

EXHIBIT 30

An Economic Overview of Patents

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Nearly 100 years ago, Justice Oliver Wendell Holmes, Jr. recognized that for lawyers to skillfully practice in areas of the law which dealt with the marketplace, a familiarity with economics was indispensable:

For the rational study of the law the black letter man may be the man of the present, but the man of the future is the man of statistics and the master of economics.²

This view was shared by Holmes's colleague, Justice Louis Brandeis, who was less generous in his assessment:

One can hardly escape from the conclusion that a lawyer who has not studied economics and sociology is very apt to become a public enemy.³

100 years later, most fields of law which concern the marketplace have accepted this guidance.⁴ The law of patents, however, largely continues to ignore these admonitions. This is no doubt largely due to the requirement that patent attorneys be educated in the technological arts, which makes attainment of a good business education difficult. However, as economic principles are increasingly utilized in valuing patents, both as damages in litigation and in licensing analysis, practitioners will need to develop increasing awareness of the economics of patents.⁵

With this goal in mind, what follows is a primer on the economics of patents. Initially, the historical development of patents is reviewed to dispel any lingering notions that patents are anything other than instruments of economic growth. Then, the principles of the economic value of patents are explored. These principles are applied to various

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² Holmes, *The Path of the Law*, 10 Harv. L. Rev. 457, 469 (1897).

³ Brandeis, *The Living Law in the Curse of Bigness*, 316, 325 (Frankel ed. 1934).

⁴ In particular, the law of antitrust.

⁵ See e.g. *In re Mahurkar Patent Litigation*, 831 F. Supp. 1354, 28 USPQ2d 1801 (N.D. Ill. 1993) (Judge Easterbrook sitting by designation).

methods used to value patent licenses to demonstrate the inappropriateness of most of these valuation methods. Finally, the curiosity of one of the methods used to calculate damages in patent cases is explored.

THE HISTORY

To fully understand patents from either a legal or a business perspective, it is important to understand the historical development of patent rights. Unlike the sister rights of trademarks and copyrights, which grew out of a "natural rights" philosophy, a review of the historical development of patent rights demonstrates that patents developed as a tool of economic development.

The widespread use of grants of exclusive rights from a governmental entity to encourage inventive activity developed concurrently in several areas of Western Europe at the end of the 16th Century. It is no coincidence that this is the same period when general economic thought was evolving beyond the ethical and philosophical focus of the Scholastic Economic period. Prior to the 17th Century, economic activity in Western Europe primarily consisted of a feudal economy, with the major economic focus on subsistence agriculture. Society was divided into four groups: serfs, landlords, royalty, and the church. The relationship among these groups was dictated less by economic relations than by historic tradition and authority. During this period, what little economic theory that developed did so in the context of the ethical and philosophical thought of the time.

The focus by Scholastic writers such as St. Thomas Aquinas was not on economic growth and development, but rather on providing guidelines to economic relationships based on notions of religious fairness. Aquinas, for example, justified the private ownership of property in view of biblical pronouncements condemning private property.⁶ As the end of the 16th Century approached, the feudal economy was under transformation. Improvements in technology, both in agriculture and in manufacturing, disrupted the division of labor. Mechanical power from water and wind replaced man and animal power. The feudal system gave way to the increasing influence and authority of nation-states.

This changing society gave rise to a new level of economic thought. While economic analysis was not to rise to the level of a profession for many years, merchant businessmen began to express views and urge policies to encourage economic growth. This period,

⁶ See, e.g., Aquinas, *Summa Theologica*, I-II, Q.94, Art.5 (c. 1273).

which was followed in the mid-18th Century by the advent of Classical Economics, is known as the Mercantilism period. An example of an influential Mercantilist is Thomas Mun, a director of the East India Company. Not surprisingly, Mun's writings encouraged importation (to England) of raw materials and exportation of manufactured goods. This resulted in an accumulation of precious metals such as gold and silver in the English economy.⁷

Like Mun's writings, much of the Mercantilist thought was designed to promote the business interests of the merchant businessmen who expressed their views. It is not surprising that the use of governmental grants of exclusivity to encourage economic development arose at a time when merchants were putting forth various economic principles designed to support their self interest. Unlike most Mercantilist thought which has been discredited by modern economics, such as Mun's self serving view on trade,⁸ use of limited grants of exclusivity to encourage economic development remains a viable economic tool.

