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THE 8% SOLUTION—OR HOW GOOD ARE THE DAMAGE CALCULATION ECONOMICS BY THE FEDERAL CIRCUIT IN *LUCENT V. MICROSOFT*?

W. LESSER

ABSTRACT

Lucent v. Microsoft brought to the fore again the complexity of infringement damage estimates. Differences in approaches were laid open in this case with the trial court jury settling \$358 million in damages against Microsoft and the appeals court striking down the value as lacking substantial evidence. Damages were established on the “reasonable royalty” basis for a product which was neither licensed nor sold. This article contends that the appeals court took too narrow a view of economics in its analysis of the software sector. Specifically, the court seems to have applied a “perfect competition” model to a sector which the earlier United States antitrust case against Microsoft documents as being not competitive in the sense of the economist’s model. Notably the court did not consider alternative revenue sources (like advertising) or the use of lump-sum royalties as a funding source for small firms. Most significantly, the appeals court failed to recognize strategic pricing behavior by Microsoft like entry deterrence which could elevate the value of the infringed product as Microsoft strove to maintain its market dominance. Six “Cortez Factors,” patterned after the *Georgia-Pacific* factors, are proposed for consideration for reasonable royalty calculations in concentrated, high tech industries. In *Lucent*, the appeals court seems to have reached the correct decision in vacating the damages, but for many wrong reasons. The Cortez Factors should help to clarify damage considerations in increasingly complex marketplaces for high tech products.

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INTRODUCTION

In this imperfect world, restrictive legislation is ineffectual without clear penalties for violations.¹ And so it is for Intellectual Property Rights (“IPR”), and notably patent infringement.² The framers of U.S. patent law have wrestled with appropriate penalties and measures since the earliest 1790 Patent Act.³ Initially, damages were based on equity or law but rarely both, subsequently damages calculations have expanded to add financial compensation for lost profits and then lost royalties.⁴ Most recently, for products which were neither marketed nor licensed, at least ‘reasonable royalties’ were permitted, where a reasonable royalty is defined as one which at minimum restores the injured party to the pre-infringement state of profitability.⁵ A parallel set of cases and legislation considers proper ways to

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¹ See *Ladner v. United States*, 358 U.S. 169, 177 (1958) (indicating that courts apply the rule of lenity and adopt the least harsh interpretation when both a statute and legislative history are ambiguous).

² *Ill. Tool Works Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 45 (2006) (“[I]t would be unusual for the Judiciary to replace the normal rule of lenity that is applied in criminal cases with a rule of severity for a special category of [patent] antitrust cases.”); *Dowling v. United States*, 473 U.S. 207, 228–29 (1985) (applying the rule of lenity to copyright cases); *United States v. Giles*, 213 F.3d 1247, 1249 (10th Cir. 2000) (applying the rule of lenity in trademark cases).

³ See discussion *infra* Part I.A.

⁴ See *Nike, Inc. v. Wal-Mart Stores, Inc.*, 138 F.3d 1437, 1440–41 (Fed. Cir. 1998) (summarizing the development of patent damages law); see also 7 DONALD S. CHISUM, CHISUM ON PATENTS § 20.02 (2009).

Difficulties in measuring damages and profits dominated the subsequent period of development (from 1870 to 1946). With damages, the difficulty was in finding an appropriate measure when a patent owner could prove neither lost profits nor an established royalty rate. The courts finally resolved the difficulty by recognizing the reasonable royalty measure, which was thereafter codified in the 1922 and 1946 acts.

Id.

⁵ 35 U.S.C. § 284 (2006) (“[T]he court should award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer”); see also *Patent Reform Act of 2009: Hearing on H.R. 1260 Before the H. Comm. on the Judiciary*, 111th Cong. 8 (2009) [hereinafter *Hearing*] (Statement of Bernard J. Cassidy, Senior Vice President & General Counsel, Tessera, Inc.) (explaining the economic principle of compensatory damages generally).

[T]he rules articulated in *Georgia Pacific* are rooted in well-established (and arguably incontrovertible) legal and economic principles of compensatory damages generally Foremost among these is to restore the injured party, as nearly as possible, to the position he or she would have enjoyed had it not been for the wrong of the other party.

Hearing, supra.

compute damages.⁶ While the courts are not infrequently criticized for being excessively vague over how decisions are to be implemented, direction over factors related to the level of a royalty were given in *Georgia-Pacific Corp. v. United States Plywood Corp.*—the so called *Georgia-Pacific* factors.⁷

Despite this over 200 year history, sharp differences still remain over the proper methods for computing damages. Under debate has been the form of royalty, whether lump-sum, running (proportion of sales or profit), or a combination of the two.⁸ Also under long standing debate is whether the royalty should apply only to the infringed part, or to the value of the entire product.⁹ Indeed, as part of the ongoing legislative discussions over patent law reform, the House of Representatives most recently in 2009 proposed a bill one part of which specifies when the “entire market value” may be used as the basis for determining damages.¹⁰ These differences were brought into clear relief in *Lucent v. Gateway* with its initial jury-decreed damage estimate of \$358 million (\$500 million including accrued interest) over the sale of three Microsoft Outlook programs on the basis of the infringement of the one component owned by Alcatel-Lucent Technologies of the thousands of the program components available to users.¹¹ Subsequently on appeal the appeals court sustained the decision of infringement but criticized the trial court for the means by which damages were calculated, remanding the decision for retrial.¹² While several analysts were critical of the lack of detail in the decision on the instruction on damages which should be provided to jurors, the appeals court did make a point of questioning the “whole market value” approach underlying the initial damage judgment.¹³ Nor are the *Lucent* damage issues unique, even for Microsoft; *i4i v. Microsoft*, decided December 22, 2009, also involved damage issues for composite software products.¹⁴

⁶ See, e.g., *Dowagiac Mfg. Co. v. Minn. Moline Plow Co.*, 235 U.S. 641, 647–48 (1915) (stating only a “reasonable approximation” is required and not “mathematical exactness”); *U.S. Frumentum Co. v. Lauhoff*, 216 F. 610, 617 (6th Cir. 1914) (stating the Court “should have no hesitation” to award damages based on a “sufficiently accurate” estimate); *City of Boston v. Allen*, 91 F. 248, 252 (1st Cir. 1898) (affirming jury instructions “to consider the question of the value of the invention to the plaintiff as a piece of property”).

⁷ 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *aff’d, in part, modified, in part*, 446 F.2d 295, 296 (2d Cir. 1971).

⁸ Compare *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1326 (Fed. Cir. 2009) [hereinafter *Lucent IV*] (discussing the benefits and detriments of lump-sum and reasonable royalty awards), with *Georgia-Pacific*, 318 F. Supp. at 1117–18 (describing the prior history where a lump-sum was awarded and reversed for a reasonable royalty).

⁹ See, e.g., *Lucent IV*, 580 F.3d at 1336–39 (discussing the applicability and flaws of the “entire market value” calculation).

¹⁰ Patent Reform Act of 2009, H.R. 1260, 111th Cong. § 5(a) (2009) (proposing to amend 35 U.S.C. § 284 to require the entire market value approach when “the claimed invention’s specific contribution over the prior art is the predominant basis for market demand for an infringing product or process”).

¹¹ *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F. Supp. 2d 1016, 1029, 1042 (S.D. Cal. 2008), *aff’d, in part, vacated, in part*, 580 F.3d 1301 (Fed. Cir. 2009) [hereinafter *Lucent III*]. For more information see discussion *infra* Part II.B.

¹² *Lucent IV*, 580 F.3d at 1335 (“Having examined the relevant *Georgia-Pacific* factors, we are left with the unmistakable conclusion that the jury’s damages award is not supported by substantial evidence, but is based mainly on speculation or guess-work.”).

¹³ *Id.* at 1336–39.

¹⁴ 589 F.3d 1246, 1272–73 (Fed. Cir. 2009).

In this article, I apply economics concepts, in a non-technical way, to the United States Court of Appeals for the Federal Circuit's decision regarding the appropriate way to evaluate damages. Since the *Lucent* award was based on a "reasonable royalty" calculation as set by the trial court,¹⁵ rather than lost profits or actual royalty agreements for related products, my comments are focused on establishing reasonable royalties. In particular, I consider when licensees might have agreed to (a) a lump-sum agreement despite the obvious limitations/risk, and (b) higher royalty rates such as the contested eight percent rate in *Lucent* for a small component of a far larger product sold as a bundled good. I propose additional factors for consideration in subsequent infringement "reasonable royalty" damage cases, referred to here as the "Cortez Factors."¹⁶ Those Factors relate to the structure of the firms and industry, and the revenue model used, such as whether it applies only to product sale profits, or incorporates product-related advertising. When those conditions are considered in the damage analysis, the fines set in *Lucent* are more justifiable. That said, instances where licensees would agree to both a lump-sum agreement and high royalty rates for a small component of a composite product would be rare, and to that degree the appeals court justices did indeed indicate a knowledge of economics in *Lucent*.¹⁷ That knowledge though, I argue here, is too constrained by the simple perspectives of pure competition and monopoly which are ill suited to understanding product value in markets like software which are neither competitive nor monopolies.¹⁸

The article is structured as follows. The following section provides a synopsis of statutes and decisions regarding damage estimates for infringement. Subsequent is an overview of *Lucent v. Microsoft*, including both the trial court decision and that of the appeal, with emphasis on the parts related to the damage calculations. Section four includes my economic analysis and reports the "Cortez Factors" while the fifth and final section is the conclusions. While the final conclusions are more nuanced, in broad terms they state that highly concentrated sectors (Microsoft has an approximate ninety percent market share for personal computer operating systems)¹⁹ and ones in which the profit margins are very high (seventy to eighty percent for Microsoft)²⁰ make entry deterrence a major aspect of product and pricing decisions, which negates the simpler marginal value analysis which effectively underlies the appeals court's damage evaluations. That is, I am arguing that the appeals court unwittingly applied a competitive market model of value to the software sector which is anything but competitive, and further a unique sector in which broad use of a software product adds to market value while exclusivity detracts.

¹⁵ *Lucent III*, 580 F. Supp. 2d at 1041.

¹⁶ The Cortez Factors would also be relevant for assessing lost profit and running royalty-based infringement damages, but the specific considerations must await a separate evaluation at a later date.

¹⁷ See, e.g., *Lucent IV*, 580 F.3d at 1330.

¹⁸ See, e.g., *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 19 (D.D.C. 1999) (indicating that Microsoft holds a near-monopoly in the Intel processor-operating system market).

¹⁹ *Id.* at 19.

²⁰ *Lucent IV*, 580 F.3d at 1335.

I. LEGISLATION AND CASE HISTORY ON DAMAGE CALCULATIONS

A. *Early Period*²¹

The first three Patent Acts (1790, 1793 and 1800) followed the Anglo-American tradition of separating law and equity.²² As a consequence, only state courts could grant injunctions, providing access to equity damages, unless diversity of citizenship was present in which instance the Federal courts took jurisdiction.²³ Regarding monetary damages, the Patent Act of 1790 allowed general damages “assessed by a jury.”²⁴ The 1793 Act for its part limited damages to the license price, but that was found restrictive in cases where no license agreement had been reached.²⁵ The 1800 Act restored the wording of the 1790 Act while retaining the ‘at least three times’ penalty stipulation first inserted in 1793.²⁶ The 1819 Act granted equity jurisdiction to Federal courts while providing no alteration in the power of the courts over the subject matter.²⁷

Since 1800 the courts have had the discretionary authority to increase damage compensation by up to three times.²⁸ As codified in the 1952 Act, “In either event [jury or court determined damages] the court may increase damages up to three times the amount found or assessed.”²⁹ However, such penalty damages are generally applied only in cases of willful and wanton infringement or bad faith litigation.³⁰

The 1836 Patent Act in section 14 allowed for the recovery of actual damages while section 17 provided for the granting of injunctions.³¹ These two sections

²¹ This subsection draws on 7 CHISUM, *supra* note 4, § 20.02.

