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Letters to the Editor.....	6
President's Message	7
<i>by Steven M. Kaufman</i>	
Commissioner's Report.....	9
<i>by Charles R. Brown</i>	
The Law and Economics of Patent Infringement Damages	11
<i>by Mark A. Glick</i>	
Tenth Anniversary of The Utah Court of Appeals	19
<i>by Judge Norman H. Jackson</i>	
Characteristics of Successful Law Firms	23
<i>by Ezra Tom Clark, Jr.</i>	
State Bar News	26
The Barrister.....	32
Views from the Bench.....	35
<i>by Chief Justice Michael D. Zimmerman</i>	
Judicial Profile	
Judge Fred D. Howard	39
<i>by Derek P. Pullan</i>	
Utah Bar Foundation	40
CLE Calendar	41
Classified Ads.....	43

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The Law and Economics of Patent Infringement Damages

By Mark A Glick

Traditionally, economists have played a surprisingly limited role in the damage phase of patent infringement cases. Until recently, patent infringement damages have been the exclusive domain of accountants and patent lawyers. This is unfortunate because economic theory can be a powerful tool for both calculating your client's damages or challenging the logic of your opponent's damage calculation.¹ The purpose of this article is to familiarize Utah Bar members with how economists approach the murky law of patent damages.

THE PATENT STATUTE

The starting point for any analysis of patent damages is 35 U.S.C. § 284 (the "Patent Statute"), which provides that:

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 use made of the invention by the infringer.

(Emphasis added.)

Prior to 1946, the precursor to section 284 went beyond "compensation", allowing for both recovery of compensation and the infringer's profits. The 1946 Amendment, Act of August 1, 1946, Ch. 726, § 1, eliminated the language regarding the infringer's profits and added the reference to compensation.²

This revision is important. Before 1946, patent owners were awarded damages that included both the lost profits to the patent owner and the infringer's profits.³ Essentially, a successful plaintiff was placed in a better position than had the infringement not occurred because profits on some sales were counted twice—once as lost profits to the patent owner and again as the actual profits the infringer received. The Supreme Court interpreted the 1946 revision as correcting this situation. *Aro Manufacturing*



MARK A. GLICK has been a Professor of Economics at the University of Utah since 1985. He received his Ph.D. in economics from the New School for Social Research, and his J.D. Degree from Columbia University where he had the Olin Fellowship in Law and Economics. He is the author of over thirty published professional papers in the areas of law and economics, and is a member of both the New York and Utah bars. Mr. Glick is also Of Counsel (part-time) with the law firm of Parsons Behle & Latimer.

Co. v. Convertible Top Replacement Co., 377 U.S. 476 (1964), held that the intent of the revised statute was to limit a plaintiff's damages to "compensation for the pecuniary loss [the patent owner] has suffered from the infringement, without regard to the question whether the defendant has gained or lost by his unlawful acts." *Id.* at 507. According to the Court, the statutory reference to compensatory damages means that damages are limited to "the difference between [the patent owner's] pecuniary condition after the infringement, and what his condition would have been if the infringement had not occurred." *Id.* In other words, "[h]ad the

infringer not infringed, what would [the] Patent Holder . . . have made?" *Id.*

LOST PROFITS

The Patent Statute is also abundantly clear as to how compensation is to be calculated. Compensatory damages have consistently been interpreted by the United States Court of Appeals for the Federal Circuit (the "Federal Circuit")⁴ to mean "lost profits," with a reasonable royalty acting as the floor for damages when lost profits cannot be proven. Accordingly, plaintiffs will typically seek lost profits when possible, and attempt to calculate a reasonable royalty only when insufficient information is available to prove lost profits, or when the requirements of such proof cannot be satisfied.

Proof of lost profits requires that the patent owner demonstrate that, absent infringement, he would have made the sales that the infringer actually made. The standards for such proof have changed measurably in the last fifteen years. Before the establishment of the Federal Circuit, the burden of proof to establish lost profits was substantial. Any possibility that someone other than the patent owner could have made any sales of the infringer completely negated a recovery of lost profits. See *Tektronix, Inc. v. United States*, 552 F.2d 343, 349 (Ct. Cl. 1977) ("if lost profits are ever to be awarded . . . it should be only after the strictest proof that the patentee would actually have earned and retained those sums in its sales"). In contrast, the Federal Circuit has adopted a lower standard of "reasonable probability." Under that standard, the patent owner must show only that it is more probable than not that he would have made the infringer's sales.