The purpose of patents is to encourage people to invent by creating a financial incentive for innovation. The potential economic rewards during the period of exclusivity are the carrot that attracts resources into innovation.⁹ While the attraction of individual creativity into innovation is important, the attraction of financial resources to support and commercialize innovation is equally important. This is easy to see if an economy without patents is imagined. Competitors could freely reverse engineer and copy successful innovative products that were developed at substantial cost. Not only would these competitors avoid the research and development costs of the innovator, the competitor could avoid the high risk of new product introduction by "cherry pinching" successful products. Against this backdrop, what firm would expend research funds? Product innovation would evaporate. Society would lose the benefit of new innovative products.

The earliest examples of grants of exclusive rights are seen in the guilds which formed in the Italian city-states of the fifteenth century. Guilds were formed by skilled artisans as a means for its members to

⁷ See, e.g., Mun, *A Discourse of Trade from England unto the East Indies* (1621); Mun, *England's Treasure by Forraign Trade* (1628).

⁸ Mun's view was based on the erroneous assumption that the earth's riches were limited and by importing raw materials and exporting manufactured goods, a nation received a larger proportion of the earth's riches at the expense of other countries. This view has been discredited by modern economic thought, under which trade acts to increase the earth's riches and therefore should be based on comparative advantages different countries have to offer to the benefit of both trading partners.

⁹ See *King Instruments Corp. v. Perego*, 65 F.3d. 941, 36 USPQ2d 1129 (Fed. Cir. 1995).

gain political power. Guilds often negotiated from the city-states the power to control membership and to exclude non-members from their craft. They also regulated disputes between guild members.

This dispute resolution no doubt included claims by guild members that other artisans had misappropriated their designs. These disputes grew into formal rules of the guild which governed member's behavior. For example, an early silk manufacturer's guild in the city state of Genoa adapted a rule granting to members who designed a new pattern the exclusive right to manufacture that pattern.¹⁰ In 1474, the woolen manufacturer's guild in the city state of Florence adopted a similar rule proscribing the taking of a pattern from a member who had designed it.¹¹

As the guild rules grew out of dispute resolution among its members, the exclusive rights granted by these guilds focused on the taking or copying of patterns or designs. This development echoed the development of trademark rights as identifiers of the source of the skilled craftsmen who made the products. Thus, the origin of trademark rights and the prohibition against copying that evolved into copyright protection originated in a natural rights theory of protection.

The next step was to expand these concepts to the use of exclusive rights as an economic tool to encourage technological progress. To a large extent, such a grant of exclusive rights to inventors was a threat to the power and prestige of a guild. If, for example, an invention made existing technology controlled by the guild obsolete, the grant of exclusivity to use the new technology could make the guild obsolete. It was left up to the emerging nation states to recognize the usefulness of such grants of exclusivity to promote economic growth. Thus, the grant of exclusive rights to inventors of new technologies that evolved into patent protection had its origin as a tool for economic development.

This first occurred in 1474, when the city-state of Venice passed a law which broadly granted exclusivity to the inventor of a machine or process.¹² This law was a broadening of an earlier law directed towards silk making. The 1474 law provided for destruction of infringing devices and payment of a fee to the inventor. An example of this law was a twenty-year term of exclusivity granted in 1594 to the inventors

¹⁰ Prager, "The Early Growth and Influence of Intellectual Property." 34 J.P.O.S. 106, 112 (Feb. 1952).

¹¹ *Id.*

¹² *Id.* at 130.

of a “machine for raising water and irrigating land with small expense and great convenience.” The inventor was Galileo.¹³

In England, where the U.S. common law originated, the granting of exclusive rights was a privilege of the crown. The grant of such privileges originally developed as a way to encourage regional economic development. In 1326, King Edward III developed a policy of encouraging the importation of useful arts. The earliest known instance of a royal grant to encourage the importation of a technology was a letter of protection to Flemish weavers in 1331.¹⁴ In 1440 a similar grant was given to the inventor of a process for manufacturing salt.¹⁵ Usually such grants were accompanied by requirements to train apprentices.

Unfortunately, subsequent royalty such as Queen Elizabeth and King James increasingly used the crown’s privilege to grant such exclusive rights to bestow special favors on political friends and relatives, rather than to encourage economic growth. The use of such grants to protect illegitimate monopolies and the resultant artificial inflation of the price of many commodities lead to increasing protest by the crown’s subjects. After several promises to reform the privilege were broken by the crown, the protests led in 1624 to the passage of the Statute of Monopolies.

