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Patent Enforcement in an Uncertain World: Widespread Infringement and the Paradox of Value for Patented Technologies

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I. Introduction

The marketplace for intellectual property (IP) is one of the more complicated settings for understanding price formation. One reason for that complexity is that IP represents property rights that may or may not be perfected, at least not initially, since upon issuance the reach of a patent, and its very validity, can be challenged. Indeed, if a patent is expected to have significant value, then such challenges are almost inevitable. The extent of the property rights, and the existence of *any* rights, bestowed by the issuance of a patent is thus unclear;⁴ an understanding of what constitutes infringement, for example, depends both on the specific claims of the patents (and how those claims will be interpreted by the courts) and on the specific nature of the products or technologies being accused of infringement. The fuzzy boundaries of IP rights, therefore, become sharpened or clarified only as litigation and/or licensing activities build a legal and market-based picture of those boundaries.

These fuzzy boundaries, along with high litigation costs, often render patent licensing agreements inherently difficult to write, monitor, and enforce. They also often cause royalty rates for the same technology to vary not only with demand and the individual characteristics of the negotiating parties, but also with the extent to which the IP's boundaries have been clarified at the time the license is negotiated. Consequently, when IP is licensed, or when IP damages must be calculated, the courts or the licensing parties often must develop benchmarks from which to determine appropriate reasonable royalty rates that reflect both the inherent fuzziness of the boundaries of IP rights and the evolving nature of these rights (and their value) over time.

Negotiating over patent value is complicated further by the ability of potential licensees to use patented technologies without a license. Unlike holders of tangible assets who can generally refuse to deliver them unless and until the customer pays, patent holders generally cannot prevent, up front, others from using their patented technologies but instead generally have to rely on costly and risky litigation to enforce their rights. An issued patent is published and therefore the information in the patent is public, and trespassing may be relatively easy, at least in the first instance.⁵ When faced with alleged infringement, the patent owner must go to court and seek an injunction and/or monetary damages in order to protect his or her patent rights. This particular feature of IP (especially when combined with the inherent fuzzy nature of IP rights) means that patent holders sometimes receive less value in their technology licenses than would be expected, particularly if those licenses are negotiated in the early days of their licensing program, or if they have limited enforcement resources, or if the number of infringers is large (i.e., when there is widespread infringement). The latter is the focus of this paper. Such widespread infringement can lead to a value paradox where widespread adoption of a patented technology before a successful licensing program is implemented can – due to transactions costs and litigation-related risks – lead to lower, not higher license rates. The corollary is that reasonable royalties for

⁴ See, e.g., Mark A. Lemley and Carl Shapiro, “Probabilistic Patents,” *Journal of Economic Perspectives*, Vol. 19 (2005), p. 75.

⁵ In fact, parties at substantial risk of such trespass (e.g., firms that make products that are likely to use others' patented technologies) often have explicit policies to avoid any review of issued patents or pending patent applications, so as to mitigate the risk of so-called “wilful infringement,” which can lead to enhanced damages.

patent damages purposes may, in some circumstances, be considerably higher than observed royalty rates.

The trespassing/infringement concerns that arise in the context of widespread infringement raise interesting transactions cost issues, although the transactions cost at issue are perhaps somewhat more Coaseian than Williamsonian. While the early Williamson framework (e.g., Williamson 1975⁶) stressed the costs of negotiating, writing, and enforcing contracts, the costs emphasized in Williamson's subsequent work (e.g., Williamson 1985⁷) are primarily those associated with contractual holdups and re-contracting, not those associated with entering into contracts in the first place. In the context of IP, both costs exist, but the latter can sometimes be more important than the former. IP owners may have to bring the potential licensees to the courthouse in order to get them to agree to a contract. However, once they have succeeded against one infringer, a substantial part of the battle is over, as any subsequent infringement will generally be easier to enforce since some of the IP issues have been at least temporarily resolved.⁸

Thus, in order to begin developing a base of paying licensees in the context of widespread infringement, IP owners must sometimes significantly discount licensing terms in their early negotiations – with a view that successful licenses, even at a relatively low price, will deliver value by buttressing the credibility of the IP, provide a source of cash to fund subsequent enforcement actions, and (perhaps) clarify the boundaries of the IP rights. Fuzzy IP rights and contracting difficulties pose interesting licensing and damages issues in the context of widespread infringement, as we explain below.

II. Defining Transactions Costs

Transactions costs, according to Williamson, “are the economic equivalent of frictions in physical systems.”⁹ Their neglect, Williamson reminds us, impairs our understanding of nonstandard modes of contracting; we might add that it can also impair pricing in market economies.

Important distinctions can be made between various types of transactions costs. Williamson distinguishes between two, interdependent, types: ex ante and ex post. Ex ante costs are “the costs of drafting, negotiating, and safeguarding an agreement.”¹⁰ As discussed below, these might include costs incurred in aligning the buyer and the seller so that they actually perceive the need for a transaction in the first instance, a step that is taken for granted in Williamson's definition but is by no means assured in the patent context, where the parties

⁶ Oliver E. Williamson, Markets and Hierarchies: Analysis and Antitrust Implications, 1975, New York: The Free Press.

⁷ Oliver E. Williamson, The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, 1985, New York: The Free Press.

⁸ After a patent license is agreed by the parties, the licensee will sometimes subsequently seek to invent around the patent, and in some cases will be sued subsequently by the patent-holder if there is a question as to whether the invent-around effort was successful. Moreover, Licensees can also sometimes challenge patent validity and infringement even after having taken a license. Thus, even with an initial license in place, which may have helped sharpen the boundaries of the fuzzy IP rights, those boundaries can be rendered fuzzy again by subsequent developments.