²² *See Nike, Inc. v. Wal-Mart Stores, Inc.*, 138 F.3d 1437, 1440 (Fed. Cir. 1998) (“The first patent statutes reflect the separation of law and equity, carried over from the English common law of patents.”).

²³ *See id.*: 7 CHISUM, *supra* note 4, § 20.02[1] (footnote omitted).

²⁴ Act of Apr. 10, 1790, ch. 7, § 4, 1 Stat. 111 (“[S]uch damages as shall be assessed by a jury, and moreover shall forfeit to the person aggrieved, the thing or things so devised . . . contrary to the true intent of this act, which may be recovered in an action on the case founded on this act.”).

²⁵ *See Seymour v. McCormick*, 57 U.S. (15 How.) 480, 488 (1853) (explaining that the 1793 Act’s exclusive reliance on a license measure for damages proved unsatisfactory).

²⁶ Act of Apr. 17, 1800, ch. 25, § 3, 2 Stat. 37, 38 (“[S]uch person so offending, shall forfeit and pay to the said patentee . . . a sum equal to three times the actual damage sustained by such patentee, . . . which sum shall and may be recovered, by action on the case . . . in the circuit court of the United States, having jurisdiction thereof.”).

²⁷ Act of Feb. 15, 1819, ch. 19, 3 Stat. 481-82 (“[U]pon any bill in equity, filed by any party aggrieved in any such cases, shall have authority to grant injunctions, according to the course and principles of courts of equity, to prevent the violation of the rights of any authors or inventors, secured to them by any laws of the United States . . .”).

²⁸ *E.g.*, *SRI Int’l, Inc. v. Advanced Tech. Labs., Inc.*, 127 F.3d 1462, 1468–69 (Fed. Cir. 1997); *Topliff v. Topliff*, 145 U.S. 156, 174 (1892).

²⁹ 35 U.S.C. § 284 (2006).

³⁰ *Roberts v. Sears, Roebuck & Co.*, 723 F.2d 1324, 1329 n.4 (7th Cir. 1983) (citing CHISUM, *supra* note 4, § 20.03[4][b]). *See also* Martha K. Gooding & William C. Rooklidge, *The Real Problem with Patent Infringement Damages*, 91 J. PAT. & TRADEMARK OFF. SOC’Y 484, 485–87 (2009) (using experiences from moot damage trials to determine that juries are often in “a mood to punish” and not to estimate actual damages).

³¹ Patent Act of 1836, ch. 357, §§ 14, 17, 5 Stat. 117 (current version at 35 U.S.C. § 284 (2006)).

bifurcated the recovery of infringement-based losses. Under law, a plaintiff could recover damages (up to 3x) while under equity, an injunction and the defendant's profits.³² However, there was a reluctance by the courts to award both profits and damages.³³ Under section 55 of the Patent Act of 1870, the power of equity relief was extended to include damages as well as lost profits.³⁴ Nonetheless a limitation remained for plaintiffs who could not prove substantial damages and whose patent had expired or otherwise did not qualify for injunctive relief.³⁵ That issue was resolved by the recognition of the "reasonable royalty" concept,³⁶ the basis for the damage award in *Lucent*.³⁷ That is, as summarized by the Federal Circuit in *SmithKline Diagnostics v. Helena Laboratories*, there are three means to measure compensatory damages, (1) lost profits, (2) an established royalty, or (3) a reasonable royalty, depending on the circumstances of the case.³⁸

Stated from an alternative approach, plaintiffs must be the basis for establishing the alleged losses in sales and profits.³⁹ In *Paduit v. Stahlin Bros. Fibre Works*, the Sixth Circuit Court of Appeals set out a four step approach for identifying causation:

To obtain as damages the profits on sales it would have made absent the infringement, i.e., the sales made by the infringer, a patent owner must prove:

- 1) demand for the patented product;
- 2) absence of acceptable non-infringing substitutes;
- 3) his manufacturing and marketing ability to exploit the demand; and
- 4) the amount of profit it would have made.⁴⁰

Where a patentee fails to show causation, and can point to no evidence that warrants a lost profits award, the court will require a determination of reasonable royalty.⁴¹ Because of the focus on the reasonable royalty method in *Lucent*, it receives the bulk of the attention here.

Now while *Paduit* is not directly applicable to *Lucent* due to the focus on lost sales, step two, the existence of non-infringing substitutes, is however generally relevant. *TWM Mfg. Co. v. Dura Corp.* sets out factors indicative of the absence of a non-infringing substitute.⁴² "Consumer demand defines the relevant market and

³² *Id.*

³³ *Birdsall v. Coolidge*, 93 U.S. 64, 68–69 (1876).

³⁴ Patent Act of 1870, ch. 230, § 55, 16 Stat. 198–217 (current version at 35 U.S.C. § 284 (2006)).

³⁵ See *Tilghman v. Proctor*, 125 U.S. 136, 143–44 (1888) (noting the differences between the remedies available in law and in equity).

³⁶ 35 U.S.C. § 284 (2006).

³⁷ *Lucent IV*, 580 F.3d 1301, 1335 (Fed. Cir. 2009).

³⁸ *SmithKline Diagnostics, Inc. v. Helena Labs. Corp.*, 926 F.2d 1161, 1164–66 (Fed. Cir. 1991).

³⁹ *Panduit Corp. v. Stahlin Bros. Fibre Works*, 575 F.2d 1152, 1156 (6th Cir. 1978) (Markey, C.J.).

⁴⁰ *Id.*

⁴¹ *Water Techs. Corp. v. Calco, Ltd.*, 850 F.2d 660, 671, 673–74 (Fed. Cir. 1988).

⁴² *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895, 900 (Fed. Cir. 1986). The factors are:

- (1) failure to design its own device, despite the alleged availability of other suspensions now characterized by Dura as "acceptable";
- (2) election to infringe, despite having expended only minimal sums when notified of infringement;
- (3)

relative substitutability among products therein.”⁴³ That is, consumers determine if a (non-infringing) substitute is “acceptable.” Of course, consumers’ choice is based in part on price so that if a (non-infringing) substitute product is acceptable in terms of its attributes but unacceptable due to a higher price caused by, for example, the need to use more costly materials than for the infringing product, the product under question cannot be considered to be an “acceptable” substitute.⁴⁴ Alternatively, the cost difference for the non-infringing alternative may set a ceiling on the royalty for the infringed product.⁴⁵ In *Grain Processing Corp. v. American Maize Products Co.* the court determined that American Maize’s production cost difference between infringing and non-infringing LoDex 10 [a corn-based food additive and stabilizer] put a cap of three percent on the reasonable royalty award.⁴⁶

Paduit also states, “a patent owner must prove [damages].”⁴⁷ That is, the burden of proof is upon the hypothetical licensor or patentee,⁴⁸ although the benefit of the doubt can be given to the injured party following typical legal practice.⁴⁹ The “proof” as well must be a factual one.⁵⁰

B. Reasonable Royalty

The concept of “reasonable royalty” was strongly affirmed in *United States Frumentum Co. v. Lauhoff*.⁵¹ Judge Denison ruled that proof of market value is one way of documenting loss, proof of lost sales is another.⁵² A third method is instructing the jury, possibly with the assistance of experts, on the value of the patent and the customary selling price in that or a similar business.⁵³ “This damage or compensation is not, in precise terminology, a royalty at all, but it is frequently spoken of as a ‘reasonable royalty’”⁵⁴ As an ancillary point, the Judge noted that the market/profit loss is real even if the plaintiff has not yet sold the infringed product.⁵⁵ The following year the Supreme Court in dictum approved the reasonable royalty concept advanced in *Lauhoff*.⁵⁶

willful infringement; (4) failure to successfully market other allegedly “acceptable” designs; (5) violation of the 1981 injunction, and (6) withdrawal from the business after enforcement of the injunction.

Id.

⁴³ *Grain Processing Corp. v. Am. Maize-Prods. Co.*, 185 F.3d 1341, 1355 (Fed. Cir. 1999).

⁴⁴ *Kaufman Co. v. Lantech, Inc.*, 926 F.2d 1136, 1142 (Fed. Cir. 1991) (citation omitted).

⁴⁵ *E.g., Grain Processing Corp.*, 185 F.3d at 1353.

⁴⁶ *Id.*

⁴⁷ *Panduit Corp. v. Stahlin Bros. Fibre Works*, 575 F.2d 1152, 1156 (6th Cir. 1978).

⁴⁸ *Dow Chem. Co. v. Mee Indus.*, 341 F.3d 1370, 1382 (Fed. Cir. 2003); *Kearns v. Chrysler Corp.*, 32 F.3d 1541, 1551 (Fed. Cir. 1994).

⁴⁹ See Susan Perng Pan, *Patent Damage Assessments After Rite-Hite and Grain Processing*, 42 IDEA 481, 483–86 (2002) (discussing patent remedies since 1995).

⁵⁰ *SmithKline Diagnostics, Inc. v. Helena Labs. Corp.*, 926 F.2d 1161, 1164 (Fed. Cir. 1991).

⁵¹ 216 F. 610 (6th Cir. 1914).

⁵² *Id.* at 616.

⁵³ *Id.* at 617.

⁵⁴ *Id.*

⁵⁵ *Id.* at 623.

⁵⁶ *Dowagiac Mfg. Co. v. Minn. Moline Plow Co.*, 235 U.S. 641, 650 (1915).

The 1946 Act amended section 4921 of the Act of 1819 to delete mention of the recovery of additional monetary damages in the form of the infringer's profits.⁵⁷ As important, the reference to a reasonable royalty was modified by "not less than" establishing it as the minimum acceptable level of 'general damages'.⁵⁸ There was a controversy if the Act's intention was the complete exclusion of the collection of additional damages in the form of profits, or merely an elimination of a mandatory accounting of profits if the reasonable royalty standard was acceptable to the plaintiff.⁵⁹ For purposes here the resolution of that issue is not relevant so a further discussion is excluded. The modified section 4921 was incorporated into the Patent Act of 1952 as section 284 which reads in its first paragraph as follows:

Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.⁶⁰

The Supreme Court has ruled that the term "adequate to compensate for the infringement" refers to monetary compensation adequate to restore the plaintiff financially to the position he/she would have had but for the infringement,⁶¹ the floor below which damages shall not fall.⁶² More recently, the Federal Circuit has offered a definition as the amount an interested third party would be willing to pay as a royalty for the right to use a patented product or process while earning a reasonable profit.⁶³ The hypothetical negotiation between willing parties is to have taken place when the alleged infringement began⁶⁴ and assumes the patent is valid.⁶⁵ As will be discussed below, this legal definition falls short of one used by economists to describe what would constitute a reasonable royalty in more complex market environments.⁶⁶

The courts have identified a number of factors related to the value of a license. Of those, the 15 factors enumerated in *Georgia-Pacific v. United States Plywood*⁶⁷ (hereafter the *Georgia-Pacific* factors) have been repeatedly relied on in subsequent rulings, including *Microsoft*:

⁵⁷ Act of August 1, 1946, ch. 726, 60 Stat. 778 (current version at 35 U.S.C. § 70 (2006)); see *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 377 U.S. 476, 505 (1964).

⁵⁸ Act of August 1, 1946, ch. 726, 60 Stat. 778 (current version at 35 U.S.C. § 70); see *King Instruments Corp. v. Perego*, 65 F.3d 941, 947 (Fed. Cir. 1995).

⁵⁹ See John Shaeffer, *Equitable Disgorgement: An Unused Power that Courts Retain to Make Willful Patent Infringement Unprofitable*, 22 NO. 1 INTELL. PROP. & TECH. L.J. 14, 15 (2010) (discussing the Federal Circuit's approaches to damages calculations).

⁶⁰ 35 U.S.C. § 284.

⁶¹ See *Aro Mfg. Co.*, 377 U.S. at 505–07.

⁶² *Id.* at 504 (quoting 35 U.S.C. § 284).

