Splitting The Atom: Economic Methodologies For Profit Sharing In Reasonable Royalty Analysis

By DeForest McDuff

Introduction

In recent years, courts have excluded economic experts for improperly using "rules of thumb" for profit sharing in reasonable royalty analyses. Common examples are the 25% Rule and improper application of the Nash Bargaining Solution (sometimes cynically, yet inappropriately, referred to as the "50% rule of thumb"). Such rules have, in the past, been popular in certain expert circles due to ease of implementation and purported wide applicability. However, courts have recently excluded blind application of rules of thumb for failing to tie such methodologies to the specific facts of a given case.[1] As a result, many experts have been left with a dilemma for how to approach profit sharing between licensor and licensee in a consistent manner while still accounting for the specific facts and circumstances of each case.

One method of evaluating relative contributions is an economic negotiation framework with strong economic foundations and support in the academic literature. Properly applied, it can tie the sharing of profits attributable to a claimed technology to the specific parties, time period relevant to a hypothetical negotiation, and technology at issue in determining a reasonable royalty. This approach is based on the academic work of Rubinstein (1982)[2] as extended by Muthoo (1999),[3] along with others who provide an analytical framework for understanding and determining profit sharing in an economic negotiation. Combining specific implementation and best practices in a reasonable royalty context can yield a robust and fact-specific methodology to withstand scrutiny and challenges by opposing experts and counsel.

This article reviews the notion of profit sharing, including deficiencies associated with improper application of past rules of thumb, and describes a potential implementation of relative contributions and economic negotiation to the apportioned value of technologies in a reasonable royalty context.[4]

Profit Sharing

Profit sharing refers to the allocation of profits attributable to a licensed technology between licensor and licensee in a negotiation over the value provided by a particular technology. On the one hand, the licensor provides certain rights to a given technology (*e.g.*, a patent license). On the other hand, the licensee provides implementation and commercialization of that technology in the marketplace, oftentimes within the context of a larger product being sold. Profit sharing is often at the core of negotiations between parties deciding how to collaborate and share in the profits generated from that collaboration.

In a reasonable royalty context, experts frequently evaluate fifteen economic factors listed in *Georgia-Pacific v. United States Plywood* (S.D.N.Y. 1970), commonly referred to as the Georgia-Pacific factors. In the realm of profit sharing, expert economists often point to *Georgia-Pacific* Factor 13, which provides consideration of 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."[5] Once an expert determines the portion of profit attributable to the implemented invention, experts often seek to determine how that profit would have been allocated between the licensor and licensee at a hypothetical negotiation framework for the patent-in-suit.

In theory, the share of profit that could be allocated to the licensor could range from 0 percent to 100 percent, although the full range is not likely to be applica-

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4. Economic negotiation is just one of several methodologies that can be considered and evaluated in a reasonable royalty context. For example, in *Lucent. v. Gateway*, the Federal Circuit highlighted the analytic method (citing *TFM Mfg. v. Dura Corp*, Fed. Cir., 1986) as well as the hypothetical negotiation approach (citing *Georgia-Pacific v. U.S. Plywood Corp.*, S.D.N.Y. 1970). As indicated by the Federal Circuit, either approach can be appropriate for evaluating a reasonable royalty.

Lucent Technologies, Inc. et al. v. Gateway Inc., et al., 580 F.3d 1301, 1335 (Fed. Cir. 2009).

TFM Mfg. v. Dura Corp., 789 F.2d 895, 899 (Fed. Cir. 1986).

5. *Georgia-Pacific Corp. v. United States Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970).

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1. *VirnetX, Inc., v. Cisco Systems, Inc.*, 767 F.3d 1308, at 37 (Fed. Cir. 2014).

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

2. Ariel Rubinstein, "Perfect Equilibrium in a Bargaining Model," *Econometrica*: 50(1) (1982): 97-109.

3. Abhinay Muthoo, "Bargaining Theory with Applications," *New York: Cambridge University Press* (1999): 41–71.

ble or reasonable in many circumstances. A reasonable royalty is determined such that both licensor and licensee agree to collaborate.[6] Technologies that generate positive economic value have a reasonable range over which the parties can negotiate.

In theory, parties could agree to any royalty within a negotiation range that makes both parties better off than their situations without an agreement. Points within this range are often referred to as being in equilibrium since neither party has a strategy to deviate and improve its outcome.[7] In practice, expert economists in a royalty context often evaluate an appropriate share of incremental profits as one factor informing on what parties might agree to in a hypothetical negotiation, over a given negotiation range, for rights to the technology at issue.