Better understood as an anti-monopoly statute, the Statute of Monopolies forbade the crown from granting monopolies, with certain exceptions, including the introduction of a new manufacture.¹⁶ After some conflict between the crown and Parliament, the Statute of Monopolies ultimately was successful in curbing abuses, although the grant of an exclusive right to inventors was still subject to the crown’s discretion. English common law subsequent to 1623 developed the concept of a specification that taught the public how to practice the invention and the use of combinations of pre-existing technology to define the novelty of an invention.

In the new world, most of the colonies provided for limited terms of exclusivity to encourage economic development. Like the early use of such grants in England, the early use in the colonies focused on encouragement of importation of useful arts into the developing colonies, although grants to inventors also occurred. Because of the abuses

13 P.J. Federico, “*Origins and Early History of Patents*,” 11 J.P.O.S. 294, 304 (1929).

14 *Id.* at 293.

15 *Id.*

16 21 Jac 1 c3 (1623).

in England, most colonial grants were free of the discretion that had given rise to the Statute of Monopolies.

By the time the familiar language in the United States Constitution was drafted,¹⁷ patents had been used to induce economic growth for centuries. Indeed, in his seminal work on market economics, published at the infancy of the Classical Economic period, Adam Smith discusses the value of patents, not as an argument for the use of patents, but rather in arguing for use of additional exclusive rights by analogizing such rights to patents as an accepted economic tool:

When a company of merchants undertake, at their own risk and expense, to establish a new trade with some remote and barbarous nation, it may not be unreasonable to incorporate them into a joint stock company, and to grant them, in case of their success, a monopoly of trade for a certain number of years. It is the easiest and most natural way in which the state can recompense them for hazarding a dangerous and expensive experiment, of which the public is afterwards to reap the benefit. *A temporary monopoly of this kind may be vindicated upon the same principles upon which a like monopoly of a new machine is granted to the inventor, and that of a new book to its author.*¹⁸

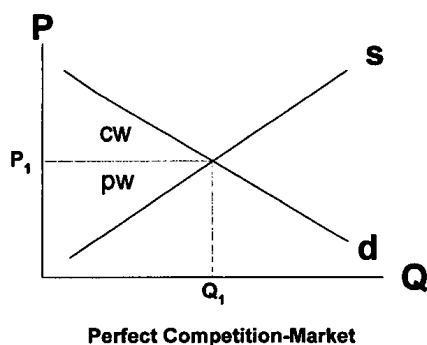
(Emphasis Added). By 1790, when the U.S. Congress implemented the Constitutional grant by passing the first patent act, use of patents to reward innovation and encourage economic growth was well established. By legislative standards, the Patent Act of 1790 has remained remarkably intact for over 200 years.

THE ECONOMICS

To understand the value of the exclusive grant of a patent, it is important to understand the economic effect of a patent in the marketplace. The classic economic marketplace model is the supply and demand curve. With quantity on the horizontal axis and price on the vertical axis, the price and output are set by the intersection of the downwardly sloping demand curve and the upwardly sloping supply curve, as seen below:

¹⁷ “The Congress shall have Power . . . to promote the progress of Science and useful Arts, by securing for limited times to Authors and Inventors the exclusive right to their respective writings and discoveries. . . .” U.S. Constitution, Article I, Clause 8 (1789).

¹⁸ Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Book V, ch. 1, p 712 (1776 Cannan ed.)(Emphasis added).



The upwardly sloping supply curve indicates that as the price of the goods increases, producers will increase output of the goods as more product can be made at a profit. The downwardly sloping demand curve indicates that as the quantity of goods available in the market increases, the price will decrease. This occurs as the increased competition drives prices down. Equilibrium market price and quantity are set by Adam Smith's invisible hand where supply meets demand.