⁶³ *Trans-World Mfg. Corp. v. Al Nyman & Sons*, 750 F.2d 1552, 1568 (Fed. Cir. 1984) (citations omitted).

⁶⁴ *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 435 F.3d 1356, 1363–64 (Fed. Cir. 2006).

⁶⁵ *Trio Process Corp. v. L. Goldstein's Sons, Inc.*, 533 F.2d 126, 129–130 (3d Cir. 1976) (citing *General Motors Corp. v. Blackmore*, 53 F.2d 725, 729 (6th Cir. 1931)).

⁶⁶ DR. ELIZABETH M. BAILEY ET AL., *GROUNDHOG DAY: RECURRING THEMES ON REASONABLE ROYALTIES IN RECENT IP DAMAGE CASES 1* (NERA Econ. Consulting 2009).

⁶⁷ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970), *aff'd, in part, modified, in part*, 446 F.2d 295 (2d Cir. 1971).

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 infringer 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.⁶⁸

Some patent blogs suggest that factors 10–15 are particularly applicable to calculating reasonable royalties while others identify factors 8–13 and 15 as the most relevant.⁶⁹ In *Lucent* the appeals court made special reference to factors 2, 8–11 and 13 (see Section III.C following).⁷⁰ A slightly different classification of the factors would place 1–2, 4–5, and 12 as setting out the market conditions in general and between the licensor and licensee.⁷¹ Some of these factors could better be referred to as a firm’s strategy for benefiting from its assets—as in factor number 4.⁷² Factors 3, 6–8, 10 and 13 describe the product, patent, and license. From an economists perspective all factors but 1 are potentially relevant for determining a reasonable royalty; factor 1 is excluded only because it relates to an actual licensing agreement under litigation.⁷³ Factor 15 of course defines a reasonable royalty and the requisite conditions for its determination.⁷⁴ The use of expert is specifically authorized.⁷⁵

C. Apportionment/Entire Market Rule

When the infringed product or process constitutes only part of the marketed product it is an economic and legal question whether the damage estimate—the reasonable royalty—should be calculated based on the price of the entire marketed product or only the infringed component.⁷⁶

This apportionment issue has been of long standing, the basis of Supreme Court decisions back at least until 1894.⁷⁷ The lower courts and the Court of Appeals for

⁶⁸ *Id.* at 1120.

⁶⁹ See Posting of Gary Odom, *Infringement Damages Primer*, PATENT PROSPECTOR http://www.patenthawk.com/blog/2005/03/infringement_damages_primer.html (Mar. 24, 2005, 11:07 AM) (last visited May 10, 2010); Posting of Gary Odom, *Reasonable Royalty*, PATENT PROSPECTOR http://www.patenthawk.com/blog/2009/05/reasonable_royalty.html#more (May 2, 2009, 3:27 PM) (last visited May 10, 2010).

⁷⁰ *Lucent IV*, 580 F.3d 1301, 1325–26, 1332–33, 1335 (Fed. Cir. 2009).

⁷¹ See *Georgia-Pacific*, 318 F. Supp. at 1120.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ 35 U.S.C. § 284 (2006).

⁷⁶ See *Imonex Servs. v. W.H. Munzprufer Dietmar Trenner GmbH*, 408 F.3d 1374, 1379 (Fed. Cir. 2005) (citations omitted).

⁷⁷ *Warren v. Keep*, 155 U.S. 265, 268 (1894) (distinguishing between the calculation of damages in a patent covering an entire infringing product and a patent covering only a part of the infringing product).

the Federal Circuit, once established as having exclusive appellate jurisdiction over cases arising from the patent laws, rendered decisions based on whole market value, apportionment, and causation principals.⁷⁸ In *State Industries, Inc. v. Mor-Flo Industries*, for example the whole market value concept was upheld for products containing both patented and non patented components “where the patent related feature is the basis for customer demand.”⁷⁹ Overall, “the Federal Circuit has most definitely embraced the ‘entire market’ rule of damages. . . . The ultimate determining factor is whether the patentee or its licensee can normally anticipate the sale of the unpatented components together with the patented components.”⁸⁰

Rite-Hite v. Kelley restated en banc the entire market value rule with additional requirements for its application.⁸¹ Rite-Hite manufactured two devices to prevent trucks from being separated from a loading dock, leading possibly to injuries of the workmen operating heavy loading equipment.⁸² Two models were sold, MDL-55, a manual system, and ADL-100, a more costly automatic device.⁸³ MDL-55 utilized the teachings of Rite-Hite’s 4,373,847 patent⁸⁴ while ADL-100 did not.⁸⁵ Rite-Hite simultaneously marketed a “dock leveler,” a bridging device designed to cover the space between the loading dock and the parked vehicle so as to avoid persons or goods slipping into any intervening space.⁸⁶ Kelley was found to have infringed the Rite-Hite patent when copying the MDL-55 product and marketed it to avoid lost sales for its own dock leveler product.⁸⁷ The district court determined that ‘but for’ Kelley’s infringement, Rite-Hite would have sold eighty more MDL-55s, 3,243 ADL-100s, along with 1,692 dock levelers.⁸⁸

Kelley appealed the damages awarded for the ADL-100 product because they were not covered by the patent-in-suit.⁸⁹ The appeals court concluded, “If a particular injury was or should have been reasonably foreseeable by an infringing competitor in the relevant market, broadly defined, that injury is generally compensable absent a persuasive reason to the contrary.”⁹⁰ This decision might be viewed as establishing a “reasonable possibility” of lost sales to an infringing product, a lower standard than had previously existed.⁹¹ However, as regards the unpatented dock leveler, it was determined that all the components must function together as a single unit, be parts of a composite machine, or constitute a functional machine.⁹²

⁷⁸ See *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1549, 1551 (Fed. Cir. 1995) (en banc) (affirming damages for the whole market value for devices not covered by the patent but arguably part of the patent damages); *SmithKline Diagnostics, Inc. v. Helena Labs. Corp.*, 926 F.2d 1161, 1164 (Fed. Cir. 1991) (discussing each potential award of damages).

⁷⁹ 883 F.2d 1573, 1580 (Fed. Cir. 1989).

⁸⁰ ROBERT L. HARMON, *PATENTS AND THE FEDERAL CIRCUIT* 1026 (BNA Books 9th ed. 2009).

⁸¹ 56 F.3d at 1549–50.

⁸² *Id.* at 1542.

⁸³ *Id.* at 1543.

⁸⁴ U.S. Patent No. 4,373,847 (filed May 4, 1981) (issued Feb. 15, 1983).

⁸⁵ *Rite-Hite Corp.*, 56 F.3d at 1543.

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ *Id.* at 1545–46.

⁹⁰ *Id.* at 1546.

⁹¹ See *id.* at 1546, 1550.

⁹² *Id.* at 1549–51.

Since the dock levelers operated separately from the securing devices they were not implicitly incorporated with the patented invention and hence damages were vacated.⁹³ “There can be no recovery for items that have essentially no functional relationship to the patented invention and that may have been sold with an infringing device only as a matter of convenience or business advantage.”⁹⁴

There is a direct connection between *Rite-Hite* and the *Georgia-Pacific* factors, notably factor 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.”⁹⁵ (see Section II.B supra). If the loss of a sale of a patented product would cause the simultaneous loss of an integral non-patented one—a ‘convoyed’ sale—then the licensor might be expected to seek a higher royalty rate for the combined product. “However, proving that the patentee would have lost the ‘convoyed sale’ will likely require proving a correlation between the patented and unpatented ‘convoyed’ product that would essentially satisfy the entire market rule [as set forth in *Rite-Hite*].”⁹⁶ “[T]he entire market rule appears to have subsumed the sixth *Georgia-Pacific* factor.”⁹⁷

“[T]he general language of *Rite-Hite* appears to leave open the door for future patentees to attempt to recoup other losses by providing stronger evidence that such damages could be directly linked to an infringement.”⁹⁸ Recovering stock price declines however has been rejected in *Interactive Pictures Corporation v. Infinite Pictures*.⁹⁹

II. *LUCENT V. MICROSOFT*

A. *Background*

This suit represents a consolidation and division of three separate actions by Lucent Technologies dating back to 2002, in three separate jurisdictions, the Eastern District of Virginia, the District of Delaware, and the Southern District of California.¹⁰⁰ In October 2007 matters relating to U.S. Patent No. 4,763,356,¹⁰¹ known as the “Day patent,” which describes a graphics mode method of entering information into fields on a computer screen without using a keyboard, were transferred to case no. 07-CV-2000 at the U.S. District Court for the Southern

⁹³ *Id.* at 1550–51.

⁹⁴ HARMON, *supra* note 80, at 1027.

⁹⁵ *Compare* *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970) (stating the quote shown above), *with* *Rite-Hite Corp.*, 56 F.3d at 1546 (“If a particular injury was or should have been reasonably foreseeable by an infringing competitor in the relevant market, broadly defined, that injury is generally compensable absent a persuasive reason to the contrary.”).

⁹⁶ Pan, *supra* note 49, at 507.

⁹⁷ *Id.*

⁹⁸ *Id.* at 503.

⁹⁹ *Interactive Pictures Corp. v. Infinite Pictures, Inc.*, 274 F.3d 1371, 1386 (Fed. Cir. 2001).

¹⁰⁰ *Lucent IV*, 580 F.3d 1301, 1308 (Fed. Cir. 2009).

¹⁰¹ U.S. Patent No. 4,763,356 (filed Dec. 11, 1986) (issued Aug. 9, 1988).

District of California.¹⁰² The Day patent, with an initial assignment to AT&T, was subsequently assigned to Lucent Technologies, the plaintiff.¹⁰³

Gateway and Dell, defendants, are both manufacturers and marketers of personal computers and licensees of Microsoft software, including Microsoft Outlook which itself and two other allegedly infringing programs, Microsoft Money and Windows Mobile, were installed on their computers prior to retail sales.¹⁰⁴ In total, 110 million copies of the software were sold with revenues over \$8 billion.¹⁰⁵ Infringement was associated with the calendar function of each software program which permits users to employ a computer mouse or similar device to select a single or multiple dates by clicking on a graphic of a monthly calendar.¹⁰⁶ The program then records a “click” as a particular month, day and year, and hence constitutes a “composition” of data.¹⁰⁷ At issue were independent claim 19 and dependent claim 21, which are method claims.¹⁰⁸

The two computer firms were charged with infringement of the Day patent by inducing/facilitating their customers to use the Day patent subject matter without permission.¹⁰⁹ Microsoft subsequently intervened and was found guilty of indirect infringement, in part because Microsoft promoted the accused features,¹¹⁰ but no distinction was made between inducing and contributory infringement.¹¹¹ Direct infringement was based on circumstantial evidence,¹¹² but on appeal at least two infringers were identified, the Lucent expert and his wife.¹¹³ The Court of Appeals for the Federal Circuit affirmed the District Court’s denial of Microsoft’s post-trial motion for Judgment as a Matter of Law that the Day Patent claims nineteen and twenty-one were invalid and obviousness.¹¹⁴

¹⁰² See *Lucent Tech., Inc. v. Gateway, Inc.*, Nos. 07-CV-2000-H (CAB), 02-CV-2060-B (CAB), 03-CV-0699-B (CAB), 03-CV-1108-B (CAB), 2007 WL 6955272, at *1 (S.D. Cal. Oct. 30, 2007). Also included were U.S. Patents Nos. 4,383,272 (filed Apr. 13, 1981) (issued May 10, 1983), 4,958,226 (filed Sept. 27, 1989) (issued Sept. 18, 1990), 5,347,295 (filed Oct. 31, 1990) (issued Sept. 13, 1994) and 4,439,759 (filed May 19, 1981) (issued Mar. 27, 1984). *Id.* On December 16, 2008, Microsoft and Lucent filed a stipulation dismissing all claims among them except those relating to the Day patent so that they are not discussed further here. *Lucent Techs., Inc. v. Microsoft Corp.*, No. 302-CV-02060, 2008 WL 5718258, at *1 (S.D. Cal. Dec. 16, 2008).

