcome a *Daubert* challenge.[192] The notes of the advisory committee for Rule 702 explain:

> Daubert set forth a non-exclusive checklist for trial courts to use in assessing the reliability of scientific expert testimony. The specific factors explicated by the *Daubert* Court are (1) whether the expert's technique or theory can be or has been tested—that is, whether the expert's theory can be challenged in some objective sense, or whether it is instead simply a subjective, conclusory approach that cannot reasonably be assessed for reliability; (2) whether the technique or theory has been subject to peer review and publication; (3) the known or potential rate of error of the technique or theory when applied; (4) the existence and maintenance of standards and

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185.   FED. R. EVID. 720.
186.   *See supra* Part II.
187.   *Id.*
188.   *Id.*
189.   *Id.*
190.   *Id.*
191.   FED. R. EVID. 720.
192.   *See* Daubert v. Merrell Dow Pharmaceuticals, Inc., 43 F.3d 1311, 1317 (9th Cir. 1995).

controls; and (5) whether the technique or theory has been generally accepted in the scientific community.[193]

Because the NBS is a long-standing, generally accepted economic theory that has been subject to peer-review and extensive publication, it is apparent that these factors weigh in favor of the NBS's

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193.   FED. R. EVID. 702 advisory committee's note ("Courts both before and after *Daubert* have found other factors relevant in determining whether expert testimony is sufficiently reliable to be considered by the trier of fact."). These factors include:

(1)   Whether experts are "proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying." *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1317 (9th Cir. 1995).

(2)   Whether the expert has unjustifiably extrapolated from an accepted premise to an unfounded conclusion. *See General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (noting that in some cases a trial court "may conclude that there is simply too great an analytical gap between the data and the opinion proffered").

(3)   Whether the expert has adequately accounted for obvious, alternative explanations. *See Claar v. Burlington N.R.R.*, 29 F.3d 499 (9th Cir. 1994) (testimony excluded where the expert failed to consider other obvious causes for the plaintiff's condition). *Compare Ambrosini v. Labarraque*, 101 F.3d 129 (D.C. Cir. 1996) (the possibility of some uneliminated causes presents a question of weight, so long as the most obvious causes have been considered and reasonably ruled out by the expert).

(4)   Whether the expert "is being as careful as he would be in his regular professional work outside his paid litigation consulting." *Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir. 1997). *See Kumho Tire Co. v. Carmichael*, 119 S. Ct. 1167, 1176 (1999) (*Daubert* requires the trial court to assure itself that the expert "employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field.").

(5)   Whether the field of expertise claimed by the expert is known to reach reliable results for the type of opinion the expert would give. *See Kumho Tire Co. v. Carmichael*, 119 S. Ct. 1167, 1175 (1999) (*Daubert*'s general-acceptance factor does not "help show that an expert's testimony is reliable where the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology or necromancy."); *Moore v. Ashland Chemical, Inc.*, 151 F.3d 269 (5th Cir. 1998) (en banc) (clinical doctor was properly precluded from testifying to the toxicological cause of the plaintiff's respiratory problem, where the opinion was not sufficiently grounded in scientific methodology); *Sterling v. Velsicol Chem. Corp.*, 855 F.2d 1188 (6th Cir. 1988) (rejecting testimony based on "clinical ecology" as unfounded and unreliable).

All of these factors remain relevant to the determination of the reliability of expert testimony under the rule as amended. Other factors may also be relevant. *See Kumho*, 119 S. Ct. at 1176 ("[W]e conclude that the trial judge must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable."). Yet no single factor is necessarily dispositive of the reliability of a particular expert's testimony. *See, e.g.*, *Heller v. Shaw Industries, Inc.*, 167 F.3d 146, 155 (3d Cir. 1999) ("[N]ot only must each stage of the expert's testimony be reliable, but each stage must be evaluated practically and flexibly without bright-line exclusionary (or inclusionary) rules."); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1317 n.5 (9th Cir. 1995) (noting that some expert disciplines "have the courtroom as a principal theatre of operations" and as to these disciplines "the fact that the expert has developed an expertise principally for purposes of litigation will obviously not be a substantial consideration.").

reliability.[194] Even still, a rejection of expert testimony is the exception rather than the rule.[195]

Courts should not abandon the use of the NBS simply because it may be too complex for a jury to understand. Instead, courts should leave this determination in the hands of the jury. If a jury feels that the testimony involving the NBS is "a fifty-percent assumption in an impenetrable facade of mathematics,"[196] they can choose to not give any weight to the expert's testimony. The reliability of the NBS, however, is well-established and should not provide a basis for courts to exclude its use.