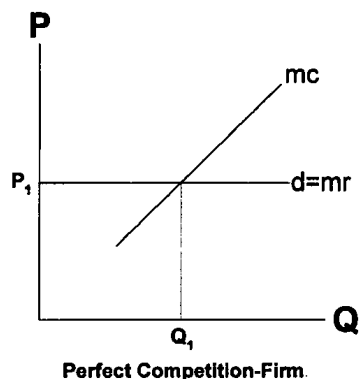
In this classical model, the area above the market price and below the demand curve is the consumer welfare. This area represents the gain to consumers who are willing to pay more than the market price for the goods, but who nevertheless can buy the goods at the lower market price. The area below the market price and above the supply curve is the producer welfare. This area represents the gain to producers who can produce and sell goods at a lower price, but who nevertheless can sell the goods at the higher market price.

One reason the demand curve slopes downward in this classic model is that substitute goods are present which, while not identical, nevertheless compete against the goods. If prices increase, a number of consumers will switch to such substitute goods. For example, if the price of toasted corn flakes increases, some consumers will buy puffed rice instead of paying the higher price. If the price of toasted corn flakes increases enough, almost all consumers will switch to puffed rice. The degree to which consumers are willing to switch to substitute goods is referred to as price elasticity of demand. The more willing consumers are to switch or, correspondingly, the closer the substitute goods, the higher the price elasticity of demand.

This concept plays a key role in assessing the role of an individual firm in a perfectly competitive market. Within a perfectly competitive market, products are perfect substitutes. Thus, the price elasticity of

demand within a perfectly competitive market is infinite. If there are 100 firms producing toasted corn flakes and one firm increases the price, consumers will simply buy the lower priced corn flakes of one of the other 99 producers. This means that an individual firm in a perfectly competitive industry is a price taker. The supply and demand forces on the market as a whole define the price that the firm must accept. At this price, the firm will continue producing so long as the marginal cost, or the additional cost of producing an additional product, is less than the marginal revenue, or the additional revenue received from selling an additional product.

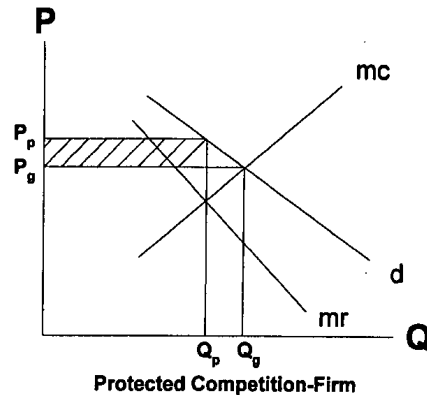
In addition, because the price is set by the market, the marginal revenue to the firm equals the market price. This is seen below:



This makes sense since no firm will produce products when the marginal cost of producing a product exceeds the market price received from the sale of that product. Thus, a profit maximizing firm will produce up to that point where marginal revenue equals marginal costs.

However, a firm with a patented product does not operate in a perfectly competitive market. The patent allows the firm to exclude from the market perfect substitute products. Unlike the firm in the perfectly competitive market seen above, a firm producing a patented product has a downwardly sloping demand curve. The marginal cost of producing a patented product is the same as the marginal cost of producing the product if it was not patented. The marginal revenue curve intersects the price axis at the same point on the demand curve, but slopes downwardly at twice the rate as the demand curve, because to sell an additional patented product at a lower price all the patented

products must be sold at this lower price. Thus, an individual firm selling a patented product enjoys the situation graphed below:



For the same reasons as before, the firm will sell a quantity where marginal revenue equals marginal costs. At this quantity, the demand curve determines the price. This price is seen to be greater than the price the product would be if not patented.

The patent allows the firm to gain an extraordinary profit. If the patent did not exist, competitors could freely copy the product. Perfect substitutes would exist. With no patent, the demand curve and the marginal revenue curve would be horizontal. With no patent, the quantity produced would increase while the price would fall. The ability to charge a higher price results in a transfer of welfare from consumers, who pay the higher price, to the producer, who receives the higher price. This is seen as the difference in area between the price the patented product commands and the lower price an unpatented product would achieve, set by the intersection of the marginal cost curve and the demand curve. This area represents the special or patent profit that accrues to the producer of a patented product.¹⁹

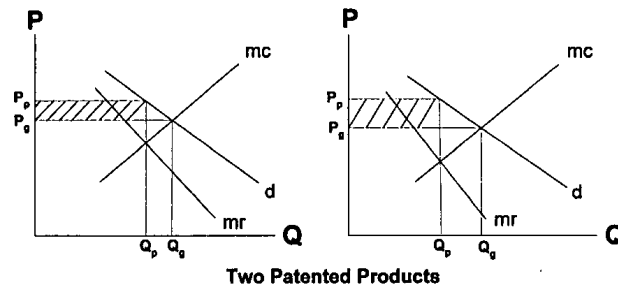
Not all patented products command the same patent profit. The amount of patent profit is defined by how close the noninfringing substitute products are to the patented product. In economic terms, the amount of patent profit is defined by the price elasticity of demand.

