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

W. LESSER

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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*

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).

5 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).

[f]The 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. 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.

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. Also under long standing debate is whether the royalty should apply only to the infringed part, or to the value of the entire product. 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. 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. 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. 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.

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. 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”).

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).

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

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”).

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.

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 guesswork.”).

Id. at 1336–39.

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,\(^\text{15}\) 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."\(^\text{16}\) 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*.\(^\text{17}\) 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.\(^\text{18}\)

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)\(^\text{19}\) and ones in which the profit margins are very high (seventy to eighty percent for Microsoft)\(^\text{20}\) 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.


\(^{19}\) *Id.* at 19.

\(^{20}\) *Lucent IV*, 580 F.3d at 1335.
I. LEGISLATION AND CASE HISTORY ON DAMAGE CALCULATIONS

A. Early Period

The first three Patent Acts (1790, 1793 and 1800) followed the Anglo-American tradition of separating law and equity. 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. Regarding monetary damages, the Patent Act of 1790 allowed general damages “assessed by a jury.” 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. The 1800 Act restored the wording of the 1790 Act while retaining the ‘at least three times’ penalty stipulation first inserted in 1793. The 1819 Act granted equity jurisdiction to Federal courts while providing no alteration in the power of the courts over the subject matter.

Since 1800 the courts have had the discretionary authority to increase damage compensation by up to three times. 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.” However, such penalty damages are generally applied only in cases of willful and wanton infringement or bad faith litigation.

The 1836 Patent Act in section 14 allowed for the recovery of actual damages while section 17 provided for the granting of injunctions. 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 (“Such damages as shall be assessed by a jury, and moreover shall forfeit to the person aggrieved, the thing or things so devised . . . counter to the true intent of this act, which may be recovered in an action on the case founded on this act.”).
26 Act of Apr. 17, 1800, ch. 25, § 3, 2 Stat. 37, 38 (“Such 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 (“Upon 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 . . . .”).
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).
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.\textsuperscript{32} However, there was a reluctance by the courts to award both profits and damages.\textsuperscript{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.\textsuperscript{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.\textsuperscript{35} That issue was resolved by the recognition of the “reasonable royalty” concept,\textsuperscript{36} the basis for the damage award in \textit{Lucent}.\textsuperscript{37} That is, as summarized by the Federal Circuit in \textit{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.\textsuperscript{38}

Stated from an alternative approach, plaintiffs must be the basis for establishing the alleged losses in sales and profits.\textsuperscript{39} In \textit{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.\textsuperscript{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.\textsuperscript{41} Because of the focus on the reasonable royalty method in \textit{Lucent}, it receives the bulk of the attention here.

Now while \textit{Paduit} is not directly applicable to \textit{Lucent} due to the focus on lost sales, step two, the existence of non-infringing substitutes, is however generally relevant. \textit{TWM Mfg. Co. v. Dura Corp.} sets out factors indicative of the absence of a non-infringing substitute.\textsuperscript{42} “Consumer demand defines the relevant market and
relative substitutability among products therein.\textsuperscript{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.\textsuperscript{44} Alternatively, the cost difference for the non-infringing alternative may set a ceiling on the royalty for the infringed product.\textsuperscript{45} In \textit{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.\textsuperscript{46} \textit{Paduit} also states, "a patent owner must prove [damages]."\textsuperscript{47} That is, the burden of proof is upon the hypothetical licensor or patentee,\textsuperscript{48} although the benefit of the doubt can be given to the injured party following typical legal practice.\textsuperscript{49} The "proof" as well must be a factual one.\textsuperscript{50}

\section*{B. Reasonable Royalty}

The concept of "reasonable royalty" was strongly affirmed in \textit{United States Frumentum Co. v. Lauhoff}.\textsuperscript{51} Judge Denison ruled that proof of market value is one way of documenting loss, proof of lost sales is another.\textsuperscript{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.\textsuperscript{53} "This damage or compensation is not, in precise terminology, a royalty at all, but it is frequently spoken of as a 'reasonable royalty' . . . ."\textsuperscript{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.\textsuperscript{55} The following year the Supreme Court in \textit{dictum} approved the reasonable royalty concept advanced in \textit{Lauhoff}.\textsuperscript{56}