While the Federal Circuit has made it clear that there is no single method by which the patent owner must carry its burden of proving lost profits, by far the most common approach is the four-part test out-

lined in *Panduit Corp. v. Stahl Brothers Fibre Works, Inc.*, 575 F.2d 1152 (6th Cir. 1978). The *Panduit* test requires that the plaintiff establish (1) the existence of demand for the patented product, (2) the absence of acceptable noninfringing substitutes, (3) the patent owner's ability to meet demand, and (4) some proof of the amount of profit lost per lost sale. *Id.* at 1156. Satisfying these four factors results in the establishment of the fact that, absent infringement, the patent owner would have made the infringer's sales.

The first prong of the *Panduit* test is rarely difficult for the plaintiff to meet. In fact, it is nonsensical. After all, if there were no demand for the patented product, there would be no infringement either. Likewise, the fourth factor may require little more than the production of the plaintiff's income statement. It is not surprising, then, that the key inquiries involved in proving lost profits are the absence of acceptable noninfringing substitutes and the patent owner's ability to produce, market and sell to the infringer's customers. Both of these questions are well-suited for economic analysis, and the Federal Circuit has increasingly incorporated economic analysis when addressing these issues.

Initially, the Federal Circuit required proof that noninfringing substitutes did not possess *all* of the attributes of the patented product. See e.g., *TWM Manufacturing Co., Inc. v. Dura Corp.*, 789 F.2d 895, 901 (Fed. Cir. 1986) ("a product lacking the advantages of the patented [product] can hardly be termed a substitute acceptable to the consumer who wants those advantages"). Such a test cannot withstand even cursory scrutiny, however, because substitutes that possess literally *all* of the attributes of the patented product would be infringing, not "noninfringing." Accordingly, the effect of this early Federal Circuit doctrine was to assure that patent owners virtually automatically met the critical second prong of the *Panduit* test.

The logical defect in this first approach led the Federal Circuit to focus on the attitudes of consumers toward the patented product and any substitutes, rather than on their physical attributes. While this change of focus marked an improvement, the Federal Circuit also held that acceptable noninfringing substitutes are legally absent when some set of customers can be shown to prefer the patented product. See *Stan-*

dard Havens Products, Inc. v. Gencor Industries, Inc., 953 F.2d 1360, 1373 (Fed. Cir. 1991) ("if purchasers are motivated to purchase because of particular features available only from the patented product, products without such features - even if otherwise competing in the market place - would not be acceptable noninfringing substitutes"). The difficulty with this approach is that, if consumer tastes are not uniform, some subset of consumers will always prefer the patented product. As a consequence, this second approach also negated any serious analysis and assured that the patent owner could satisfy the second *Panduit* prong.

"It is not surprising, then, that the key inquiries involved in proving lost profits are the absence of acceptable noninfringing substitutes and the patent owner's ability to produce, market and sell to the infringer's customers."

Federal Circuit case law has now advanced significantly. In *State Industries, Inc. v. Mor-Flo Industries, Inc.*, 883 F.2d 1573 (Fed. Cir. 1989), the Federal Circuit held that lost profits are available to the patent owner only for the *share* of the infringing sales that would have gone to the patent owner absent the infringement. The Federal Circuit has thus finally dispensed with the rigid all or nothing approach of *Panduit*. Under this new procedure, a court can award lost profits to the patent owner on the portion of the infringer's sales that are equal to the patent owner's market share. This approach, though a substantial improvement, is still not without its problems, however. The *Mor-Flo* approach is economically correct only for cases in which the products at issue are "homogenous", that is, where the products lack significant brand name recognition or significant physical or quality differences. However, in cases where products are heterogenous, the *Mor-Flo* market share approach may still lead to erroneous conclusions.