¹⁰³ *Lucent IV*, 580 F.3d at 1308 n.1.

¹⁰⁴ See Tony Dutra, *Patent Damages Reform Debate Evident In Arguments for Microsoft Infringement Case*, PAT., TRADEMARK & COPYRIGHT L. DAILY (June 4, 2009), http://news.bna.com/ptdm/PTDMWB/split_display.adp?fedfid=12898739&vname=ptdbulallissues&fcn=1&wsn=501310000&fn=12898739&split=0.

¹⁰⁵ *Lucent IV*, 580 F.3d at 1323.

¹⁰⁶ *Id.* at 1317.

¹⁰⁷ See *id.*

¹⁰⁸ *Id.* at 1310–12; U.S. Patent No. 4,763,356 (filed Dec. 11, 1986) (issued Aug. 9, 1988).

¹⁰⁹ *Lucent III*, 580 F. Supp. 2d 1016, 1028 (S.D. Cal. 2008), *aff’d, in part, vacated, in part*, 580 F.3d 1301 (Fed Cir. 2009).

¹¹⁰ See *id.* at 1029, 1037.

¹¹¹ *Id.* at 1029.

¹¹² *Id.* at 1036–37.

¹¹³ *Lucent IV*, 580 F.3d at 1317–18.

¹¹⁴ *Id.* at 1308.

*B. U.S. District Court for the Southern District of California Damage Decision*¹¹⁵

The jury-identified lump-sum damage of \$357,693,056.18 imposed on Microsoft by the jury falls between the Lucent expert's estimate of \$561.9 million based on an eight percent royalty of the entire Outlook sales, while Microsoft's proposed a \$6.5 million settlement.¹¹⁶ Microsoft contested that the verdict violated the "entire market" rule (see Section II.C supra) or the jury acted purely speculatively.¹¹⁷ Addressing the second point first, the trial court noted that a jury is not mandated to accept either expert's opinion and that the "to the penny damage calculation" was evidence of a systematic consideration of actual damages rather than capriciousness.¹¹⁸ As regards the whole market contention, the trial court argued that the Lucent experts provided significant evidence of actual lump-sum royalties in the software sector of up to \$290 million while the case history requires damages based on a hypothetical license negotiation at the time of first infringement assumes the patent is valid and would be infringed (see Section II.B supra).¹¹⁹ Since in actual negotiations either or both points may be unclear, the negotiating position of the licensor under the hypothetical may be stronger than in the actual, leading to a higher damage estimate. The court also concluded that the calendar feature was integral to the programs and necessary to meet customer expectations.¹²⁰

*C. U.S. Court of Appeals for the Federal Circuit Damage Decision*¹²¹

The Court of Appeals for the Federal Circuit vacated the trial court's damage award on the basis of a lack of "substantial evidence," whether or not the jury relied on the entire market value calculation or another undisclosed method.¹²² At the same time it was decided the "evidence [was] properly before the jury."¹²³ In its analysis the appeals court relied particularly on several *Georgia-Pacific* factors (see Section II.B supra), as follows, with principal attention to damages from the Outlook application.

¹¹⁵ *Id.* at 1308.

¹¹⁶ *See id.* at 1308, 1323.

¹¹⁷ *Id.* at 1323.

¹¹⁸ *Lucent III*, 580 F. Supp. 2d 1016, 1043–44 (S.D. Cal. 2008), *aff'd, in part, vacated, in part*, 580 F.3d 1301 (Fed. Cir. 2009).

¹¹⁹ *Id.* at 1043.

¹²⁰ *Id.*

¹²¹ *Lucent IV*, 580 F.3d at 1323–39.

¹²² *Id.* at 1324, 1340; *see also* *State Contracting & Eng'g Corp. v. Condotte Am., Inc.*, 346 F.3d 1057, 1072 (Fed. Cir. 2003) ("A jury's decision with respect to an award of damages 'must be upheld unless the amount is 'grossly excessive or monstrous', clearly not supported by the evidence, or based on speculation or guesswork.'" (quoting *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1580 (Fed. Cir. 1992))).

¹²³ *Lucent IV*, 580 F.3d at 1325.

1. *Factor 2:*

“The rates paid by the licensee for the use of other patents comparable to the patent suit[,]” which the appeals court interpreted as a question of whether either party would have agreed to a lump-sum or running royalty.¹²⁴ Lump-sum royalties by putting payments ahead of sales revenues shift all market risk from the licensor to the licensee with some offsetting benefit of removing the administrative need to monitor product sales or revenues.¹²⁵ The appeals court critiqued the trial court analysis on three points:

- Lucent’s expert in his testimony chose running royalties over lump-sum payments, yet Lucent defended the jury decision for a lump-sum payment,¹²⁶
- Documentation or expectation of the frequency of use of the allegedly infringing component,¹²⁷ and
- The example license agreements offered by Lucent were for far smaller amounts, were not analyzed for the jury, applied to markedly different products and conditions, and included both lump-sum and running royalty agreements.¹²⁸

2. *Factors 10 and 13:*

“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.” (#10) and “[t]he portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.” (#13)¹²⁹

The alleged infringing date-picker function was presented as a tiny component of a much larger program, whether the component is measured in terms of the multiple features available for Outlook users or the proportion of lines of code.¹³⁰ The appeals court “[found] it inconceivable to conclude, based on the present record, that the use of one small feature, the date-picker, constitutes a substantial portion of the value of Outlook[,]”¹³¹ that substantial portion in this case being close to eight percent.¹³²

¹²⁴ *Id.* (quoting *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *aff’d, in part, modified, in part*, 446 F.2d 295 (2d Cir. 1971)).

¹²⁵ See generally Philip Johnson, *Reasonable Royalty Damages and License Structure: Why Some Experts Go Running When they Should Take their Lumps*, INSIDE ECON ONE (2007), http://www.econone.com/resource/sections/11/reasonable_royalty_damages.pdf. (analyzing licensing structures from an economic perspective).

¹²⁶ *Lucent IV*, 580 F.3d at 1326–27.

¹²⁷ *Id.* at 1333.

¹²⁸ *Id.* at 1329–30.

¹²⁹ *Id.* at 1332 (quoting *Georgia-Pacific Corp.*, 318 F. Supp. at 1120).

¹³⁰ *Id.* at 1332–33.

¹³¹ *Id.* at 1332.

¹³² *Id.* at 1338–39.

3. Factor 11:

“The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.”¹³³ This factor the appeals court interpreted to mean “an invention used frequently is generally more valuable than a comparable invention used infrequently.”¹³⁴

The appeals court was critical of Microsoft’s assertion that actual customer use of the date-picking function was irrelevant as use post-dates the hypothetical license fee negotiation.¹³⁵ *Ex ante*, the firms can estimate use through comparisons with comparable products, consumer surveys, focus groups, etc.¹³⁶ Of course, value is not necessarily directly correlated with use as in the case of a fire alarm function where its mere existence has value to consumers even if rarely used.¹³⁷ That said, since Lucent was able to identify only a single (or possibly two) infringers meant use-based value of the date-picker was absent.¹³⁸ “Beyond that finding, all the jury had was speculation.”¹³⁹

4. Other Factors:

The remaining *Georgia-Pacific* factors both raise and lower the potential license value.¹⁴⁰ Factor 8 for example (“[t]he established profitability of the product made under the patent”) elevates the value of the license as “the products at issue are sold with an approximately 70–80% profit margin.”¹⁴¹ Conversely, Factor 9 (“[t]he . . . advantages of the patent property over the old modes or devices”) suggests a lower value as “the infringing use of the data picker seems to have, at best, only a slight advantage over what is arguably the closest prior art.”¹⁴² Comparisons with the closest prior art were however not part of the decision.¹⁴³

5. Decision:

The appellate court decided that the “evidence as presented did not reach the “substantial evidence’ threshold” meaning that “the jury’s damage award is not supported by substantial evidence, but is based mainly on speculation or guesswork.”¹⁴⁴ Since Lucent did not meet its burden of proving lump-sum damages

¹³³ *Id.* at 1333 (quoting *Georgia-Pacific Corp.*, 318 F. Supp. at 1120).

¹³⁴ *Id.*

¹³⁵ *Id.* at 1333–35.

¹³⁶ *Id.* at 1334.

¹³⁷ *See id.* at 1325–26 (citing *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1159 (6th Cir. 1978) (Markey, J.)).

¹³⁸ *Id.* at 1334–35.

¹³⁹ *Id.* at 1334.

¹⁴⁰ *Id.* at 1335.

¹⁴¹ *Id.*

¹⁴² *Id.*

¹⁴³ *See id.* (omitting a discussion comparing the closest prior art to the data picker software).

¹⁴⁴ *Id.*

at the level of \$358 million, the award was vacated and the case remanded for a new trial on damages.¹⁴⁵

In reaching that decision, the appellate court indicated a strong suspicion that the jury applied the “entire market value” rule of calculating damages.¹⁴⁶ Supporting that contention were calculations presented by Microsoft indicating the awarded damages were very close to a weighted average of revenues using eighty-five percent OEM prices and fifteen percent retail prices.¹⁴⁷ Conversely, a 5.5% royalty applied to the entire sales yields a similar value.¹⁴⁸ However, as the appellate court notes, “There is nothing inherently wrong with using the market value of the entire product, especially when there is no established market value for the infringing component or feature, so long as the multiplier accounts for the proportion of the base represented by the infringing component or feature.”¹⁴⁹ Clearly the appeals court is concluding that Lucent did not demonstrate that the high multiplier of 8 percent was justified by the very small portion of “the base” represented by the infringed date-picker function. I next evaluate whether the trial court applied sound economic reasoning in reaching that conclusion.

III. ECONOMIC ASSESSMENT OF *LUCENT V. MICROSOFT* ANALYSIS

This section applies basic economic concepts to evaluate reasonable royalty decisions as applied in *Lucent* and more generally to other damage decisions. The intent is less to judge the economics sophistication of the courts in *Lucent* and other infringement damage cases and more to identify other approaches which can lead to improved damage estimates, whether made by juries or the court. These additional aspects are referred to as the “Cortez Factors” and can be considered as augmenting the frequently-used *Georgia-Pacific* factors (see Section III.C preceding).¹⁵⁰

A. Economic Model

Economists use economic models in two ways pertinent to damage estimates. Models abstract from and hence simplify reality while identifying which aspects of a product market are pertinent to determining damages.¹⁵¹ Understanding the pertinent factors is useful in considering damages even if, as is often the case, the actual numbers for calculating damages are unavailable.¹⁵² In short, it is necessary to clarify what exactly is being sought if there is any chance of finding it.

¹⁴⁵ *Id.* at 1337–39.

¹⁴⁶ *Id.* at 1336.

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ *Id.* at 1339.

¹⁵⁰ See *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *aff'd, in part, modified, in part*, 446 F.2d 295 (2d Cir. 1971).

¹⁵¹ See RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 124–25 (6th ed. 2003) (discussing the general applicability of abstract economic theories to law and remedies).

¹⁵² See *Georgia-Pacific Corp.*, 318 F. Supp. at 1120 (discussing factors that are generally useful in considering damages).