The following cases illustrate the use of market analysis to determine the reasonable royalty:

\begin{itemize}
  \item \textit{Grain Processing Corp. v. Am. Maize-Prods. Co.}, 185 F.3d. 1341, 1355 (Fed. Cir. 1999).
  \item \textit{Kaufman Co. v. Lantech, Inc.}, 926 F.2d 1136, 1142 (Fed. Cir. 1991) (citation omitted).
  \item \textit{E.g., Grain Processing Corp.}, 185 F.3d at 1353.
  \item \textit{Panduit Corp. v. Stahlin Bros. Fibre Works}, 575 F.2d 1152, 1156 (6th Cir. 1978).
  \item \textit{Dow Chem. Co. v. Mee Indus.}, 341 F.3d 1370, 1382 (Fed. Cir. 2003); \textit{Kearns v. Chrysler Corp.}, 32 F.3d 1541, 1551 (Fed. Cir 1994).
  \item \textit{SmithKline Diagnostics, Inc. v. Helena Labs. Corp.}, 926 F.2d 1161, 1164 (Fed. Cir. 1991).
  \item 216 F. 610 (6th Cir. 1914).
  \item \textit{Id.} at 616.
  \item \textit{Id.} at 617.
  \item \textit{Id.}
  \item \textit{Id.} at 623.
\end{itemize}
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.\(^5\) As important, the reference to a reasonable royalty was modified by “not less than” establishing it as the minimum acceptable level of ‘general damages’\(^6\) 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.\(^7\) 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.\(^8\)

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,\(^9\) the floor below which damages shall not fall.\(^10\) 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.\(^11\) The hypothetical negotiation between willing parties is to have taken place when the alleged infringement began\(^12\) and assumes the patent is valid.\(^13\) 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.\(^14\)

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\(^15\) (hereafter the Georgia-Pacific factors) have been repeatedly relied on in subsequent rulings, including Microsoft:

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\(^10\) Id. at 504 (quoting 35 U.S.C. § 284).
\(^13\) 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)).
\(^14\) DR. ELIZABETH M. BAILEY ET AL., GROUNDHOG DAY: RECURRING THEMES ON REASONABLE ROYALTIES IN RECENT IP DAMAGE CASES 1 (NERA Econ. Consulting 2009).
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 economist’s 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

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68 Id. at 1120.
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.
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 principles. 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." 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."

Rite-Hite v. Kelley restated en banc the entire market value rule with additional requirements for its application. 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. Two models were sold, MDL-55, a manual system, and ADL-100, a more costly automatic device. MDL-55 utilized the teachings of Rite-Hite’s 4,373,847 patent while ADL-100 did not. 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. 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. 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.

Kelley appealed the damages awarded for the ADL-100 product because they were not covered by the patent-in-suit. 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." This decision might be viewed as establishing a “reasonable possibility” of lost sales to an infringing product, a lower standard than had previously existed. 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.

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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).
78 883 F.2d 1573, 1580 (Fed. Cir. 1989).
81 56 F.3d at 1549–50.
82 Id. at 1542.
83 Id. at 1543.
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. 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. 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.” (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].” “[The entire market rule appears to have subsumed the sixth Georgia-Pacific factor.]”

“The 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.” Recovering stock price declines however has been rejected in Interactive Pictures Corporation v. Infinite Pictures.

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. In October 2007 matters relating to U.S. Patent No. 4,763,356, 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 District of California.

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

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. In total, 110 million copies of the software were sold with revenues over $8 billion. 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. The program then records a “click” as a particular month, day and year, and hence constitutes a “composition” of data. At issue were independent claim 19 and dependent claim 21, which are method claims.

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. Microsoft subsequently intervened and was found guilty of indirect infringement, in part because Microsoft promoted the accused features, but no distinction was made between inducing and contributory infringement. Direct infringement was based on circumstantial evidence, but on appeal at least two infringers were identified, the Lucent expert and his wife. 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 obvious.


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


Lucent IV, 580 F.3d at 1323.

Id. at 1317.

See id.


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).

See id. at 1029, 1037.

Id. at 1029.

Id. at 1036–37.

Lucent IV, 580 F.3d at 1317–18.

Id. at 1308.
B. U.S. District Court for the Southern District of California Damage Decision\textsuperscript{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.\textsuperscript{116} Microsoft contested that the verdict violated the “entire market” rule (see Section I.C supra) or the jury acted purely speculatively.\textsuperscript{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.\textsuperscript{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).\textsuperscript{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.\textsuperscript{120}

C. U.S. Court of Appeals for the Federal Circuit Damage Decision\textsuperscript{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.\textsuperscript{122} At the same time it was decided the “evidence [was] properly before the jury.”\textsuperscript{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.

\textsuperscript{115} Id. at 1308.

\textsuperscript{116} See id. at 1308, 1323.

\textsuperscript{117} Id. at 1323.


\textsuperscript{119} Id. at 1043.

\textsuperscript{120} Id.