Consider the following example of infringement in the carbonated soda industry where products are heterogenous. Suppose it were found that Pepsi had been infringing

on the patented formula used by Coca-Cola (in reality the formula is a trade secret). Assume further that the relevant market is defined as branded soda in the United States and includes the sales of 7-Up, Dr. Pepper, several root beer brands and a few other products sold nationally⁵. Moreover, for purposes of illustration, assume that in this market, Coca-Cola's market share is 30% and Pepsi's is 20%. Using the Federal Circuit's current analysis, Coca-Cola would be entitled to lost profits on 30% of Pepsi's sales. The lost profits calculation would take Coca-Cola's profit margin and multiply it by 30% of Pepsi's sales.⁶ The theory is that if Pepsi had not infringed its customers would have switched to other branded soda products in proportion to their market shares. But this assumption is clearly erroneous. If Pepsi had not infringed, Coca-Cola would have more likely garnered more than 30% of the Pepsi sales. This is because Coke and Pepsi are very close substitutes while the other branded sodas are more distant substitutes. Consumers who purchased Pepsi are likely to have preferred another cola product like Coca-Cola to products like 7-Up, Dr. Pepper or root beer. The problem being illustrated is that the market share approach treats all competing products in the market as equals, even when clearly this is not the case.

In *BIC Leisure Products, Inc. v. Windsurfing Intern, Inc.*, 1 F.3d 1214, 1218 (Fed. Cir. 1993), the Federal Circuit recognized the importance of product differentiation to the lost profits analysis. In that case, the patent owner sold a high-end, high-priced wind surfing board, while the alleged infringer sold a similar but lower priced, low-end board. The Federal Circuit reached beyond the standard market share approach to lost profits and held that the two products at issue, while arguably part of the same product market, were sufficiently differentiated that the patent owner would probably have sold to very few of the infringer's customers. This was the court's conclusion despite the fact that the patent owner had a significant overall market share. *BIC Leisure* thus represents a clear advance in economic thinking for the Federal Circuit.

In order to be entitled to lost profits damages, the patent owner must also demonstrate that he possesses the marketing and manufacturing capability to make

the infringer's sales. The reason is that, even if it can be shown that demand would have gone to the patent owner absent the infringement, the patent owner must still show that it could have met the additional demand.⁷ While in the past the ability to make the infringer's sales was considered solely from the point of view of manufacturing capacity, courts today inquire whether the patent owner has the ability to market and service the infringer's customers as well. See *Polaroid Corp. v. Eastman Kodak Co.*, 16 U.S.P.Q. 2d 1481 (D. Mass. 1990). This is important because, as any businessman knows, the ability to procure sales requires much more than merely producing the product. The ability to distribute, market and service a product is equally as important as the manufacturing capacity to produce it. In sum, the Federal Circuit's analysis of the *Panduit* factors has evidenced a willingness and increasing ability to apply economic analysis in the calculation of the patent owner's lost sales.

PRICE EROSION

Lost profits include not only the loss of sales due to infringement but also the price reduction that results from the unlawful competition from the infringer. This reduction in price, or "price erosion," is now a recognized part of the lost profits damage measure. According to the Federal Circuit, "lost profits may be in the form of diverted sales, eroded prices, or increased expenses. The patent owner must establish a causation between his lost profits and the infringement. A factual basis for the causation is that 'but for' the infringement, the patent owner would have made the sales that the infringer made, charged higher prices, or incurred lower expenses." See *LAM, Inc. v. Johns-Manville Corp.*, 718 F.2d 1056, 1065 (Fed. Cir. 1983) (emphasis added).⁸

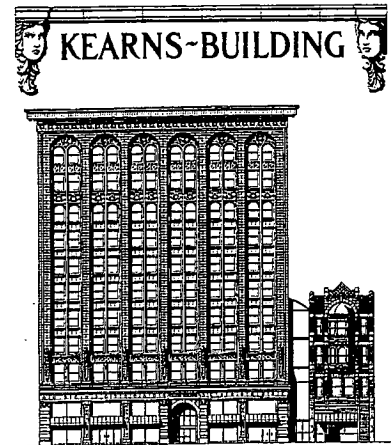
The earliest case to establish a price erosion element of lost profits was *Yale Lock Manufacturing Co. v. Sargent*, 117 U.S. 536, 548 (1886). In *Yale Lock*, the Supreme Court found that the infringer was selling locks that included the infringing device at a lower price than the patent owner. As a result, the patent owner was forced to lower his price by \$1 on some types of locks and \$2 on other types of locks. The Court awarded, as part of the patent owner's lost profits, the erosion of

the patent owner's lock price multiplied by the sales on which the lower price had been applied. But *Yale Lock* failed to consider the impact that the hypothetical price increase might have on output or sales. As some later courts have recognized, it is not consistent for the patent owner to claim that "but for" the infringement prices would have been higher, while at the same time contend that total sales would have remained unchanged.⁹