C. The Nash Bargaining Solution is More Impartial than the Manipulable Georgia-Pacific Factor Analysis

While the *Georgia-Pacific* analysis has been used for over 30 years to calculate a reasonable-royalty rate,[197] it is easily manipulable and should be abandoned in favor of the more impartial NBS. As Choi and Weinstein point out, the *Georgia-Pacific* analysis "can produce a royalty rate unsupported by economic theory."[198]

First, the *Georgia-Pacific* analysis can be easily manipulated and difficult to understand. For example, a plaintiff, attempting to garner a high royalty rate, may emphasize a few factors while leaving out other important factors that may be detrimental to its position.[199] Vice versa, a defendant may emphasize only a few factors in an attempt to establish a low royalty rate.[200] Choi and Weinstein explain that what can result is "an unsound calculation shrouded by 'reliance' on the *Georgia-Pacific* factors."[201] Professor Tom Cotter from the University of Minnesota Law School, opined that the "*Georgia-Pacific* factors . . . can be easily manipulated by the trier of fact to reach virtually any outcome."[202] Additionally, one commentator explained that, "[t]he

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194.   *See supra* Part I.

195.   *Id.*

196.   Oracle Am., Inc. v. Google Inc., 798 F. Supp. 2d 1111, 1120 (N.D. Cal. 2011).

197.   *See supra* INTRODUCTION.

198.   Choi & Weinstein, *supra* note 9, at 51.

199.   *See id.*

200.   *See id.*

201.   *Id.*

202.   Merritt J. Hasbrouck, Comment, *Protecting the Gates of Reasonable Royalty: A Damages Framework For Patent Infringement Cases*, 11 J. MARSHALL REV. INTELL. PROP. L. 192, 200 (2011) (quoting Tom Cotter, Briggs and Morgan Professor of Law, Univ. of Minn. Law Sch., Remarks at the Federal Trade Commission Hearing On: The Evolving IP Marketplace—Remedies, Panel 1: Standards for Assessing Patent Damages and Their Implementation by Courts 1, at 39 (Feb. 11, 2009)).

factors do not give clear guidance on how to calculate damages awards because there is no standardized way to apply or prioritize the factors."[203] Moreover, courts have expressed aversion for the *Georgia-Pacific* analysis. The Federal Circuit has described the *Georgia-Pacific* analysis as "a difficult judicial chore, seeming often to involve more the talents of a conjurer than those of a judge."[204] Finally, in *Gasser Chair Co., Inc. v. Infanti Chair Mfg. Corp.*, the court held that "[i]t would be an affectation of research to cite the countless cases which simply reiterate the '*Georgia–Pacific*' factors to be considered in determining a reasonable royalty. . . . To set out those fifteen factors would also needlessly burden this decision."[205]

Next, the NBS provides a more impartial reasonable-royalty-rate determination than the *Georgia-Pacific* analysis. Because the NBS is mathematical, it provides less wiggle room for manipulability than the *Georgia-Pacific* analysis. Conversely, because the *Georgia-Pacific* factors are not based upon mathematics, they are analyzed from a subjective perspective. It would be naïve, however, to assert that the NBS is wholly impartial. A damages expert could input incorrect values to manipulate the results, but this manipulation should be more readily apparent to a jury member. It would be easier for a jury member to ascertain that the cost variable of an NBS analysis has been manipulated, than it would to ascertain that a damages expert is advocating an unreasonable-royalty rate by simply stating the basis for his rate a subjective analysis of the various *Georgia-Pacific* factors.

While the NBS may be a better method than the *Georgia-Pacific* analysis, a detailed analysis of the effectiveness of the *Georgia-Pacific* analysis is beyond the scope of this article. However, a future article may be useful to analyze the effectiveness of the NBS compared to the effectiveness of the *Georgia-Pacific* analysis.

CONCLUSION

Courts should allow the use of the NBS as a viable method to calculate a reasonable royalty in patent infringement cases because, if properly used, the NBS adequately applies the facts of each specific case, is grounded in sound, unmanipulable economic theory, and is more impartial than the *Georgia-Pacific* analysis. Courts have excluded the use of the NBS due to its improper use by damages

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203.   *Id.*

204.   Fromson v. W. Litho. Plate & Supply Co., 853 F.2d 1568, 1574 (Fed. Cir. 1988).

205.   Gasser Chair Co., Inc. v. Infanti Chair Mfg. Corp., 943 F. Supp. 201, 216 (E.D. N.Y. 1996).

experts. However, as shown here, the NBS, when used correctly, provides an impartial theory to calculate reasonable royalty damages. Its theory has been established as sound, accepted economic theory over the past 60 years, and it is the most useful way to determine an accurate reasonable royalty. Furthermore, a proper application of the NBS takes into account the relative bargaining positions of both parties, and adjusts the royalty rate accordingly.

As recently exemplified in a recent Federal Circuit opinion, proper use of the NBS is vital to its viability as a proper method to calculate a reasonable royalty. Accordingly, proper use can be encouraged by a simple technique used by many mathematics teachers—show your work. If the equations by Choi and Weinstein are utilized, and damages experts show how they calculated the values for the variables involved, courts can rest assured that the damages experts are tying the specific facts of the case to their analysis.