¹⁹ This higher price also results in deadweight loss to society represented by the triangle to the right of the patent profit. This area is lost to consumers who cannot afford to pay the higher price but is not gained by the producer because no product is sold to these consumers. This deadweight loss represents the cost to society of a patent system against which must be measured the benefit to society of increased innovation.

The price elasticity of demand for a patented product is defined by several factors, including factors related to the legal, technical and marketing disciplines.²⁰

Initially, the breadth or scope of the patent affects the price elasticity of demand. A broad, pioneer patent has a much greater potential to decrease the price elasticity of demand than a narrow patent. The breadth of the patent is not, however, the sole determinant of price elasticity. The degree to which technologies that do not infringe the patent can perform similarly to the patented technology also effects the price elasticity of demand. Finally, the market demand for the technological improvements will affect the price elasticity of demand. Even if a technologically superior product can be made that a patent broadly protects, if the technological improvement does not meet a market need, the price elasticity of demand is high.

These principles can be seen in the two examples of patented products below. In the first example, the various factors result in high price elasticity of demand. In the second example, these factors result in a low price elasticity of demand. The difference in patent profit can be seen in the different areas representing the patent profit.



In order for sound financial principles to be a basis for valuing a patent, this patent profit must be the foundation of any valuation of patent rights.

FINANCIAL

In the prior section, the appropriate economic foundation for valuing patents was discussed. The appropriate foundation is the special

²⁰ See Schaafsma, *Patent Mapping: A Graphical Model of Patent Rights*, 77 J.P.T.O.S. 953 (December 1995) for a description of a technique useful in managing patents which takes input from these disciplines into account.

or patent profit that a patent owner receives in the market by virtue of the owner's ability to exclude perfect substitute products. In this section, the proper analysis for valuation of this patent profit is discussed, including an analysis for dividing this patent profit in licensing.

Initially, however, the inappropriateness of several valuation methods that are endorsed by many but which do not directly relate to the patent profit is discussed. The first is the so-called industry norm. This analysis seeks to prescribe a standard royalty rate for patents in a given industry as a method of valuing the patent.

The problem with this method is that it does not relate at any level to the degree to which the patent can exclude substitute products and command a patent profit. Not all patents in any given industry bear the same ability to exclude substitutes. When this measure is used, patents that represent a minor but yet profitable ability to exclude substitutes will not be exploited. These patents, when analyzed at a given "industry norm," will not justify payment by any licensee of this industry royalty.

Likewise, the opportunity to license and therefore exploit patents that represent a broad ability to exclude substitutes will be lost because enlightened competitors will outbid for the license by paying higher than the industry royalty. This competitor can afford to do this because the patent profit on those patents will be greater than the patent profit on the average reflected in the industry norm. The industry norm method of valuation results in exploitation of only a narrow band of patents whose value happens to equate with the industry royalty. Opportunities outside this narrow band will therefore be lost.

A second method attempts to prescribe a portion of the total profits that result from commercialization of the patented technology as a method of valuing the patent. A typical "rule of thumb" under this method is for the licensor to command 25% of the profit. While this method attempts to link the value of the patent to the profitability of commercial exploitation, because it does not relate to the value and degree to which the patent can exclude substitute products and therefore command a patent profit, it is little better than the "industry norm."

Even unpatented products that compete against perfect substitutes in a perfectly competitive market are sold at a profit. No profit maximizing firm would continue to produce and sell an unprofitable product. Thus, Adam Smith's invisible hand guides the market price and output to a level at which firms make an appropriate return on their investment of making the goods. The profit made by products which have perfect

substitutes is referred to as the economic profit. The amount of this profit depends on many factors, including the investment required to produce and the risk of selling the unpatented product. Even across different perfectly competitive industries, these factors can result in widely different economic profitability.

Patented products add to this economic profit the patent profit tied into the ability of the patent to further exclude substitutes. As discussed above, the portion of the total profit can vary greatly even within a given industry. Adding these values together, and multiplying by an arbitrary fraction to derive the value of a patent is an exercise in arbitrary business analysis.