\textsuperscript{121} Lucent IV, 580 F.3d at 1323–39.

\textsuperscript{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))).

\textsuperscript{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.\footnote{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.\footnote{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.\footnote{126}
- Documentation or expectation of the frequency of use of the allegedly infringing component,\footnote{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.\footnote{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)\footnote{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.\footnote{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[,]"\footnote{131} that substantial portion in this case being close to eight percent.\footnote{132}

\footnote{124} \textit{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)).
\footnote{126} \textit{Lucent IV}, 580 F.3d at 1326–27.
\footnote{127} \textit{Id.} at 1333.
\footnote{128} \textit{Id.} at 1329–30.
\footnote{129} \textit{Id.} at 1332 (quoting \textit{Georgia-Pacific Corp.}, 318 F. Supp. at 1120).
\footnote{130} \textit{Id.} at 1332–33.
\footnote{131} \textit{Id.} at 1332.
\footnote{132} \textit{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.\textsuperscript{145}

In reaching that decision, the appellate court indicated a strong suspicion that 
the jury applied the “entire market value” rule of calculating damages.\textsuperscript{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.\textsuperscript{147} Conversely, a 5.5% royalty applied to 
the entire sales yields a similar value.\textsuperscript{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.”\textsuperscript{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 \textit{LUCENT V. MICROSOFT} ANALYSIS

This section applies basic economic concepts to evaluate reasonable royalty 
decisions as applied in \textit{Lucent} and more generally to other damage decisions. The 
intent is less to judge the economics sophistication of the courts in \textit{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 \textit{Georgia-Pacific} factors (see Section III.C preceding).\textsuperscript{150}

\textbf{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.\textsuperscript{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.\textsuperscript{152} In short, it is necessary 
to clarify what exactly is being sought if there is any chance of finding it.

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\textsuperscript{145} Id. at 1337–39.
\textsuperscript{146} Id. at 1336.
\textsuperscript{147} Id.
\textsuperscript{148} Id.
\textsuperscript{149} Id. at 1339.
\textsuperscript{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).
\textsuperscript{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).
\textsuperscript{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. These models are perfect competition and simple monopoly. Perfect competition has very desirable characteristics for consumers, and for an economy overall. It assures that production is efficient, and no producer makes excess profits, profits beyond what is needed to keep a business in operation. 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. 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. 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.

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. 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). 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. 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.

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153 See Mark Skousen, The Making of Modern Economics 173–74 (2d ed. 2009) (discussing the original theories of capitalism from Smith and the marginalist revolution that created two mainstream economic schools of thought).
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.
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").
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. That product cost though is less that the consumer price, which allows for the existence of “excess” profits. The equivalent of VMP under competition is the Marginal Revenue Product (MRP) for monopoly. 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. 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. 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.

Now no one can reasonably claim that Microsoft even with its ninety percent market share is a simple monopolist (in the terms of economists). 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. 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. What has been well documented in the antitrust case US v. Microsoft in Findings of Fact, Microsoft has indeed exercised extensive control over prices. Documented examples include:

"[Microsoft's] decision not to consider the prices of other vendor's 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."
[It is indicative of monopoly power that Microsoft felt that it had substantial discretion in setting the price of its Windows 98 upgrade product . . . . The 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.]

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. 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. 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. 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.” Clearly, the appeals court is critical of the justification of the trial court in imposing a lump-sum royalty. 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?

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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 407–8 (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. 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. 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. 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. 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.

This much is good economics, but there is no effort to consider when one set of considerations dominates the other. That is, when to pick one form of payment over the other? One factor is the predictability of demand. 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. In general, if the product is conventional in its several dimensions then the past is a reasonable basis for predicting future demand. 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.

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. To assist investors

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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 & Poor’s and Moody’s. Each uses slightly different systems: the one employed by Moody’s is for long term debt (maturities of one year or more):

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

- **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 standing

An inverse relationship exists between the credit rating and the historic default rate as investors wish to be compensated for increased risk taking. “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%.” 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). That is, even within investment grade bonds, the credit rating can mean interest rates nearly twice those available to the highest rated municipalities. The particulars differ, but the pattern applies to corporate bonds as well. Indeed, finding startup funds is such a significant factor it is a major component of entrepreneurship textbooks.

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194 Id.
195 Id.
196 See id.
199 Id.
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.\textsuperscript{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.”\textsuperscript{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.\textsuperscript{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.”\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.


\textsuperscript{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).


\textsuperscript{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”).

\textsuperscript{205} JEROME A. KATZ & RICHARD P. GHEEN, ENTREPRENEURIAL SMALL BUSINESS 610 (2d ed. 2009).