Traditional Approaches

Traditional approaches utilized by some experts (and, unfortunately, frequently misapplied) include the 25% Rule and Nash Bargaining. In concept, these approaches sought to provide quantitative metrics to divide incremental apportioned profit between licensor and licensee. However, both approaches as implemented (properly or improperly) by many experts have disadvantages that go right to the heart of recent expert exclusions under *Daubert*.

The 25% Rule. The 25% Rule is a so-called "rule of thumb" based on the idea that the licensor should receive 25 percent of the operating profit associated with the revenue generated by a certain product or technology.[8] The 25% Rule had a claimed empirical foundation based on a sample of commercial licenses and corresponding profits associated with those products.[9] Experts using the 25% Rule sometimes used it as a "starting point" to be adjusted by the *Georgia-Pacific* factors described above. In 2011, the *Federal Circuit in Uniloc v. Microsoft* effectively ended use of the 25% Rule: "This court now holds as a matter of Federal Circuit law that the 25 percent rule of thumb is a fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation. Evidence 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."[10]

Nash Bargaining. The Nash Bargaining Solution was originally developed in the 1950s by Nobel laureate economist and mathematician, John Nash.[11] The Nash Bargaining Solution provides a solution to a negotiation between two parties that, under certain assumptions, results in each party getting an equal share of the benefits from cooperation relative to its non-cooperative payoff (*i.e.*, outside option).[12] Dr. Nash's original work indicated several working assumptions of the Nash Bargaining Solution, including: "(1) the two individuals are highly rational, (2) that each can accurately compare his desires for various things, (3) that they are equal in bargaining skill, and (4) that each has full knowledge of the tastes and preferences of the other."[13] While these assumptions may be satisfied in certain hypothetical negotiations, the assumption of equal bargaining skill may frequently be challenged. In 2014, the Federal Circuit ordered a notable exclusion of damages under the Nash Bargaining Solution, stating: "For the reasons that follow, we agree 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."[14]

Both the 25% Rule and the Nash Bargaining Solution suffer from certain disadvantages that lay at the heart of the Federal Circuit's recent mandates to tie damages to the facts and circumstances of the case.[15] Specifically, both the 25% Rule and the Nash Bargaining Solution (at least as commonly implemented) do not account for: (1) the specific parties in the negotiation, (2) the specific timing of the negotiation, and (3) if implemented improperly, the specific technology, products, or other case-specific facts at issue. Both rules have, at times, been called arbitrary and separated from the facts of the case,[16] and in many circumstances those critiques are warranted.

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6. In certain circumstances, for example, where the alleged infringement has occurred in lieu of actually paying a royalty, courts have found that a reasonable royalty may exceed the alleged infringer's profits.

7. John Nash, "The Bargaining Problem," *Econometrica* (1950): 155-162 at 155.

8. Robert Goldscheider, John Jarosz, and Carla Mulhern (2002), "Use of the 25 Per Cent Rule in Valuing IP," *les Nouvelles*, 37(4): 123–133, at 123.

9. Ibid., 124.

10. *Uniloc USA v. Microsoft Corp.*, 632 F.3d 1292, at 1315 (Fed. Cir 2011).

11. John Nash, "The Bargaining Problem," *Econometrica* (1950): 155-162 at 155.

12. Ibid.

13. Ibid.

14. *VirnetX, Inc., v. Cisco Systems, Inc.*, 767 F.3d 1308, at 37 (Fed. Cir. 2014).

15. *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, at 54 (Fed. Cir. 2014).

VirnetX, Inc., v. Cisco Systems, Inc., 767 F.3d 1308, at 36 (Fed. Cir. 2014).

Ericsson, Inc. v. D-Link Systems, Inc., 773 F.3d 1201, at 47 (Fed. Cir. 2014).

16. *Uniloc USA v. Microsoft Corp.*, 632 F.3d 129, at 1315 (Fed. Cir 2011).

VirnetX, Inc., v. Cisco Systems, Inc., 767 F.3d 1308, at 37 (Fed. Cir. 2014).

Relative Contributions and Economic Negotiation

In response to recent exclusions under the 25% Rule and Nash Bargaining, and in the relentless pursuit of economic excellence, some experts have gravitated towards evaluation of relative contributions and economic negotiation that can be applied, given appropriate circumstances, and tied to the specific facts of an individual case.