Despite the inappropriateness of these methods, they retain widespread endorsement and use. Two reasons account for this. The first is the simplicity of the analysis. It is much easier to apply a canned formula in analyzing whether to license technology than to attempt to establish the value of a unique asset on a case by case basis. However, firms that use simple business analysis that results in poor design making and lost opportunities will not survive.

The second reason for the continued use of these methods is that, for a given business enterprise, use of either method becomes a self-fulfilling prophecy. If a business development professional is supplied with an arbitrary formula to use in analyzing licensing opportunities, it is simple to determine whether the opportunity makes sense. The business development professional will simply pass on those patents that have a value less than this arbitrary formula requires, concluding the opportunity is not profitable. For those patents that have a value that happens to fall into the narrow band defined by the arbitrary formula, the business development professional will conclude licensing is profitable and, if this rate is acceptable to the licensor, a deal will result. For those patents that have a value above the arbitrary formula, the business development professional will enthusiastically embrace a license. If the firm's competitors are equally unenlightened, and a deal is struck, the business development professional will point to the wind-fall profit as a further confirmation of the rule of thumb. If the firm has an enlightened competitor who outbids the firm, the business development professional will scoff at the foolishness of the competitor paying more than the industry norm, while the opportunity is lost.

The enlightened competitor is able to bid more because it understands and has estimated the patent profit for the product. This is done by first modeling the sales volume and price for the new product, an

estimate to be sure, but nevertheless a sound business estimate that should be calculated in any new product introduction. This analysis gives estimates for the volume at which the marginal cost and marginal revenue curves intersect and the price of the goods.

The price model should include an analysis of the price premium the market is willing to pay for the advantages the patent product represents over the closest substitute product. Again, this is an estimate to be sure, but a sound business estimate that should be calculated in any new product introduction. With this information, the number of products sold can be multiplied by this price premium to derive the expected special patent profit. Dividing this number by the estimated number of products sold derives the value of the special patent profit for each product.

Once this number is derived, an apportionment must be negotiated between the licensor, who will not be willing to license the technology unless a fair portion of this special profit is retained, and the licensee, who will not be willing to produce products embodying the technology unless a fair return on the cost and risks of new product introduction is retained. Market conditions will determine this fair apportionment, with factors such as high risk of commercialization, large capital investments to bring the product to market and unique expertise of the licensee arguing for a greater portion going to the licensee, while factors such as low risk of commercialization, small capital investments to bring the product to market, and numerous suitable licensees argue for a greater portion going to the licensor.

THE MEASURE OF DAMAGES

Perhaps the most striking feature of the patent laws when analyzed from an economic perspective is the lack of connection between the economic incentive for which this exclusive right was designed and the measure of damages for infringement of a patent. The courts profess as the goal of damage awards the recovery to the patent holder of what would have been made but for the infringing activity.²¹ However, the standard measures of recovery are not grounded in a solid economic foundation. While economic principles increasingly are being inserted into damage analysis, it is not being done as an integrated attempt to compensate a patent holder for lost patent profits. Rather, it has been inserted as a supplement to the standard damage measures. Additionally, of the three major measures of damages, two allow the infringer

²¹ See *Seymour v. McCormick*, 57 U.S. (16 HOW.) 480 (1853).

to keep a significant portion of the patent profit. What is needed in all damage analysis is an integrated assessment of the economic impact of infringing activity in an attempt to award the patent holder the economic patent profit.

The principal measures of damages for infringement of a patent are reasonable royalty, established royalty and lost profits.²² Because lost profits generally result in the greatest award for damages, patent holders will attempt to prove this measure. In this measure, four factors must be proven under the so-called Panduit test: (1) demand for the patented product; (2) absence of acceptable noninfringing substitutes; (3) capacity to meet the demand; and (4) the amount of profit that would have been made.²³

In applying the Panduit test, courts have applied an inference that the patent holder lost sales equal in quantity to those actually made by the infringer. The courts also have applied a so-called "market share" theory, under which the patent holder recovers lost sales damages based on that portion of the infringer's sales that corresponded to the patent holder's market share.²⁴

Courts have dealt with various problems in applying the Panduit test with a list of factors which effect proof of the four factors. Courts have found causation when the patent holder and the infringer are the "sole competitors in the marketplace,"²⁵ when the patent holder and the infringer bid against each other,²⁶ or when the infringer was a former customer of the patent holder.²⁷

Courts have found causation lacking when the infringer charged a significantly lower price than the patent holder,²⁸ when the infringer

²² While still viewed as relevant evidence in certain circumstances, recovery of an infringer's profits was eliminated as a measure of damages in and of itself with the passage of the 1941 patent statute.