"This reduction in price, or 'price erosion,' is now a recognized part of the lost profits damage measure."

Economic principles teach that there is a direct relationship between the price level and the level of output or sales.¹⁰ Some courts have recognized this connection. For example, in the seminal case of *Panduit Corp. v. Stahlin Bros. Fibre Works*, 575 F.2d 1152, 1157 (6th Cir. 1978), Judge Markey held for the purposes of calculating lost profits that demand was sufficiently elastic that "any loss in Panduit's profits due to the price reduction was more than compensated by the gain in profits due to the increase in plaintiff's sales volume because of the price reduction." *Id.* at 1157. Similarly, in *Polaroid Corp. v. Eastman Kodak Co.*, 16 U.S.P.Q. 2d 1481 (D. Mass. 1990), the Massachusetts District Court concluded that no lost profits from price erosion were justified because "the higher prices Polaroid says it would have charged would have depressed demand so substantially that the strategy they historically pursued is actually the more profitable one." *Id.* at 1506. Put differently, the court found that price elasticity was already too high to justify an award based on price erosion.

Despite the apparent simplicity of this principle, the majority of courts that have awarded damages for price erosion have done so *without* adjusting the level of output on which lost profits are calculated. The case of *Micro Motion, Inc. v. Exac Corp.*, 761 F. Supp. 1420 (N.D. Cal. 1991), is illustrative. The case involved Exac's infringement of Micro Motion's patent for flow meters. Before Exac entered the market, Micro Motion was the only supplier of the flow meters at issue. Micro Motion



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claimed patent damages in the form of lost profits on Exac's sales for which Micro Motion had the capacity to produce, and a reasonable royalty on the remainder of Exac's sales. But Micro Motion also claimed that, but for the infringement, its prices on its sales would have been higher. It called Professor Daniel Rubinfeld, a nationally recognized economist, who testified that absent infringement Micro Motion's prices would have been 4% higher, and as a result total output would have been 1% lower (thus, elasticity was .25). Citing to this testimony, the court awarded the plaintiff an additional 4% of sales on the lost profits portion of Exac's sales, but surprisingly did not reduce the size of the total output base consistent with

Professor Rubinfeld's analysis. The court was clearly in error. Either output should have been reduced based on the theorized price, increase as plaintiffs' expert conceded, or the court should have refused to grant damages for price erosion all together on the theory that, if Micro Motion would have licensed Exac (the basis for the reasonable royalty award), Exac would have competed with Micro Motion for all sales (since it had a license), eliminating any ability of Micro Motion to raise price.

THE ENTIRE MARKET RULE

Another issue often raised in patent infringement cases is what product sales are eligible for compensation to the patent owner — that is, can the sale of products not

covered by the patent in suit be a basis for lost profits? The contours of the proper legal and economic limitations to recovery on the sales of non-patented items raises serious legal and constitutional issues. Only a brief outline of the pertinent rules is provided here." The Federal Circuit recently addressed this issue in *Rite-Hite Corp. v. Kelley Co., Inc.*, 56 F.3d 1538, 35 U.S.P.Q. 2d 1065, 1071 (Fed. Cir. 1995). There, the Federal Circuit held that lost profits on non-patented components or complementary products sold with the patented product must satisfy the so-called "entire market rule" to be compensable. The entire market rule requires that, in order to be recoverable, the "unpatented components must function together with