1. *Perfect Competition:*

Two models of economic systems, ends of a spectrum, dominate neoclassical economic thinking.¹⁵³ These models are *perfect competition* and *simple monopoly*.¹⁵⁴ Perfect competition has very desirable characteristic for consumers, and for an economy overall.¹⁵⁵ It assures that production is efficient, and no producer makes excess profits, profits beyond what is needed to keep a business in operation.¹⁵⁶ By eliminating excess profits, it is easy to show that the price of composite product times the marginal (next) unit is equal to the price of a component part.¹⁵⁷ This Value of Marginal Product (VMP) as economists call it can be most easily understood in terms of production; car companies hire workers until the output of the last hired times the price of a car equals the wage rate.¹⁵⁸ By extension to software—and this extension is conceptual only for VMP does not strictly apply to the price of composite products—the producer of a composite program adds components until the price of the last component added equals the price of the composite program times the additional units sold.¹⁵⁹

Practically speaking, introducing the VMP concept into the patent infringement damage estimate debate adds little. Rarely are the data available to calculate the component price.¹⁶⁰ More basically, the VMP concept applies only when the inputs are variable, as a car assembler can use more labor and less equipment (Ferrari) or more robots and fewer line workers (Toyota).¹⁶¹ Yet the date-picker function in Outlook is added in a fixed proportion, one per program. What considering VMP in this context does do is to highlight that the appeals court treats software as if it is a competitive sector, as if there is a single market-determined price for a program component which must be identified.¹⁶² The meaning of this perspective will become clearer when contrasting pure competition with the other basic economics model at the other end of the spectrum, simple monopoly.

¹⁵³ See MARK SKOUSEN, *THE MAKING OF MODERN ECONOMICS* 173–74 (2d ed. 2009) (discussing the original theories capitalism from Smith and the marginalist revolution that created two mainstream economic schools of thought).

¹⁵⁴ George J. Stigler, *Perfect Competition, Historically Contemplated*, 65 COLUM. UNIV. J. POL. ECON. 1, 1–5 (1957).

¹⁵⁵ See *id.* at 5 (discussing the desirability in general of competition as the best economic theory for consumers).

¹⁵⁶ See *id.* at 1–2 (discussing mathematical economists' model for profits).

¹⁵⁷ See *id.*

¹⁵⁸ GRAHAM BANNOCK ET AL., *THE PEGUIN DICTIONARY OF ECONOMICS* 242 (7th ed. 2003).

¹⁵⁹ See A.C. Pigou, *Real and Money Wage Rates in Relation to Unemployment*, 47 ECON. J. 405, 407–08 (1937) (analyzing the value of marginal products for composite commodities).

¹⁶⁰ See, e.g., Greg R. Vetter, *"Infectious" Open Source Software: Spreading Incentives or Promoting Resistance?*, 36 RUTGERS L. J. 53, 133–34, 134 n.207 (2004) (stating that the bundling of software and difficult valuation of intangibles make it impossible for one to "disaggregate the cost factors").

¹⁶¹ See CHRISTINE AMMER & DEAN S. AMMER, *DICTIONARY OF BUSINESS AND ECONOMICS* 256, 257 (1977).

¹⁶² See *Lucent IV*, 580 F.3d 1301, 1323–39 (Fed. Cir. 2009) (deconstructing the district court's damages verdict and post-verdict ruling).

2. *Simple Monopoly:*

Simple monopoly retains the efficiency criteria of pure competition by setting output at the level where the cost of the next (marginal) unit sold equals its value.¹⁶³ That product cost though is less than the consumer price, which allows for the existence of “excess” profits.¹⁶⁴ The equivalent of VMP under competition is the Marginal Revenue Product (MRP) for monopoly.¹⁶⁵ The MRP equates the productivity of the last component added times the added (marginal) revenue. The distinction with VMP is the concept that the monopolist has control over the product price by regulating output. Marginal value declines as units sold increase because consumers are willing to pay less for more total units—that is why demand curves slant downward. By contrast, under perfect competition, firms must accept the market-determined price on a take it or leave it basis. Set a higher price and there will be no sales; set one lower and there are only losses. The appeals court has shown a full awareness of the existence of a demand curve for Outlook by suggesting means by which the curve can be estimated.¹⁶⁶ However no mention is made that Microsoft can target a point on the demand curve by adjusting price, or alternatively by picking a price and adjusting output accordingly.¹⁶⁷ Yet if a would-be licensee like Microsoft can affect the consumer price, and as the license value is ultimately related to the consumer price, then the competitiveness of the market must be an aspect of determining damages.¹⁶⁸

Now no one can reasonably claim that Microsoft even with its ninety percent market share is a simple monopolist (in the terms of economists).¹⁶⁹ Microsoft rather fits into the broad middle range between monopoly and competition known as oligopoly, although in this case toward the monopoly end of the spectrum.¹⁷⁰ Alternatives to (competition for) even the Windows operating system exist in the forms of the Apple operating system and *Linux* along with OS/2 Warp (IBP) and BeOS (Be Inc.), but use is very limited.¹⁷¹ What has been well documented in the antitrust case *US v. Microsoft* in Findings of Fact, Microsoft has indeed exercised extensive control over prices.¹⁷² Documented examples include:

“[Microsoft’s] decision not to consider the prices of other vendors’ Intel-compatible PC operating systems when setting the price of Windows 98, for example, is probative of monopoly power. One would expect a firm in a competitive market to pay much closer attention to prices charged by other firms in a market.”¹⁷³

¹⁶³ See Phillip Areeda, *Introduction to Antitrust Economics*, 52 ANTITRUST L.J. 523, 525 (1983).

¹⁶⁴ *Id.*

¹⁶⁵ AMMER & AMMER, *supra* note 161, at 257.

¹⁶⁶ *Lucent IV*, 580 F.3d at 1337–38.

¹⁶⁷ See *generally id.* (making no mention of the demand curve-output selection process).

¹⁶⁸ See *id.* at 1337 (indicating that a patentee typically licenses its inventions for the “true economic value” even though such a value rarely if ever exists at the time a patent is licensed).

¹⁶⁹ See ERNEST GELLHORN ET AL., ANTITRUST LAW AND ECONOMICS IN A NUTSHELL 73 (5th ed. 2004) (asserting that a simple monopolist occupies the entire market).

¹⁷⁰ See *id.* at 67 (asserting that actual markets reside between perfect competition and simple monopoly).

¹⁷¹ See *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 18, 45 (D.D.C.1999).

¹⁷² *Id.* at 26–28.

¹⁷³ *Id.* at 26.

[I]t is indicative of monopoly power that Microsoft felt that it had substantial discretion in setting the price of its Windows 98 upgrade product . . . [T]he company could have charged \$49 for an upgrade to Windows 98 . . . but the study identifies \$89 as the revenue-maximizing price. Microsoft thus opted for the higher price.¹⁷⁴

3. *Assessment:*

Given the prior antitrust court-documented discretionary control Microsoft could and had exercised over its software prices, the appeals court can be faulted for not recognizing the interaction between the license royalty and the packaged software price. To Microsoft, the appropriate royalty is not a single value but a relationship with the software price at the Microsoft-determined sales level.¹⁷⁵ Certainly the appeals court was not alone in this oversight; courts broadly can be faulted for applying a perfect competition price determination model when the licensee has many of the powers of a monopolist.¹⁷⁶ That is, the MRP conceptual model should be applied, not the VMP as was done in *Microsoft*.

Certainly licensors recognize that the important value is the total license revenue generated, not the royalty rate alone, and will be concerned as well with the price charged for the composite product by the licensee.¹⁷⁷ The courts must recognize this importance as well. This distinction leads to the first Cortez Factor:

Cortez Factor 1: *Leading firms in highly concentrated industries likely have significant discretionary control over price. When such firms are licensees, the royalty payments can affect the price charged for the composite product so that the product price and royalty payments are jointly determined. Courts and juries must recognize this interaction and not act as if there is a single, objective, market-determined royalty rate if only it can be identified.*

B. *Lump-Sum v. Running Royalty*

The appeals court subsumed within *Georgia-Pacific* factor 2 (see Section II.B supra) the question of “whether the licensor and licensee would have agreed to a lump-sum payment or instead to a running royalty based on ongoing sales or usage.”¹⁷⁸ Clearly, the appeals court is critical of the justification of the trial court in imposing a lump-sum royalty.¹⁷⁹ Did the appeals court go far enough in its analysis of the incentives for one form of royalty over the other to raise a legitimate question about the trial court decision?

¹⁷⁴ *Id.* at 27.

¹⁷⁵ See *Lucent IV*, 580 F.3d 1301, 1331–32 (Fed. Cir. 2009) (indicating that Microsoft’s argument before the trial court was lacking support in the evidence).

¹⁷⁶ See, e.g., *id.* at 1334 (indicating that the calculation of an exact royalty rate is difficult for software applications such as the one at issue in the case).

¹⁷⁷ See Pigou, *supra* note 159, at 407–08 (discussing the value of composite products).

¹⁷⁸ *Lucent IV*, 580 F.3d at 1326.

¹⁷⁹ See *id.* at 1325, 1335.

1. *Certainty of demand projection*

The appeals court documents carefully the costs and benefits of lump-sum, sometimes called “paid-up” royalties.¹⁸⁰ These include for the licensor a shifting of the risk of market acceptance to the licensee at some risk that the payment will eventually undervalue the revenue generated by the licensed product.¹⁸¹ Throughout the license period, the licensor is relieved of the cost and complexity of monitoring sales or profits so as to determine the appropriate periodic royalty payments.¹⁸² For the licensee the risk exchange is the mirror image; the licensee takes on the risk of market acceptance up to the amount of the payment while benefiting if the market value exceeds the pre-paid amount.¹⁸³ The appeals court is completely correct in these regards. By quoting Cauley the appeals court further indicated a recognition of the benefit to the patent holder, the licensor, of a lump-sum payment for raising cash quickly.¹⁸⁴

This much is good economics, but there is no effort to consider when one set of considerations dominates the other.¹⁸⁵ That is, when to pick one form of payment over the other? One factor is the predictability of demand.¹⁸⁶ If the demand—meaning the total revenue generated—for the licensed product can be predicted with confidence then both sides are more likely to seek a lump sum payment.¹⁸⁷ In general, if the product is conventional in its several dimensions then the past is a reasonable basis for predicting future demand.¹⁸⁸ Conversely, if the product is a notable departure—say the iPhone—then demand becomes much more challenging to predict and the licensee is less likely to take on the significant risk of a paid-up royalty.¹⁸⁹

2. *Cost of Capital*

Perhaps a more significant, or at least less apparent, factor is differences in the cost of capital. Typically newer, less established firms with few resources will (among other factors) pose a higher default risk for investors.¹⁹⁰ To assist investors

¹⁸⁰ *See id.* at 1326.

¹⁸¹ *Id.*

¹⁸² *Id.*

¹⁸³ *Id.*

¹⁸⁴ *Id.* (“A lump-sum license ‘benefits the patent holder in that it enables the company to raise a substantial amount of cash quickly’” (citation omitted)).

¹⁸⁵ *See, e.g., id.*

¹⁸⁶ *See, e.g.,* James D. Dana & Kathryn E. Spier, *Revenue Sharing and Vertical Control in the Video Rental Industry*, 49 J. INDUS. ECON. 223, 227 (2001) (discussing the predictability of the demand of a licensing market, the video movie rental market, in the late 1990s).

¹⁸⁷ *See Lucent IV*, 580 F.3d at 1325 (showing that both sides did not agree on whether to apply the lump-sum method to this particular case).

¹⁸⁸ *See generally* Dana & Spier, *supra* note 186 (discussing uncertainty in demand of the video movie rental market).

¹⁸⁹ *See id.* at 227 (comparing the demand for newly-released movie rentals to that of older movie rentals).