²³ *Panduit Corp. v. Stahl Bros. Fibre Works, Inc.*, 575 F.2d 1152, 197 USPQ 726 (6th Cir. 1978); *Bio-Rad Laboratories, Inc. v. Nicolet Instruments Corp.*, 739 F.2d 604, 222 USPQ 654 (Fed. Cir.), *cert. denied*, 469 U.S. 1038 (1984).

²⁴ *State Industries, Inc. v. Mor-Flo Industries, Inc.* 883 F.2d 1575, 12 USPQ2d 1026 (Fed. Cir. 1989).

²⁵ *Milgo Electronic Corp. v. United Business Communications, Inc.*, 623 F.2d. 645, 206 USPQ 481 (10th Cir.), *cert. denied*, 449 U.S. 1066 (1980).

²⁶ *Manville Sales Corp. v. Paramount Systems Inc.*, 14 USPQ2d 1291 (E.D. Pa. 1989), *aff'd.*, 917 F.2d. 544, 16 USPQ2d 1587 (Fed. Cir. 1990).

²⁷ *Central Soya Co. v. Geo. A. Hormell & Co.*, 723 F.2d. 1573, 220 USPQ 490 (Fed. Cir. 1983).

²⁸ *Smithkline Diagnostics, Inc. v. Helena Laboratories Corp.*, 12 USPQ2d 1375 (E.D. Tex. 1989), *aff'd.*, 926 F.2d. 1161, 7 USPQ2d 1992 (Fed. Cir. 1991).

sold to different markets than the patent holder,²⁹ and when noninfringing substitute products are available.³⁰ In this last category, courts have grappled with where to draw the line on what is and is not an adequate noninfringing substitute. The Federal Circuit attempted to clarify this standard, noting that “to be decreed acceptable, the alleged acceptable noninfringing substitute must not have a disparately higher price than or possess characteristics significantly different from the patented product.”³¹

As much difficulty as courts have had in grappling with proof of causation, it pales in comparison to the problem of where to draw the line on sales in calculating lost profits. When the patent is for an improvement, only covers a portion of the commercial product or does not cover components sold with the patented product, the courts have struggled with what to include or preclude in calculating lost profits. Recently, courts have fared better in recognizing price erosion caused by the presence of the infringing product and compensating the patent holder for this damage.

If proof of lost profits is not sufficient, the patent holder is stuck with the damage measure based on a payment of a royalty. If the patent is subject to a licensing program, this damage is based on the established royalty under that program. If lost profits cannot be proven and the patent is not subject to a licensing program, a so-called reasonable royalty is used. A reasonable royalty is defined as that amount that would have been agreed upon in a hypothetical negotiation between a willing patent owner and a willing potential user as of the date when the infringement began. Because this is based on the assumption that the patent is valid, no discount is given for risk of patent invalidity.

Court decisions applying an established royalty generally seek to determine whether sufficient evidence exists to establish acquiescence to a royalty rate in analogous circumstances. Thus, little economic analysis is used. In seeking to set a reasonable royalty, the courts have inserted economic principles, but again as a supplement to the standard legal analyses rather than as an integrated attempt to compensate a patent holder for lost patent profits. The courts look to several factors in setting a reasonable royalty, including: prior licenses under the pat-

²⁹ *Water Technologies Corp. v. Calco, Ltd.*, 850 F.2d. 665, 7 USPQ2d 1097 (Fed. Cir.), *cert. denied*, 488 U.S. 968 (1988).

³⁰ *Datascope Corp. v. SMEC, Inc.*, 678 F. Supp. 457, 5 USPQ2d 1963 (D.N.J. 1988), *aff'd in part, rev'd in part*, 879 F.2d. 820, 11 USPQ2d 1321 (Fed. Cir. 1989).