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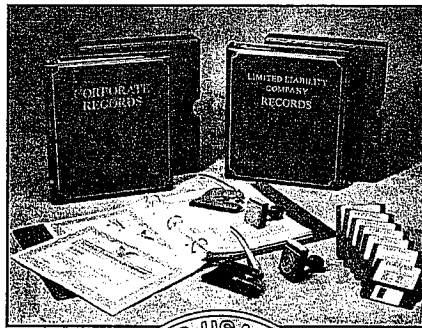
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the patented components in some manner so as to produce a desired end product or result. All the components together must be analogous to components of a single assembly or be parts of a complete machine, or they must constitute a functional unit." *Id.* at 1071. Thus, the sale of products that are complementary to a patented product (i.e., convoyed sales) but not functionally integrated, are not compensable.¹² The court reasoned that the Patent Statute sought to compensate only competitive injury, and products sold with the patented product do not necessarily compete directly with the infringer.

While this reasoning narrows the lost profits recovery by eliminating awards for convoyed sales, it expands potential recoveries for lost sales on products not covered by the patent in suit, but which nonetheless compete with the infringer's products. To illustrate such a situation, suppose that the patent owner sells two products, A & B. Assume further that the infringer infringes the patent covering product A, but sells its product in competition with product B. According to *Rite-Hite*, the patent owner can recover for lost profits on its lost sales of product B, even though product B does not use the patented technology.

The *Rite-Hite* holding is likely to raise future controversy.¹³ The foundation of the *Rite-Hite* rule lies in the court's definitions of "competition" and "functional integration." Both concepts are defined narrowly by the Federal Circuit. Functional integration is defined in physical rather than economic terms, focusing on how products physically relate to each other in use, rather than the efficiencies or inefficiencies from complementarity. Likewise, competition is limited to a direct product by product confrontation and does not consider broader strategic rivalry among firms. Economic analysis can be useful in unpacking the logic of the *Rite-Hite* holding as these issues are revisited in the future.

REASONABLE ROYALTY

One of the most confusing areas of patent damage law is the calculation of a reasonable royalty. In my view, application of three economic principles is critical to maintaining even minimal consistency in calculating a reasonable royalty. The three bedrock economic principles are: (i) there must be gains from voluntary trade; (ii) measures of cost must include "opportunity

cost"; and (iii) distribution of the gains from trade are indeterminate.¹⁴ As discussed below, strict adherence to these three basic economic principles is necessary to arrive at any defensible reasonable royalty calculation.

Absent an "established royalty,"¹⁵ the Federal Circuit requires that a reasonable royalty be determined as the "hypothetical results of hypothetical negotiations between the patentee and the infringer (both hypothetically willing) at the time infringement began." *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1579 (Fed. Cir. 1996). In other words, the Federal Circuit test asks what royalty would have resulted from a voluntary negotiation between the patent owner and the infringer prior to the onset of the infringement. This test is called the willing licensor/willing licensee test.¹⁶

"Economic theory can be a powerful tool in the calculation of patent infringement damages."

In applying the willing licensor/willing licensee test, it must be assumed that there are mutual gains from voluntary trade, that is, that both the licensor and the licensee will be better off if a license is granted. If this were not the case, no trade between the parties would occur. To see why, suppose that the patent owner is the low cost producer over the entire range of output. In this case, the patent owner can make more profits by producing the product entirely himself than he could by licensing over any range of output, and thus he will have no incentive to license the infringer. The willing licensor/willing licensee test requires us to assume away this case and presume that a license will benefit both the patent owner and the licensee.¹⁷

But how should the magnitude of the mutual gains be measured? The mutual gains, or the "profitability pie," is the net profit that the licensee can gain from the license. To calculate the "profitability pie", or any measure of net benefit, requires that we use the second economic principle described above—that cost must include the infringer's opportunity cost. Opportunity cost means the benefits that could have been derived from the licensee's next best oppor-

tunity. To illustrate, ask yourself what is the maximum amount that a willing licensee would pay for use of a technology. The answer is an amount equal to the additional profits that would accrue to the infringer from using the technology. These profits are equal to the profits that the licensee expects to receive from using the new technology *net of* the profits that it could obtain by utilizing the next best alternative technology available.