¹⁹⁰ *See* Maria Vassalou & Yuhang Xing, *Default Risk in Equity Returns*, 59 J. FIN. 831, 832–33 (2003) (asserting that small firms have greater default risk than large ones).

in identifying the default risk several ratings firms exist, the largest among which include Standard & Poor¹⁹¹ and Moody's.¹⁹² Each uses slightly different systems; the one employed by Moody's is for long term debt (maturities of one year or more):¹⁹³

- Investment Grade
 Aaa - "gilt edged"
 Aa1, Aa2, Aa3 - high-grade
 A1, A2, A3 - upper-medium grade
 Baa1, Baa2, Baa3 - medium grade¹⁹⁴

- Speculative Grade
 Ba1, Ba2, Ba3 - speculative elements
 B1, B2, B3 - lack characteristics of a desirable investment
 Caa1, Caa2, Caa3 - bonds of poor standing
 Ca - highly speculative
 C - lowest rating, extremely poor prospects of attaining any real investment standing¹⁹⁵

An inverse relationship exists between the credit rating and the historic default rate as investors wish to be compensated for increased risk taking.¹⁹⁶ "The historic default rate for Aaa-rated securities is very low. The average default rate from 1970 - 2000 for Aaa-rated securities over a ten-year period was only 0.67%, well under 1%. However, as one descends the rating scale into the speculative-grade section, the default rate increases dramatically. For B-rated securities, the 10-year probability of default is 44.57%."¹⁹⁷ The effect on interest rates is quite substantial. On one day tax exempt municipal bond rates with 2015 maturities averaged 1.79% with a rating of Aaa and 3.24% for a Baa bond (still considered to be investment grade).¹⁹⁸ That is, even within investment grade bonds, the credit rating can mean interest rates nearly twice those available to the highest rated municipalities.¹⁹⁹ The particulars differ, but the pattern applies to corporate bonds as well.²⁰⁰ Indeed, finding startup funds is such a significant factor it is a major component of entrepreneurship textbooks.²⁰¹

¹⁹¹ *S&P – Ratings – United States*, STANDARD & POOR'S, <http://www.standardandpoors.com/ratings/en/us/> (last visited May 6, 2010).

¹⁹² MOODYS.COM, <http://www.moody.com/cust/default.asp> (last visited May 6, 2010).

¹⁹³ See MOODY, MOODY'S RATING SYMBOLS AND DEFINITIONS 8, 10 (Moody's Investor Servs., June 2009), <http://v3.moody.com/sites/products/AboutMoodyRatingsAttachments/MoodyRatingsSymbolsand%20Definitions.pdf>.

¹⁹⁴ *Id.*

¹⁹⁵ *Id.*

¹⁹⁶ *See id.*

¹⁹⁷ *Rating Definitions*, MOODYSKOREA.COM, <http://www.moodykorea.com/english/definition.asp> (last visited May 6, 2010).

¹⁹⁸ See *Bond Yields – Market Data Center*, WALL ST. J., http://online.wsj.com/mdc/public/page/2_3021-bondyield.html (last visited May 6, 2010) (on file with The John Marshall Review of Intellectual Property Law).

¹⁹⁹ *Id.*

²⁰⁰ Compare Moody's *Seasoned Aaa Corporate Bond Yield: Percent*, ECONOMAGIC.COM, <http://www.economagic.com/em-cgi/data.exe/fedstl/aaa+2> (last visited May 6, 2010) (indicating that the Aaa rate for 2010 is 5.26%), with Moody's *Seasoned Baa Corporate Bond Yield: Percent*,

The issue of capital access is a relevant one for infringement damage consideration for one model is large, established firms licensing innovative products/processes from startups.²⁰² Binder, former CEO of Amgen, the highly successful biotech startup firm, wrote of the time, “Once Amgen grew large enough, we could afford to license other companies’ discoveries instead of the other way around.”²⁰³ Indeed, one of the oft-claimed benefits of patents is to permit small (and presumably asset-poor) firms to negotiate with large ones without risking the loss of their inventions.²⁰⁴ From another text on entrepreneurship, this one for small firms, “Before sharing information on a new idea to obtain financing or marketing assistance, that idea must first be protected as a trade secret or by a patent.”²⁰⁵

The access/cost of capital issue says that the small startup firm may prefer a lump-sum royalty as a means of securing funding from the larger, established licensee.²⁰⁶ Microsoft for example in 2003, close to when Lucent filed the initial action against it, had a “legendary cash stockpile” of over \$49 billion.²⁰⁷ Of course, for the opportunity cost of extending credit and added risk taken on, the licensee agreeing to a lump-sum payment would expect a lower total payment than of paying on a running royalty basis.²⁰⁸ In economists’ terms, the small firm has a high discount rate and is willing to take a smaller payment today than the promise of a larger one tomorrow.²⁰⁹ But as a would-be licensee is more knowledgeable about the value of the invention it is in a reduced risk position compared to a less informed lender and can act as an efficient bank from the perspective of the licensor.²¹⁰ That is, when there is a substantial difference in the cost of capital between the licensor and licensee, a lump-sum royalty agreement can be efficient for both entities.

ECONOMAGIC.COM, <http://www.economagic.com/em-cgi/data.exe/fedstl/baa+2> (last visited May 6, 2010) (indicating that the Baa rate for 2010 is 6.25 %).

²⁰¹ See, e.g., ROBERT D. HISRICH & MICHAEL P. PETERS, *ENTREPRENEURSHIP* 381, 389 (McGraw-Hill/Irwin 5th ed. 2002) (discussing startup funding).

²⁰² See generally Richard M. Cieri & Michelle M. Morgan, *Licensing Intellectual Property and Technology from the Financially—Troubled or Startup Company: Prebankruptcy Strategies to Minimize the Risk in a Licensee’s Intellectual Property and Technology Investment*, 55 *BUS. LAW.* 1649 (2000) (stating that the IP license allows the licensor to waive the right to sue the licensee for infringement in exchange for fees or royalties; and those royalties could be useful capital to a small or startup company with valuable IP and little capital).

²⁰³ GORDON BINDER & PHILIP BASHE, *SCIENCE LESSONS: WHAT THE BUSINESS OF BIOTECH TAUGHT ME ABOUT MANAGEMENT* 157 (Harvard Bus. Press 2008).

²⁰⁴ See Cieri & Morgan, *supra* note 202, at 1649–50 (stating that some intellectual property assets are owned by small businesses or financially unstable individuals or startups who lack capital and need “financial investors, business partners, or entities willing to pay to use those assets”).

²⁰⁵ JEROME A. KATZ & RICHARD P. GREEN, *ENTREPRENEURIAL SMALL BUSINESS* 610 (2d ed. 2009).

²⁰⁶ See Philip Mendes, *To License a Patent—or, to Assign it: Factors Influencing the Choice*, WIPO DOCUMENTS, http://www.wipo.int/export/sites/www/sme/en/documents/pdf/license_assign_patent.pdf (last visited May 6, 2010).

²⁰⁷ Todd Bishop, *Microsoft’s Cash Reserve at \$49 Billion*, SEATTLE POST-INTELLIGENCER, July 18, 2003, at 1, available at http://www.seattlepi.com/business/131322_msftearn18.html.

²⁰⁸ See Rochelle Cooper Dreyfuss & Lawrence S. Pope, *Dethroning Lear? Incentives to Innovate After MedImmune*, 24 *BERKELEY TECH. L.J.* 971, 994 (2009).

²⁰⁹ *Id.* (stating that the lump sum payment would need to be calculated using an “anticipated discount” based on the “projected time value of money over the life of the license”).

²¹⁰ See Joshua D. Coval & Tobias J. Moskowitz, *The Geography of Investment: Informed Trading and Asset Prices*, 109 *U. CHI. J. POL. ECON.* 811, 812 (2001).

3. *Due diligence*

The licensor, most especially in cases of an exclusive license, is always concerned but what the licensee invests sufficient funds and attention that the product reaches its market potential.²¹¹ “If this issue is not covered, then the exclusive licensee can sit on the technology and keep others from exploiting it and bringing money to the licensor.”²¹² One approach to achieving diligence is to identify *milestones* in the license agreements, with specific dates. Milestones can include the completion of specific tasks, penalties (including termination) for not meeting goals, or periodic (annual) minimum payments.²¹³ At the extreme, a lump-sum royalty is a very effective inducement for the licensee to diligence.²¹⁴

4. *Assessment*

The appeals court had a grasp of basic economics, in particular the methods for projecting demand and a recognition that a pre-paid royalty serves as a source of capital to the licensor.²¹⁵ That said, and the appeals court is certainly not alone in that regard, the court did not take the next intellectual step to recognize the degree of predictability of demand, and the consequence for the desirability of a lump-sum royalty, particularly for the licensor.²¹⁶ That condition leads to the second Cortez Factor:

Cortez Factor 2: *Predictability of demand for a licensed product or composite product reduces the risk of a lump-sum royalty for licensors and licensees alike and increases the likelihood of it being used.*

The appeals court also gives evidence of a fixed view of negotiations as being between “equals.”²¹⁷ While that precept may be the appropriate legal basis for considering reasonable royalties, it certainly does not reflect the reality of the range of firm sizes and access to capital, which is partly reflected in the differential interest rates for levels of credit ratings.²¹⁸ When lump-sum royalties are evaluated as a means for cash-rich licensees to fund asset-poor licensors, then the practice can be

²¹¹ Donna Bobrowicz, *A Checklist for Negotiating Licenses Agreements in Intellectual Property Management*, in INTELLECTUAL PROPERTY MANAGEMENT IN HEALTH AND AGRICULTURAL INNOVATION: A HANDBOOK OF BEST PRACTICES 1142 (Anatole Krattiger et al. eds., MHIR 2007).

²¹² *Id.*

²¹³ Clinton H. Neagley, *Patent Licensing for Small Agricultural Biotechnology Companies*, in INTELL. PROP. MGMT. IN HEALTH AND AGRIC. INNOVATION: A HANDBOOK OF BEST PRACTICES 1213–19 (Anatole Krattiger et al. eds., MHIR, 2007).

²¹⁴ See Robert Goldscheider, *The Negotiation of Royalties and Other Sources of Income from Licensing*, 36 IDEA 1, 9, 11 (1995).

²¹⁵ See *Lucent IV*, 580 F.3d 1301, 1326 (Fed. Cir. 2009) (quoting Richard Cauley’s book which explains that the lump sum license benefits the licensor).

²¹⁶ *Id.* (stating that with a lump sum fee the licensee must pay the entire amount agreed upon, whether the technology is successful or even used in the future).

²¹⁷ See *id.* at 1324 (explaining the “willing licensor-licensee” approach as an example of equal negotiations).

²¹⁸ See MOODY, *supra* note 193, at 8.

recognized as an efficient means for financing small, innovative firms with higher costs of capital.²¹⁹ That leads to the third Cortez Factor:

Cortez Factor 3: *Lump-sum royalties can be an efficient and hence profitable way for large cash-rich licensees to finance small asset-poor licensors when the licensor is willing to a lower implicit royalty rate.*

Finally, a licensor is always concerned that the licensee, particularly in cases of exclusive licenses, act speedily to commercialize the invention and not allow it to languish.²²⁰ A substantial lump-sum royalty is an effective if not exclusive means of incentivizing the licensee, for which the licensor should be willing to concede a lower overall royalty payment than when using other less favorable license terms.²²¹ As the fourth Cortez Factor this can matter can be summarized as:

Cortez Factor 4: *A lump-sum royalty is one of several means to provide an incentive for the licensee to act with diligence to commercialize a product or process in exchange for which the licensor should be willing to accept a reduction in the license payments.*

Of course, a lump-sum royalty would make economic sense to the licensee only if the total anticipated royalty payments were notably lower when lump-sum than running.²²² In effect the licensee is lending money to the licensor with the fee reflected as a lower overall sum than if the payments were spread out over time.²²³ As regards *Microsoft* in particular, Lucent, a large firm in its own right, does not fit the idea of a small startup in need of growth capital.²²⁴ Nor is it likely that a sophisticated firm like Microsoft would agree to both a high (8%) royalty rate and a lump-sum payment, as was imposed by the trial court decision.²²⁵ Either is conceivable, but both unlikely. Thus the appeals court seemingly made a good economic assessment, if perhaps not for the correct reasons.

C. Value Creation

The appeals court highlights *Georgia-Pacific* factor 11 (see Section II.B supra) as focusing on the extent of use of an invention as indicative of its value.²²⁶ “Implicit in this factor is the premise that an invention used frequently is generally more

²¹⁹ See Goldscheider, *supra* note 214, at 9, 11.

²²⁰ Mendes, *supra* note 206, at 5.

²²¹ See Goldscheider, *supra* note 214, at 8–9.