³¹ *Kaufman Co. v. Lantech, Inc.*, 926 F.2d. 1136, 1142, 17 USPQ 1828, 1832 (Fed. Cir. 1991).

ent;³² industry custom on comparable licenses;³³ the relationship between the parties and the patent holder's licensing policy;³⁴ the infringer's profits;³⁵ benefits over noninfringing alternatives;³⁶ and any collateral benefits.³⁷

Thus, a strict application of these royalty measures not only allows the infringer to keep its economic profits, but in fact allows the infringer to keep a considerable portion of its patent profits. As discussed above, in negotiating a license to a patent, the patent profits are necessarily split between the licensor and the licensee. The profits either royalty measure allows the infringer to keep include those patent profits the willing potential user would have retained in a negotiation. Thus, the patent holder who cannot prove lost profits often is left with but a portion of the patent profits to which it is entitled, while the infringer is left to count a portion of the patent profits it is allowed to retain. The distaste of allowing the infringer to retain this portion of the patent profit has not been lost on all courts.³⁸

A product sold under the protection of the exclusive grant of a patent enjoys a market in which perfect substitutes should not compete against a patented product without the patent holder's authorization. If an infringing product is sold, a perfect substitute exists. The effect of the existence of this perfect substitute in the marketplace is usually complex. Factors such as the pricing and marketing strategy of the infringer, the pricing and marketing response by the patent holder, and even the reaction of other producers of noninfringing substitutes can have dramatic affect on the new marketplace. Courts have selectively recognized and have developed and applied new legal rules in attempting to address these factors. However, the measure of an infringing

³² *Studiengesellschaft Kohle, GmbH v. Dart Industries, Inc.*, 862 F.2d. 1564, 9 USPQ2d 1273, (Fed. Cir. 1988).

³³ *American Original Corp. v. Jenkins Food Corp.*, 774 F.2d. 459, 227 USPQ 299 (Fed. Cir. 1985). The inappropriateness of industry custom as an economic and financial valuation of a patent is discussed above.

³⁴ *Smithkline Diagnostics, Inc. v. Helena Laboratories Corp.*, 926 F.2d. 1161, 17 USPQ2d 1922 (Fed. Cir. 1991).

³⁵ *Trall v. Marlee Electronics Corp.*, 912 F.2d. 1443, 16 USPQ2d 1059 (Fed. Cir. 1990).

³⁶ *State Industries, Inc. v. Mor-Flo Industries, Inc.*, 883 F.2d. 1573, 12 USPQ2d 1026, (Fed. Cir. 1989).

³⁷ *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d. 895, 229 USPQ 525, (Fed. Cir.) *cert. denied*, 479 U.S. 852 (1986).

³⁸ See *Fromson v. Western Litho Plate & Supply Co.*, 853 F.2d. 1568, 7 USPQ2d 1606 (Fed. Cir. 1988). In fact, many courts, either by discussion or by implication, simply increase the "reasonable royalty" award from a true "willing buyer—willing seller" negotiation to a higher royalty percentage in an attempt to fully compensate the patent holder. While this is a step in the right direction, as set forth below, an integrated economic approach is needed.

product's effect on the market cries out for an integrated market economic analyses in order to attempt to make the patent holder whole. This should be based on an analysis of the market and not a list of factors designed to draw bright line categories.

Even if the patent holder cannot demonstrate its own lost profits from an integrated market economic analysis, a similar analysis should be employed to ascertain the economic patent profits that the market has paid and to compensate the patent holder this amount. This approach would have the advantage of compensating the patent holder for the marketplace's valuation of the exclusive right, would shrink the distinction between the lost profits and reasonable royalty measures of damages, would prevent the infringer from retaining a portion of the patent profit, and would free the courts from artificial measures which attempt to do justice.³⁹ This approach would neither be inconsistent with the statutory directive, which establishes "reasonable royalty" as a *floor* on damages, or case law rejecting the infringer's profits as a measure of damages, because the measure would be the marketplace's valuation of the patent profits, not the infringer's profits.

CONCLUSION

As economic principles are increasingly utilized in the patent field, practitioners have a responsibility to understand the economics of patents. This responsibility not only includes understanding damage calculations in litigation, but also the use of proper valuation methods in other areas as well. In addition, practitioners should recognize and speak out against improper valuation methods, whether in damage calculation in litigation or in valuing patents for license.

³⁹ Of course, the courts would still be free to award increased damages under 35 USC § 284 based on the same factors currently applied.