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

\textsuperscript{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”).

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. 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. 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. At the extreme, a lump-sum royalty is a very effective inducement for the licensee to diligence.

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. 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. 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." 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. When lump-sum royalties are evaluated as a means for cash-rich licensees to fund asset-poor licensors, then the practice can be

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212 Id.


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.\footnote{See Goldscheider, supra note 214, at 9, 11.} 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.\footnote{Mendes, supra note 206, at 5.} 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.\footnote{See Goldscheider, supra note 214, at 8–9.} 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.\footnote{See Goldscheider, supra note 214, at 8.} 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.\footnote{See Mendes, supra note 206, at 2–3.} 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.\footnote{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).} 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.\footnote{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).} 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.\footnote{Lucent IV, 580 F.3d 1301, 1333–35 (Fed. Cir. 2009).} "Implicit in this factor is the premise that an invention used frequently is generally more
valuable than a comparable invention used infrequently.”

In a narrow sense this conjecture is likely to be true: use equates to value. But viewed narrowly like this implies that use is the only source of income and that use and value are approximately lineally related. Is that conjecture justified?

1. Sources of value

Certainly the use of an invention is a major component of value. 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. This is standard economics and is reflected in the comments of the appeals court. 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. Google the search engine giant in 2008 earned $21.8 billion in revenues, ninety-seven percent of which was from advertisements. 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.”

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. However, it is the number of times users “click” on an advertisement that triggers payments to the site host. 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. 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.

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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).
231 POSNER, supra note 151, at 273–74.
232 Lucent IV, 580 F.3d at 1326.
234 Id.
236 Carl Bialik, Sites Profit from Google’s Ad System, WALL ST. J., May 26, 2004, at B4D.
237 Id.
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. 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. 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. But that assumption increasingly cannot be made.

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. Typically in the absence of a simple monopoly such levels of profitability attract entrant firms which drive down the price. Certainly there have been competitor operating systems. Yet Microsoft's market share has been declining very slowly. 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. That is an easy relationship to understand, but it applies

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239 See *Lucent IV*, 550 F.3d 1301, 1333 (Fed. Cir. 2009).
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 POSTER, *supra* note 151, at 275–76.
only to products which are not shared. For consumer software there is a major benefit in being able to share files among users; word processing programs are a clear example. 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. These preferences mean there is a benefit to the leading software supplier even if its products are not the best by some technical measure. 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. Its “large market share creates incentives for [independent software venders] to develop applications first and foremost for windows . . . .” “Each [independent software vender] realizes that the new operating system could attract a significant number of users if enough [independent software venders] developed applications for it; but few [independent software venders] want to sink resources into developing for [a new operating] system until it becomes established.” 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.

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. 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.” 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.

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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.


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. 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. "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." That effort was the basis for the Department of Justice antitrust action. More recently, Microsoft is attempting to challenge Google's dominance of the search engine through its new Bing. 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. The effort has been costly for Microsoft with $3.5 billion spent over three years prior to Bing. And expenditures continue with an estimated up to $100 million advertising campaign for Bing, Microsoft's largest ever.

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. 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. 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. 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. Since the competitor could not enter the market without incurring losses, it would be deterred, if not thwarted altogether,
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 multi-faceted 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 that 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

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273 E.g., Microsoft Corp., 84 F. Supp. 2d at 19.
275 See id.
276 See id.
277 See id.
278 E.g., Microsoft Corp., 84 F. Supp. 2d at 26–28.
280 Cooper, supra note 278, at 846–49.
281 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”).
282 Fulton, supra note 235.
284 See id.
285 See id.
286 See Lucent IV, 580 F.3d at 1334.
287 See id.
288 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. 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.” The substitutability of prior art is of course a factual question in each case. 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. When strategic valuation issues come into play the standard models of perfect competition and simple monopoly go out the window. Value—perhaps willingness to pay—is more related to disadvantaging competitors by leaving no new opportunities to be exploited than profit maximization in the single product market. And with Microsoft’s seventy percent profit margins there is much to protect and significant funds to use for doing so. 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.
It just did so for the wrong reasons.²⁰⁷

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 therein was used as the technical basis for a date-picker function used in Microsoft Outlook and several other programs.²⁰⁸ 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.²⁰⁹ 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

²⁰⁶ Id. at 1336–38 (indicating why the jury’s verdict related to the entire market value calculation was erroneous).
²⁰⁷ See id.
²⁰⁸ Id. at 1308–09, 1310–11 (providing the case’s background and discussing the Day patent).
²⁰⁹ 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. 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 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

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301 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.