²²² See Goldscheider, *supra* note 214, at 8.

²²³ See Mendes, *supra* note 206, at 2–3.

²²⁴ Alcatel-Lucent, Hoover’s Company Records, Feb. 23, 2010, at 2 (identifying Lucent’s annual sales at \$23,938,900,000 and net income at \$7,291,300,000).

²²⁵ See *Lucent III*, 580 F. Supp. 2d 1016, 1029, 1043 (S.D. Cal. 2008), *aff’d, in part, vacated, in part*, 580 F.3d 1301 (Fed. Cir. 2009) (sustaining the jury’s verdict based on Lucent’s expert testimony that eight percent of the retail selling price of the patented technology at issue would be a reasonable royalty).

²²⁶ *Lucent IV*, 580 F.3d 1301, 1333–35 (Fed. Cir. 2009).

valuable than a comparable invention used infrequently.”²²⁷ In a narrow sense this conjecture is likely to be true; use equates to value.²²⁸ But viewed narrowly like this implies that use is the only source of income and that use and value are approximately lineally related.²²⁹ Is that conjecture justified?

1. Sources of value

Certainly the use of an invention is a major component of value.²³⁰ Per unit value is unlikely to be constant over a large range due to the expected downward sloping demand curve; whether total revenue (units times price) will increase with increased sales depends on the elasticity of demand for the product.²³¹ This is standard economics and is reflected in the comments of the appeals court.²³² However, in the contemporary world value is not necessarily created only from direct product sales. This is particularly true for web applications where advertising revenue is the major source of income and rising in importance.²³³ Google the search engine giant in 2008 earned \$21.8 billion in revenues, ninety-seven percent of which was from advertisements.²³⁴ There is even talk that Microsoft will provide Office, the base of *Lucent*, to users for free and earn its return through advertising or “commercial derivative services.”²³⁵

Under this revenue model, use in the form of web site visits is a component of value; advertisers seek the highest traffic sites for presenting their products.²³⁶ However, it is the number of times users “click” on an advertisement that triggers payments to the site host.²³⁷ More users increase the probability of a “click” but the demographics of users, the targeted market segment, is the important consideration of the effectiveness of ads.²³⁸ So value creating in the web world, and computer software more generally, is more removed from the “use equates to value” model than is implied by the appeals court analysis.

²²⁷ *Id.* at 1333.

²²⁸ *Id.*

²²⁹ *See id.* (summarizing Microsoft’s argument that the frequency of the use of the patented technology at issue is irrelevant).

²³⁰ *See* *Bush v. Remington Rand, Inc.*, 213 F.2d 456, 465 (2d Cir. 1954).

²³¹ POSNER, *supra* note 151, at 273–74.

²³² *Lucent IV*, 580 F.3d at 1326.

²³³ *E.g.*, Google Inc., Annual Report, 37, 39 (Feb. 13, 2009).

²³⁴ *Id.*

²³⁵ Scott M. Fulton, III, *Inside Office Web Apps: Will Word Web App hold a candle to Word 2010?*, BETANEWS.COM (Sept. 22, 2009), <http://www.betanews.com/article/Inside-Office-Web-Apps-Will-Word-Web-App-hold-a-candle-to-Word-2010/1253650380>.

²³⁶ Carl Bialik, *Sites Profit from Google’s Ad System*, WALL ST. J., May 26, 2004, at B4D.

²³⁷ *Id.*

²³⁸ LOUIS E. BOONE ET AL., *CONTEMPORARY MARKETING: SECOND CANADIAN EDITION* 275 (2010) (describing “psychographic segmentation”).

2. Assessment

The appeals court in invoking narrowly *Georgia-Pacific* factor 11 to equate use with value dates itself by implying the existence of a simple commercial world where the dominant revenue model requires realizing value through direct use.²³⁹ The enormous success of Google, which provides its search service for free and earns income through ad revenues, shows just how increasingly inapplicable that simple model is.²⁴⁰ In terms of the Cortez Factors, this situation can be described as:

Cortez Factor 5: *When a licensed product value is dependent even in part on generated advertising revenue or derivative services where targeting the appropriate demographic is more important than sheer numbers of users then there is only an indirect relationship between use and value.*

Now Office at the time of *Lucent* was indeed sold so the appeals court was correct in suggesting that the value of the contested date picker function was to some degree associated with its use.²⁴¹ But that assumption increasingly cannot be made.²⁴²

D. Market Dominance and Value

Microsoft is clearly a hugely profitable company with a ninety percent market share for its operating system and a seventy to eighty percent profit margin around the time of *Lucent*.²⁴³ Typically in the absence of a simple monopoly such levels of profitability attract entrant firms which drive down the price.²⁴⁴ Certainly there have been competitor operating systems.²⁴⁵ Yet Microsoft's market share has been declining very slowly.²⁴⁶ To understand why requires some understanding of the particular characteristics of software use. From that base it is easier to appreciate the value of a component part like Lucent's date-picker function.

1. User value in the consumer software market and market share

For many products (BMW and Mercedes-Benz cars), scarcity creates exclusivity which enhances value.²⁴⁷ That is an easy relationship to understand, but it applies

²³⁹ See *Lucent IV*, 580 F.3d 1301, 1333 (Fed. Cir. 2009).

²⁴⁰ Google Inc., *supra* note 233, at pml.

²⁴¹ *Lucent IV*, 580 F.3d at 1321.

²⁴² See *id.*

²⁴³ *Id.* at 1335 (indicating the profit margin); *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 19 (D.D.C. 1999).

²⁴⁴ See POSNER, *supra* note 151, at 275–76.

²⁴⁵ *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 19 (D.D.C. 1999).

²⁴⁶ Gregg Keizer, *Windows Loses Market Share to Mobile Operating Systems*, PC WORLD, Jan. 3, 2010.

²⁴⁷ *E.g.*, *Not Exactly a Recession Beater: This Sharp-edged Lamborghini Roadster Goes for \$1.6 Million*, USATODAY.COM (Sept. 15, 2009, 7:31 AM), <http://content.usatoday.com/communities/driveon/post/2009/09/68499029/1>.

only to products which are not shared.²⁴⁸ For consumer software²⁴⁹ there is a major benefit in being able to share files among users²⁵⁰; word processing programs are a clear example.²⁵¹ At the same time, consumers prefer to be able to use the same approaches on different platforms and computer brands—in short not to be required to learn/relearn multiple programs.²⁵² These preferences mean there is a benefit to the leading software supplier even if its products are not the best by some technical measure.²⁵³ Into the future, independent software providers will be drawn to the leading brand as it promises the largest potential market.

Together these two factors create what has been called a “vicious cycle”—a positive feedback loop benefiting Microsoft’s operating system Windows.²⁵⁴ Its “large market share creates incentives for [independent software vendors] to develop applications first and foremost for windows . . .”²⁵⁵ “Each [independent software vendor] realizes that the new operating system could attract a significant number of users if enough [independent software vendors] developed applications for it; but few [independent software vendors] want to sink resources into developing for [a new operating] system until it becomes established.”²⁵⁶ Thus consumers have the incentive to purchase the dominant software program for current compatibility with other users along with anticipated future new applications, while the independent software industry has the incentive to provide more applications for that same program, indeed a vicious cycle from the perspective of a potential entrant into the operating system market.²⁵⁷

For Microsoft, maintaining this “cycle” in its benefit requires its software offerings, whether Microsoft-provided or produced by an independent vendor, serve the requirements of the vast majority of users.²⁵⁸ One observer quotes Microsoft as “feeling that the final product does need to address the everyday needs of about 90% of its usage base, or perhaps 90% of the needs of all its usage base.”²⁵⁹ Implicit in this position is the requirement to prevent an entrant from establishing a foot hold through a superior product not available from or through Microsoft.²⁶⁰

²⁴⁸ Franck Vigneron & Lester W. Johnson, *A Review and a Conceptual Framework of Prestige-Seeking Consumer Behavior*, ACAD. MARKETING SCI. REV., 1999 No. 1, at 5, available at <http://www.amsreview.org/articles/vigneron01-1999.pdf>.

²⁴⁹ The term “consumer software” is meant to refer to software used directly by individuals, in contradistinction to software like server systems which function a level or two removed for direct consumer use.

²⁵⁰ See *Microsoft Corp.*, 84 F. Supp. 2d at 20.

²⁵¹ Steve Hamm, *More to Life than the Office*, BUS. WK., July 3, 2006, at 68, available at http://www.businessweek.com/magazine/content/06_27/b3991412.htm.

²⁵² Paul Klempner, *Competition When Consumers Have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade*, 62 REV. ECON. STUD. 515, 517 (1995).

²⁵³ *Id.* at 517–19 (giving several reasons for not switching software products).

²⁵⁴ *Microsoft Corp.*, 84 F. Supp. 2d at 20.

²⁵⁵ *Id.*

²⁵⁶ *Id.* at 21.

²⁵⁷ *Id.* at 20–21.

²⁵⁸ *Id.*

²⁵⁹ Fulton, *supra* note 235.

²⁶⁰ See *United States v. Microsoft Corp.*, 84 F. Supp. 2d at 22–23 (explaining barriers to operating system market entry from a consumers perspective).

Microsoft is legendary for competing intensively and for spending extensive sums to prevent possible competitors to its key operating system market.²⁶¹ Initially, Microsoft sought to prevent entry through web browsers like Netscape's Navigator by spending considerable sums to place its own web portal Internet Explorer free on Windows.²⁶² "Microsoft decided to bind Internet Explorer to Windows in order to prevent Navigator from weakening the applications barrier to entry, rather than for any pro-competitive purpose."²⁶³ That effort was the basis for the Department of Justice antitrust action.²⁶⁴ More recently, Microsoft is attempting to challenge Google's dominance of the search engine through its new Bing.²⁶⁵ Clearly Google's enormous ad revenues are an attraction, but Microsoft is also acting defensively to prevent Google from displacing Microsoft's licensed software products by providing open source programs through Google's Software as a Service offering in direct competition with Office.²⁶⁶ The effort has been costly for Microsoft with \$3.5 billion spent over three years prior to Bing.²⁶⁷ And expenditures continue with an estimated up to \$100 million advertising campaign for Bing, Microsoft's largest ever.²⁶⁸

2. Strategic behavior

Microsoft is engaged in strategic behavior, which can be defined as measures taken by a firm to improve the market environment to its advantage.²⁶⁹ In particular, the preceding describes non-cooperative strategic behavior which operates like a zero sum game—one firm's gain is a competitor's loss.²⁷⁰ A component of strategic behavior is strategic pricing under which a firm sets a price considering other factors than the short term profit generated from a product in isolation. For example, in a practice known as limit pricing, a firm with lower average costs (possibly due in part to a higher market share) may price below the profit-maximizing level in order to prevent entry by a rival.²⁷¹ This would be possible if for example the dominant firm could price at a level profitable for itself, but below the average cost for the would-be entrant.²⁷² Since the competitor could not enter the market without incurring losses, it would be deterred, if not thwarted altogether,

²⁶¹ *Id.* at 21.

²⁶² *Id.* at 49.

²⁶³ *Id.*

²⁶⁴ See Press Release, U.S. Dep't of Justice, Justice Department Files Antitrust Suit Against Microsoft for Unlawfully Monopolizing Computer Software Markets (May 18, 1998) (on file with The John Marshall Review of Intellectual Property Law).

²⁶⁵ Farhad Manjoo, *The Search for a Rival*, TIME, Aug. 31, 2009, at 38–39.

²⁶⁶ See James Gaskin, *Google Apps Sync for Microsoft Outlook*, ITWORLD (Sept. 15, 2009, 9:00 AM), <http://www.itworld.com/software/77645/google-apps-sync-microsoft-outlook>.

²⁶⁷ Peter Burrows, *Is Qi Lu Microsoft's Search Engine Savior?*, BUS. WEEK (May 28, 2009, 11:30 AM EST), http://www.businessweek.com/magazine/content/09_23/b4134040743599.htm.