It would be a fundamental error to consider the licensee's potential gains to be the actual accounting profits. Yet, this is precisely what many courts do in calculating patent damages.¹⁸ An example will illustrate. Suppose that a licensee can make \$5000 using technology A. But using this technology will cause infringement. In the alternative, the licensee can obtain only \$4000 from using an available noninfringing technology. In these circumstances, the licensee will be willing to pay no more than \$1000 for a license to use A, even though on its income statement the licensee will report \$5000 in profit. Notice that if the licensee were forced to pay more than \$1000 for a license, he will be better off simply using technology B. As a result, he can be expected to pay no more than \$1,000 for a license. While many courts are inconsistent on this point, several have recognized that taking account of opportunity cost is the only correct method.¹⁹

The most difficult issue in calculating a reasonable royalty involves how to divide the gains or the profitability pie between the patent owner (his reasonable royalty) and the licensee (his profit). The division will be the result of the patent owner/licensee bargaining process. It has been traditional in economics to suggest that the outcomes of bargaining are essentially indeterminate.²⁰ One possible method for dealing with this problem is to make assumptions about the characteristics of the bargaining process in order to narrow the range of indeterminacy.²¹ A second approach taken by some licensing attorneys is to rely on a rule of thumb that distributes 25-33% of the profitability pie to the patent owner.²² A third approach is to evaluate the relative bargaining strengths of the parties using the famous 14 factors set forth in *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified on other grounds*, 446 F.2d 295 (2d Cir. 1971), *cert.*

denied, 404 U.S. 870 (1971).²³ While the *Georgia-Pacific* factors can be useful for determining the portion of the potential gains that should be awarded to the patent owner as the reasonable royalty, they cannot be used to calculate a reasonable royalty directly as some experts attempt to do. Such an application of the *Georgia-Pacific* factors becomes simply an arbitrary exercise at best, or more often, an example of result-oriented reasoning.

THE FUTURE, A "UNIFIED" APPROACH?

At bottom, calculating economic compensation requires a determination of what the patent owner's income would have been absent the infringement. If there had been no infringement, the patent holder may have produced and sold the product itself, or it may have licensed another producer or seller either exclusively or non-exclusively. If it *would have produced the product* "but for" the infringement, then lost profits are the appropriate approach to compensation. If the patent owner *would have licensed the patent* "but

for" the infringement, then the best damage measure is the lost "reasonable" royalty.

The problem is that the most likely optimal strategy for the patent owner, absent the infringement, may have involved both production and licensing. The patent owner is likely to be the lowest cost producer only over some range of output, while others may be more efficient in producing additional units of output or selling in other markets. Under such circumstances, the patent owner has an incentive to produce over a limited range of output and then license any further production. This is because the licensee can produce more cheaply, and, therefore, can sell the patented item more profitably than can the patent owner over these additional units of output. The licensee's costs, however, must include the royalty charged by the patent owner. As a result, the division of output between the patent owner and the licensee is functionally related to the size of the royalty. The patent owner's price is also related to the level of output it can sell. Thus, for the patent owner, the decision of what range of output to produce, what price to charge and what royalty to offer is really a single interrelated decision.

The optimal combination of production and licensing, as well as the optimal royalty rate and price level will depend on (i) the nature of competition, (ii) the number and characteristics of the competitors, (iii) the cost structure (economics of scale) of the patent owner and the potential licensees, and (iv) the extent to which license fees are "passed on" in final product prices. These factors are uniquely suited to economic analysis. Economic theory can be used to model such a situation and simultaneously compute an estimate of the size of lost profits and the optimal (or reasonable) royalty. This "unified theory" of patent damages, though not yet adopted in any reported decisions, is likely to be on the horizon.²⁴

CONCLUSION

Economic theory can be a powerful tool in the calculation of patent infringement damages. The patent damage problem requires that the analyst study what the economic world would look like if the infringer were removed from the market. Economic analysis is well-suited to address this issue, whether considered globally or within a circumscribed analysis of lost profits, price erosion or a reasonable royalty. As discussed above, the influence of economic thinking is

becoming more and more evident in judicial decisions that address patent damages issues. This is likely to continue in the future as lawyers and judges recognize the potential impact that economics can bring to bear in this area of law.

¹In my opinion, it is best to treat accountants and economists as complements rather than substitutes. Accountants, I believe, are better suited than economists for assisting in the fashioning of discovery requests and reviewing financial documents. Economists, on the other hand, are better equipped to assist in the development of an effective damage theory. I have experienced the benefits of this complementary relationship in working with Coopers & Lybrand in patent cases.