Economic theory and industry practice indicate that profit sharing between licensor and licensee is based on the relative contributions and economic negotiations of both parties in a negotiation. Evaluating the relative contributions of licensor and licensee is consistent with publications and best practices set forth by the Internal Revenue Service,[17] international economic guidelines,[18] and other published research.[19] Similarly, evaluating the negotiating positions of licensor and licensee is consistent with the hypothetical negotiation construct.[20]

One framework that can capture and address the relative contributions and negotiating positions between licensor and licensee is described in Muthoo (1999), which provides a solution based on relative discount rates (*i.e.*, opportunity costs) of reaching a negotiated agreement.[21] In the Muthoo framework, the share of profit to party A is: $S_A = r_B/(r_A + r_B)$ where r_A is the discount rate of party A, and r_B is the discount rate of party B.[22] The solution is based on relative discount rates to evaluate how each party would participate in a hypothetical negotiation across a bargaining range. This framework traces its origins back to pioneering negotiation research by Rubinstein (1982) and has been referenced and extended in publications on negotiation in econom-

ics textbooks and top-tier academic journals.[23] While the Muthoo and Rubinstein frameworks may or may not have applicability in any individual circumstance or situation, the models can provide economic guidance and one approach for consideration in a reasonable royalty analysis. Muthoo himself discusses the specific application of the economic negotiation framework in the context of intellectual property royalties in Muthoo (2006).[24]

Published research demonstrate applicability and predictive power of the Rubinstein/Muthoo models in actual negotiations. For example, economic literature finds empirical support for the Rubinstein bargaining models predicting outcomes in experimental settings (*e.g.*, Binmore, *et al.* (1989), Binmore, *et al.* (1991), Binmore (2007)).[25] As another example, other published literature finds empirical support for Rubinstein's and Muthoo's bargaining models in real world negotiations, ranging from cars to medical supplies to even legislative bargaining (*e.g.*, Tsebelis and Money (1997), Morton, *et al.* (2011), Grennan and Swanson (2016)).[26] Other research shows the predictive power

17. Internal Revenue Service, "Profit Split Method" *Code of Federal Regulations* (2004), 26 ch. 1, §1.482-6, at 640.

18. OECD (2010). Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations. OECD Publishing, at 25, 96-97.

19. *See*, for example:

Sebastien Gonnet and Pim Fris (2007), "Contribution Analyses Under the Profit Split Method," *International Tax Review*, December 31, 2007.

H. Peyton Young, "Individual Contribution and Just Compensation," in The Shapley Value, Alvin Roth, ed., Cambridge, *Cambridge University Press* (1988): 267-728, at 267.

Andreu Mas-Colell, *et al.* (1995), Microeconomic Theory, New York and Oxford, *Oxford University Press* (1995): 679-681.

20. *See*, for example:

Rite-Hite Corp. v. Kelley Co., Inc., 56 F.3d 1538, at 1554 (Fed. Cir. 1995).

State Indus., Inc. v. Mor-Flo Indus., Inc., 883 F.2d 1573, at 1580 (Fed. Cir. 1989).

LaserDynamics, Inc. v. Quanta Computer, Inc., 694 F.3d 51, at 76 (Fed. Cir. 2012).

21. Abhinay Muthoo, "Bargaining Theory with Applications," *New York: Cambridge University Press* (1999): 41–71.

22. Ibid., 46.

23. Ariel Rubinstein, "Perfect Equilibrium in a Bargaining Model," *Econometrica* 50(1) (1982): 97-109.

While Rubinstein (1982) provides foundation for the particular Muthoo (1999) framework described herein, the approach is distinct from Rubinstein (1982).

See, for example:

Joel Watson, *Strategy: An Introduction to Game Theory* (New York: W.W. Norton & Company, Inc., 2002: 186–187.

Dilip Mookherjee and Debraj Ray, "Contractual Structure and Wealth Accumulation," *The American Economic Review*, 92(4) (2002): 818-849.

Luca Anderlini and Leonardo Felli, "Costly Bargaining and Renegotiation," *Econometrica* (2001), 69(2): 377-411.

Brian Knight, "Estimating the Value of Proposal Power," *The American Economic Review* 95(5) (2005): 1639-1652.

24. Abhinay Muthoo, "Bargaining Theory and Royalty Contract Negotiations," *Review of Economic Research on Copyright Issues* 3(1) (2006): 21-23.

25. Ken Binmore, Avner Shaked, and John Sutton, "An Outside Option Experiment," *The Quarterly Journal of Economics* 104(4) (1989):753-70.

Ken Binmore, Peter Morgan, Avner Snaked, and John Sutton, "Do People Exploit their Bargaining Power? An Experimental Study," *Games and Economic Behavior* 3(3) (1991): 295-322.

Ken Binmore, "Does Game Theory Work? The Bargaining Challenge," Cambridge, MA: *The MIT Press* (2007).

26. George Tsebelis and Jeanette Money, Bicameralism, New York, NY: *Cambridge University Press* (1997).

Fiona Scott Morton, Jorge Silva-Risso, and Florian Zettelmeyer, "What matters in a price negotiation: Evidence from the U.S. auto retailing industry," *Quant Mark Econ* 9 (2011): 365–402.

Bradley Larsen, "The Efficiency of Real-World Bargaining: Evidence from Wholesale Used-Auto Auctions," *Stanford University and National Bureau of Economic Research*, Working Paper (2015).