²⁶⁸ Abbey Klaassen & Rupal Parekh, *Microsoft Looks to JWT to Market New Search Engine—Web Giant Expected to Spend Up to \$100 Million in Bid to Win Share From Google, Yahoo*, ADVERTISING AGE (April 1, 2009, 6:04 PM), <http://www.evri.com> (search for "Microsoft Looks to JWT to Market New Search Engine").

²⁶⁹ See *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 19 (D.D.C. 1999).

²⁷⁰ See *id.*

²⁷¹ *Langenderfer, Inc. v. S.E. Johnson Co.*, 729 F.2d 1050, 1061 n.2 (6th Cir. 1984).

²⁷² See *id.*

while the established firm would continue to make additional profits into the distant future, even if at somewhat reduced levels.²⁷³

Numerous other examples and scenarios for limit pricing exist,²⁷⁴ but the relevant point here is that a firm in determining a price to charge is considering factors beyond the limits of a particular market as characterized by the demand curve.²⁷⁵ That is, the firm is not setting the price in accordance with the point where additional revenues are equal to additional costs (MR = MC)²⁷⁶ (see Section III.A supra) but rather with a broader strategic goal in mind, such as entry deterrence.²⁷⁷ What strategic pricing means is that the narrow confines of pricing such as the contribution of a part to the value of the whole is not relevant, or at least predominant.²⁷⁸ In terms of license royalties, basing the royalty on the contribution to value of the composite product is largely irrelevant.²⁷⁹ Prices are set considering factors beyond the confines of a particular market.²⁸⁰

Consider now the potential value to Microsoft of the Lucent date-picker function. Presumably the option to select dates conveniently is necessary function for a multifaceted package like Outlook, as was determined by the jury.²⁸¹ If Microsoft did not incorporate a date function in Outlook—in violation of efforts to serve 90 percent of the needs of all its customers²⁸²—it would be easier for a competitor to offer an option with that function.²⁸³ Such competition to Outlook could then serve as an entry to add additional programs and eventually upset Microsoft's dominance.²⁸⁴ Indeed that is the approach Google is taking now (see Section IV.A.a supra).²⁸⁵

To avoid that outcome Microsoft would be expected to be willing to pay a royalty rate greater than the nominal contribution of the date-picker function to the overall Outlook program package.²⁸⁶ Microsoft would be valuing the function in regards to its overall, long term market position and not narrowly on Outlook sales.²⁸⁷ Note that this consideration transcends the question if the royalty should be based on the entire composite program, or the proportion of the base of the date-picker function to that program (see Section II.C supra).²⁸⁸

²⁷³ *E.g.*, *Microsoft Corp.*, 84 F. Supp. 2d at 19.

²⁷⁴ See PAOLO BUCCIROSSI ED., HANDBOOK OF ANTITRUST ECONOMICS 419–20 (MIT Press 2008).

²⁷⁵ *See id.*

²⁷⁶ *See id.*

²⁷⁷ *See id.*

²⁷⁸ *E.g.*, *Microsoft Corp.*, 84 F. Supp.2d at 26–28.

²⁷⁹ Mark Cooper, Ph.D., *Antitrust as Consumer Protection in the New Economy: Lessons from the Microsoft Case*, 52 HASTINGS L.J. 813, 846–49 (2001).

²⁸⁰ *See, e.g.*, *Lucent IV*, 580 F.3d at 1336.

²⁸¹ Cooper, *supra* note 278, at 846–49.

²⁸² *Lucent IV*, 580 F.3d 1301, 1322 (Fed. Cir. 2009) (supporting the jury's finding that "the infringing pop-up tool functionally is pervasive in the accused products").

²⁸³ Fulton, *supra* note 235.

²⁸⁴ *See* Matt Asay, *Google Competes for the Future: Microsoft, the Past*, CNET NEWS (Oct. 23, 2009, 7:12 AM PDT), http://news.cnet.com/8301-13505_3-10381775-16.html.

²⁸⁵ *See id.*

²⁸⁶ *See id.*

²⁸⁷ *See Lucent IV*, 580 F.3d at 1334.

²⁸⁸ *See id.*

²⁸⁹ *See, e.g., id.* at 1336–39 (providing the Federal Circuit's entire market value analysis).

Of course, the Lucent product was not the only date-picker function available to Microsoft when Outlook was programmed.²⁸⁹ And according to the appeals court conclusions the Lucent product had “at best, only a slight advantage over what is arguably the closest prior art.”²⁹⁰ The substitutability of prior art is of course a factual question in each case.²⁹¹ The point being made here is that, for a given degree of closeness to prior art, strategic pricing decisions will value the current art product more highly than if pricing were considered in the standard context of a single product market and equating marginal revenues with marginal cost.

3. Assessment

The consideration of strategic behavior as affecting royalty rates is perhaps the most significant gap in the appeals court economic analysis in *Lucent*.²⁹² When strategic valuation issues come into play the standard models of perfect competition and simple monopoly go out the window.²⁹³ Value—perhaps willingness to pay is a better term—is more related to disadvantaging competitors by leaving no new opportunities to be exploited than profit maximization in the single product market.²⁹⁴ And with Microsoft’s seventy percent profit margins there is much to protect and significant funds to use for doing so.²⁹⁵ In terms of the Cortez Factors:

Cortez Factor 6: *When leading firms in an industry follow strategic behavior to limit entry then pricing may be set outside profit maximizing levels to inhibit competitors. In terms of royalty levels, strategic behavior considerations mean licensees may be willing to pay rates well beyond a level justifiable when considering only a specific product market. Strategic pricing considerations also take considerations outside the narrow limits of basing damage estimates on the entire product or, alternatively, the proportion of the base contributed by the licensed product.*

This said, was at the time of the infringement the date-picker function worth eight percent or thereabouts of the total sales of Outlook? Probably not, if indeed the prior art was as close as claimed. But was it worth more to Microsoft than the proportion of the base making up Outlook? Probably yes. So the appellate court was

²⁸⁹ *Id.* at 1313 (discussing the FXFE system's process of a user entering data and sequences routinely employed in automated teller machines).

²⁹⁰ *Id.* at 1335.

²⁹¹ *Pharmastem Therapeutics, Inc. v. Viacell, Inc.*, 491 F.3d 1342, 1359 (Fed. Cir. 2007) (citations omitted).

²⁹² *See generally Lucent IV*, 580 F.3d 1301 (omitting strategic behavior analysis).

²⁹³ *See Cooper, supra* note 278, at 846–49 (discussing Microsoft’s strategic pricing).

²⁹⁴ *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 26 (D.D.C. 1999) (“While Microsoft may not be able to stave off all potential paradigm shifts through innovation, it can thwart some and delay others by improving its own products to the greater satisfaction of consumers.”).

²⁹⁵ *Lucent IV*, 580 F.3d at 1335.

not wrong in vacating the trial court's damage assessment for retrial.²⁹⁶ It just did so for the wrong reasons.²⁹⁷

CONCLUSION

The economic analysis of the appeals court in *Microsoft* can be said to have found the trees but missed the forest. The "trees" in this instance is the rejection of the \$358 million damage estimate against Microsoft for the infringement of the Lucent-licensed "Day patent." The method disclosed there-in was used as the technical basis for a date-picker function used in Microsoft Outlook and several other programs.²⁹⁸ The combination of the large damage award (\$500 million with accrued interest) and a lump-sum payout indeed seems excessive given the evidence presented.

Conversely, the 'forest' is the complexity of economic factors and relationships among firms which nowhere entered into the analysis of the appeals court. Thus if the court can be given an 'A' for the correct decision, the logic behind that position deserves only a C+. Indeed, the perspective on economic activity which can be inferred from the appeals court's statements characterizes a rather quaint system in which revenues are derived only from the sale of individual products which themselves are composed of parts the value of which is related to the proportional contribution.²⁹⁹ Moreover, licensors and licensees are treated as equals in the market and seem not to recognize that levels and forms (lump-sum or running) of royalties are merely alternative payment methods which may have different value to a licensor or licensee and hence are negotiated in multi-dimensions as a matrix of value.³⁰⁰

For example, the licensee may have significant discretionary control over price which means that the product price and the royalty value to the licensor are jointly determined.³⁰¹ Or an established licensee may in effect serve as a lower cost banker to the licensor by offering a lump-sum royalty in exchange for a lower implicit royalty rate.³⁰² Treating the parties as willing equals in negotiations may be good law but is weak economics.³⁰³

Perhaps most significantly, nowhere in the decision is there an indication—and the appeals court is by no means alone in the legal system in holding this circumscribed perception of economic activity—of a market in which dominant firms act strategically to position themselves and particularly to stymie competitors. Yet

²⁹⁶ *Id.* at 1336–38 (indicating why the jury's verdict related to the entire market value calculation was erroneous).

²⁹⁷ *See id.*

²⁹⁸ *Id.* at 1308–09, 1310–11 (providing the case's background and discussing the Day patent).

²⁹⁹ *Id.* at 1336–38 (discussing that the entire market value rule allows for the recovery of damages based on the value of an entire apparatus containing several features).

³⁰⁰ *See id.* at 1324–25 (illustrating that negotiations are entered into by two willing and equal parties).

³⁰¹ *See, e.g.,* Dana & Spier, *supra* note 186, at 224 (demonstrating an extreme example of joint product price/royalty value determination in the video movie rental market).

³⁰² *See Lucent IV*, 580 F.3d at 1323.

³⁰³ *See id.* at 1324–25.

that occurs regularly and means the marginal conditions (as economists call them) for setting quantities sold and prices no longer apply. Under these conditions, for infringement damage calculations, the distinction between royalties based on the proportion of the base or the entire market value are not pertinent.³⁰⁴ These new conditions apply broadly where dominant firms exist, but the software and web industries are particularly relevant examples at this time for they combine strong single firm dominance and large profit margins which give the lead firms both the incentive and financial wherewithal to act strategically.

In short, the courts need to acquire a more nuanced understanding of how firms compete and the ramifications for acceptable royalty rates and terms. As a step in that direction the following six Cortez Factors are presented to augment the 12 *Georgia-Pacific* factors in helping determine appropriate damages. The Cortez Factors however are specifically focused on reasonable royalty calculations.

Cortez Factor 1: *Leading firms in highly concentrated industries likely have significant discretionary control over price. When such firms are licensees, the royalty payments affect the price charged for the composite product so that the product price and royalty payments are jointly determined. Courts and juries must recognize this interaction and not act as if there is a single, objective, market-determined royalty rate if only it can be identified.*

Cortez Factor 2: *Predictability of demand for a licensed product or composite product reduces the risk of a lump-sum for licensors and licensees alike and increases the likelihood of being used.*

Cortez Factor 3: *Lump-sum royalties can be an efficient and hence profitable way for large cash-rich licensees to finance small asset-poor licensors when the licensor is willing to lower implicit royalty rate.*

Cortez Factor 4: *A lump-sum royalty is one of several means to provide an incentive for the licensee to act with diligence to commercialize a product or process in exchange for which the licensor should be willing to accept a reduction in the license payments.*

Cortez Factor 5: *When a licensed product value is dependent even in part on generated advertising revenue or derivative services where targeting the appropriate demographic is more important than sheer numbers of users then there is only an indirect relationship between use and value.*

Cortez Factor 6: *When leading forms in an industry follow strategic behavior to limit entry then pricing may be set outside profit maximizing levels to inhibit competitors. In terms of royalty levels, strategic behavior considerations mean licensees may be willing to pay rates well beyond a level justifiable when considering only a specific product market. Strategic*

³⁰⁴ See *Lucent IV*, 580 F.3d at 1336 (discussing that for the entire market value rule to apply, the patentee must prove that the patented article or process covers the “basis for customer demand” (citation omitted)).

pricing considerations also take considerations outside the narrow limits of basing damage estimates on the entire product or, alternatively, the proportion of the base contributed by the licensed product.