²The legislative history of the Patent Statute is discussed in *Kori Corp. v. Wilco Marsh Buggies & Draglines, Inc.*, 761 F.2d 649, 654 (Fed. Cir. 1985).

³See *Kori Corp.* 761 F.2d at 655.

⁴Pursuant to the Federal Courts Improvement Act of 1982, the Federal Circuit was created and given exclusive jurisdiction over appeals in patent cases.

⁵This is how the Federal Trade Commission has defined the relevant market in this industry.

⁶Profit margin is calculated as sales less variable costs, with the total divided by sales.

⁷This third *Panduit* prong is connected to the second because the size of the patent owner's capacity impacts the number of non-infringing substitutes in the market. If the patent owner cannot meet demand, then the class of acceptable non-infringing substitutes must expand as consumers turn to other products to satisfy their needs. Despite their connection, the two issues can be treated separately.

⁸See also *General American Transp. Corp. v. Cryo-Trans, Inc.*, 893 F. Supp. 774, 796 (N.D. Ill. 1995) ("price erosion occurs when a plaintiff is forced to lower prices due to the presence in the market of the defendant's infringing product"); *Saf-Guard Products, Inc. v. Service Parts, Inc.*, 491 F. Supp. 996, 1002 (D. Ariz. 1980) ("Computation of the plaintiff's lost profits also requires determination as to the plaintiff's effective selling price. If the plaintiff's reduced selling prices are used in the computation of lost profits, the defendant would receive a substantial benefit as a result of its infringing competition with the plaintiff.")

⁹Courts have granted damages based on a price erosion theory on the basis of a variety of types of evidence. For example, in *TWM Mfg. Co., Inc. v. Dura Corp.*, 789 F.2d 895, 902 (Fed. Cir. 1986), the Federal Circuit upheld an award of damages based on price erosion because of proffered evidence that TWM "had to give special discounts to compete with Dura's pricing practices." *Id.* at 902. The court further dismissed defendant Dura's argument "that there was no correlation between the special discounts and its infringing activity." *Id.* Similarly, in *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1579 (Fed. Cir. 1992), the Federal Circuit upheld an award of lost profits based on price erosion because of evidence presented by Brooktree that "it was forced to reduce its prices when AMD announced its chips at lower prices, and that but for the infringement, Brooktree would have continued to sell its chips at the prices that had already been established." *Id.* at 1579.

¹⁰This relationship is measured by the economist's concept of "elasticity." A product is said to be very elastic when consumers are willing to switch to a different good that is only slightly less expensive. Gasoline and groceries are common examples of elastic goods. This is demonstrated by the way gas stations display their prices in big signs at intersections and grocery stores always promise to give the lowest price in town. An inelastic good is one in which consumers are not willing to switch. Prescription medication is an example of an inelastic product; an AIDS patient is not likely to quit buying the prescribed medicine regardless of any price increases.

¹¹Those readers interested in the deeper issues raised by the entire market rule should consult the complete set of opinions in *Rite-Hite Corp. v. Kelley Co., Inc.*, 56 F.3d 1538 (Fed. Cir. 1995).

¹²Prior to *Rite-Hite* conveyed sales were compensable if they were normally sold with the patented product.

¹³For a discussion, see Lisa C. Childs, "Rite Hite Corp. v.



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Kelley Co., The Federal Circuit Awards Damages for Harm Done to a Patent Not in Suit," 1996 Loy. U. Chi. L. Rev. 665.

¹⁴For a discussion of these principles, see Robert Cooter and Thomas Ulen, *Law and Economics* at 72-78 (1995).

¹⁵An established royalty is defined as the prevailing royalty in the industry as evidenced by a substantial number of prior licenses. To qualify as "established" such prior licenses must have the following characteristics:

1. They must be secured before the alleged infringement
2. They must be paid by a substantial number of industry participants
3. They must be in the same market involving the same technology
4. They cannot be secured under threat of litigation or settlement.