Matthew Grennan and Ashley Swanson, "Transparency and Negotiated prices: The Value of Information in Hospital-Supplier Bargaining," *National Bureau of Economic Research*, Working Paper (2016).

of bargaining models in real-world situations that are consistent with the basic assumptions of those models, such as Konig, *et al*. (2007), Thomson and Leinaweaver (2014), and Casterella, *et al*. (2004).[27] In summarizing the support for these bargaining models, Kohlscheen and O'Connell (2008) state: "Rubinstein's analysis has proven its worth not only in the game theory literature but also in applied theory and empirical work (*e.g.*, Shaked and Sutton 1984, Bulow and Rogoff 1989, Muthoo 1996 and Binmore 2007a)."[28] This relative contribution and economic negotiation framework is distinct and differs from improper application of the Nash Bargaining Solution in several respects, including: (1) no assumption of symmetry of equal negotiating strengths between parties; (2) no conclusion (in most circumstances) of a 50/50 profit split; (3) incorporation of party-specific facts and information; (4) incorporation of time-specific facts and information; and (5) specifically determined based on the apportioned contribution of a claimed technology. The underlying assumptions of the Muthoo framework are often satisfied in a hypothetical negotiation context: (1) there exist gains from trade; (2) the parties have positive discount rates; (3) the parties can make offers and counteroffers; (4) offers can be made within an arbitrarily small amount of time; (4) the parties have linear utility in monetary value; and (5) the parties have symmetric information regarding each other's opportunity cost of time.[29]

In practice, experts often calibrate the model using the relative weighted average cost of capital (WACC), a common empirical measure of a discount rate, for each party in the negotiation. Common sources of WACC estimates for each party include industry sources such as Bloomberg or Ibbotson,[30] properly evaluated and/or calibrated to provide a reliable estimate for a given party.[31] Identifying measures of discount rates that are representative of the specific parties and time period of interest, within a negotiation range provided by an apportionment to the claimed technology, provides a profit sharing calculation that addresses the specific parties, timing, products, and technology of a particular case. Appropriate calibration of discount rates will often depend on facts and information specific to the case and availability of discount rate measures for the parties.[32]

It can be helpful to explicitly address the assumptions of the model in expert reports to evaluate the applicability in a specific circumstance or negotiation. In some instances, it may also be helpful to consider and address qualitative factors that are specific to a particular negotiation at issue and/or evaluate potential numerical adjustments, as appropriate. Properly applied, the relative discount framework provides a methodology that is often applicable and specific to the evaluation of relative contributions and economic negotiation in a reasonable royalty context, and consistent with the *Georgia-Pacific* framework.

We are optimistic of the framework's ability, when applicable and properly applied, to withstand further scrutiny and become potential implementation for consideration in reasonable royalty analyses. ∎

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27. Thomas Konig, Bjorn Lindberg, Sandra Lechner, and Winfried Pohlmeier, "Bicameral Conflict Resolution in the European Union: An Empirical Analysis of Conciliation Committee Bargains," *British Journal of Political Science* 37(2) (2007): 281–312.

Thomson and Leinaweaver, "Testing models of legislative decision-making with measurement error: The robust predictive power of bargaining models over procedural models," *European Union Politics* 15(1) (2014):43–58.

Jeffrey R. Casterella, Jere R. Francis, Barry L. Lewis, and Paul L. Walker, "Auditor Industry Specialization, Client Bargaining Power, and Audit Pricing," *AUDITING: A Journal of Practice & Theory* 23(1) (2004): 123-140.

28. E. Kohlscheen and S. A. O'Connell, "On Risk Aversion in the Rubinstein Bargaining Game," *The University of Warwick: Department of Economics* (2008).

29. Abhinay Muthoo, "Bargaining Theory with Applications," *New York: Cambridge University Press* (1999): 43–54.

30. Bloomberg is a provider of global business and financial information and news. It is generally recognized as one of the leading sources of financial information.

See: Bloomberg Website, "Bloomberg Facts," *http://www.bloomberg.com/now/bloomberg-facts/.*

Ibbotson describes its mission as follows: "Our philosophy behind the Cost of Capital Yearbook is to provide the latest and most up-to-date financial and cost of equity information possible to financial professionals."

Ibbotson, *Cost of Capital Yearbook*, (Chicago, IL: Morningstar, Inc., 2007): 1.

31. Abhinay Muthoo, "Bargaining Theory with Applications," *New York: Cambridge University Press* (1999): 43–54.

32. One benefit, from a model calibration perspective, is that the outcome depends on relative discount rates rather than the absolute rates themselves and thus is often relatively robust to any potential imprecision in individual parameters.