See *Railroad Dynamics, Inc. v. A. Stucki Co.*, 727 F.2d 1506, 1518 (Fed. Cir. 1984); *American Original Corp. v. Jenkins Food Corp.*, 774 F.2d 459, 462 (Fed. Cir. 1985).

¹⁶There is an alternative approach to the willing licensor/willing licensee test called the "analytical method." The analytical approach takes the profits of the infringer, subtracts the infringer's normal profit and award the remainder to the patent owner. The approach in *Tektronix, Inc. v. United States*, 552 F.2d 343 (Ct. Cl. 1977), is typical. In that case the court calculated the reasonable royalty as follows: First, the court determined the infringer's sales, and subtracted both variable and fixed costs to arrive at gross profits. Next, the infringer's rate of profit on his other products was subtracted. Finally, the remainder was divided among the infringer and the patent owner in order to provide some return to the infringer for the risks of manufacturing the patented product.

¹⁷We are asked to make this assumption despite the knowledge that the parties themselves did not arrive at a mutually acceptable license agreement.

¹⁸See e.g., *Polaroid Corp. v. Eastman Kodak Co.*, 16 U.S.P.Q. 2d 1481 (D. Mass. 1990); *Fromson v. Western Litho Plate & Plate & Supply Co.*, 853 F.2d 1568, 1575 (Fed. Cir. 1988).

¹⁹See, e.g., *Columbia Wire Co. v. Kokomo Steel & Wire Co.*, 194 F. 108, 110, 114, C.C.A. 186 (C.C.A. 1911); *Union*

Carbide Corp. v. Graver Tank & Mfg. Co., 345 F.2d 409, 411, 145 U.S.P.Q. 240 (7th Cir. 1965); *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1078, 219 U.S.P.Q. 679 (Fed. Cir. 1983); *Smith Intern., Inc. v. Hughes Tool Co.*, 1986 WL 4795, 299 U.S.P.Q. 81, 83 (C.D. Cal. 1986); *Ellipse Corp. v. Ford Motor Co.*, 461 F. Supp. 1354, 1369, 201 U.S.P.Q. 455 (N.D. Ill. 1978); and *Slimfold Mfg. Co., Inc. v. Kinkead Industries, Inc.* 932 F.2d 1453, 1458, 18 U.S.P.Q. 2d 1842 (Fed. Cir. 1991).

²⁰See Paul Milgram and John Roberts, *Economics, Organization & Management* at 140 (1992).

²¹For example, rather than try to recreate a hypothetical negotiation that has already been tried and abandoned, one might ask what would have been the outcome of such negotiations assuming full information. See *id.* ("informational asymmetries can prevent any agreement from being reached, even when an agreement would be efficient under complete information").

²²See e.g., Robert Goldscheider, *The Licensing Law Handbook* (1993-94). Reference to this rule can be found in *Tektronix, Inc. v. U.S.*, 552 F.2d 343, 350 (Ct. Cl. 1977), *Paper Converting Machine Co. v. Magna-Graphics Corp.*, 745 F.2d 11, 22 (Fed. Cir. 1984); *Syntex Inc. v. Paragon Optical Inc.*, 7 U.S.P.Q. 2d 1001, 1027 (D. Ariz. 1987); and *Polaroid Corp. v. Eastman Kodak Co.*, 16 U.S.P.Q. 2d 1481, 1535 (D. Mass. 1990)

²³The fourteen factors are:

1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.
2. The rates paid by the licensee for the use of other patents comparable to 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 item; and the extent of such derivative or conveyed 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 alternative products or methods, if any, that had or could have been used to obtain 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 the 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 profits that should be credited to the invention as distinguished from non-patented elements, services provided in conjunction with the product, the manufacturing process, business risks, or significant features or improvements added by the infringer.
14. The opinion testimony of qualified experts.

²⁴The problem of an optimal license fee is similar to the problem faced by a vertically integrated firm deciding whether, and at what price, to sell upstream inputs to its downstream competitors. See Duncan Cameron and David Reiffen, "Merger Analysis With Captive Capacity: A Suggested Approach," 17 Res. in Law & Econ. 127 (1995). Therefore, economic models already exist to perform the analysis necessary to implement the unified theory. In my opinion, it is only a matter of time before judicial decisions will catch up with available analytical techniques.

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