⁹ Williamson (1985), p. 19.

¹⁰ Williamson (1985), p. 20.

may legitimately disagree as to the patent's scope and validity. Ex post costs¹¹ take several forms including mal-adaptation costs (where the contract drifts out of alignment), haggling costs (incurred associated with trying to correct ex post misalignment), the costs of governance, and possibly even bonding costs. Re-contracting hazards and costs, which receive much attention in Williamson's work, are ex post transactions costs.

Ex ante transaction costs, while receiving less attention in Williamson's transactions cost economics framework, are nevertheless the focus of much of the finance literature, and sometimes in economics (e.g., the Austrian School perspective which focuses on the discovery of prices). The field of IP, however, has paid relatively little attention to transactions costs of either type, beyond some attention to issues of "holdup".

In this paper we explore the IP transactions costs associated with alignment and negotiations as patent licensing programs are begun in circumstances of widespread infringement. In such circumstances there is often an associated reluctance for firms to pay for their use of others' patented technology if they see that their rivals are not paying; a firm that pays puts itself at a competitive disadvantage relative to one that is not paying. If so, then the only method of effective discipline for infringement may be through use of the judicial system. Where infringement is understood to be widespread, infringers may understand that the patent owner's costs and risks will be higher, and therefore that the likelihood of successful enforcement will be lower. This raises significant issues with respect to calculating reasonable royalty damages in some circumstances. These issues are explored below.

III. Legal Context for Calculating Reasonable Royalty Damages

A. Hypothetical Negotiation

United States patent law provides for damages "adequate to compensate for the infringement but in no event less than a reasonable royalty..."¹² There are fifteen well-established factors, delineated in the *Georgia-Pacific* case,¹³ that are traditionally considered in efforts to estimate a "reasonable royalty" for allegedly infringing products.

The fifteenth factor is the most general, and is typically the most significant from an economics perspective. This factor describes a hypothetical negotiation between the patent holder (the potential licensor) and the alleged infringer (the potential licensee). This hypothetical negotiation is typically assumed to take place under certain assumptions:

- The parties are "prudent" entities seeking to negotiate a mutually-acceptable licensing rate and are not under compulsion to reach an agreement;¹⁴
- The hypothetical negotiation occurs on or around the date of first infringement;

¹¹ Williamson (1985), p. 21.

¹² 35 U.S.C. § 284.

¹³ *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D. N.Y.1970).

¹⁴ In other words, the "willing licensee" concept rests on the licensee's willingness and/or ability to walk away from the business, or to substitute some non-infringing alternative (if in fact one is available), should negotiations fail and the patent holder enforce the patent. Similarly, the "willing licensor" concept rests on the licensor's willingness to deny the license – *i.e.* there is no compulsory license and the patent holder can preclude the prospective licensee from using the patented technology if the proposed license terms are not acceptable.

- The patent is known by both parties to be valid, infringed, and enforceable; and
- Both parties know all information that might be relevant to the outcome of the negotiation.¹⁵

These last two assumptions clearly distinguish the hypothetical negotiation from actual negotiations between a potential licensor and a potential licensee. In real-world negotiations, both parties have imperfect information about many relevant factors, including issues related to validity and infringement, which can have substantial effects on expected outcomes.

B. Hypothetical License Structure

Patent licenses can be structured in many ways. Some involve only a single patent, while others involve a portfolio of patents. Some licenses run for a limited term, others for the life of the patents involved. Some are fully-paid-up lump-sum licenses; others call for a running royalty on sales; still others call for both an up-front fee and a running royalty.

Given the myriad ways that a license *could* be structured, when analyzing the hypothetical negotiation it is often instructive to examine the ways that licenses in an industry are in fact structured. Often, the structure of a license is designed to balance the risks between the parties and to provide economic incentives for the parties to adhere to both the letter and the spirit of the agreement. Based on our experience in reviewing myriad licenses in various contexts, it is common for licenses to provide for an up-front fee, a running royalty rate, and some observable metric (e.g., sales volume) that allows the parties to monitor the degree to which the licensee is using the patented technology.¹⁶

There are sound economic reasons why parties often use these types of provisions. For example, an up-front fee provides the licensor with an initial infusion of cash, and ensures that it will receive some return for granting the licensee the option to use its patents even if sales by the licensee do not materialize. A running royalty, on the other hand, shares both downside risk and upside potential between licensor and the licensee. If sales of products that make use of the IP are lower than expected, the licensee will earn lower profits from that IP than expected, but likewise will pay lower total royalties. Conversely, if such sales are higher than expected, the licensee will earn higher profits, and the licensor will benefit in the form of higher total royalties.

1. Royalty Rate and Base

The issue of the choice of an observable metric to govern the total royalties to be paid is somewhat more complex. In order to reduce disputes and economize on transaction costs, the parties to licensing agreements frequently negotiate provisions calling for royalties on all of specified types of the licensee's product offerings, even when both parties acknowledge

¹⁵ As stated in *Georgia-Pacific*: "It does contemplate a marshaling of all of the pertinent facts which, like cards dealt face up, are for all to see. And it then contemplates the supposititious meaning of buyer and seller, who are able, on the basis of the over-all round-up of information, to become 'willing' buyers and sellers, at a royalty which will enable the buyer to make and sell at a reasonable profit." *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1122 (S.D.N.Y. 1970). The "marshaling of all of the pertinent facts" is generally assumed to include the consideration of various alternatives available to the alleged infringer.

¹⁶ That metric can be direct (e.g., if the parties agree that particular sales use the patented technology) or indirect (e.g., if the parties agree that some observable and measurable characteristic will serve as a proxy for a more-difficult-to-measure aspect).

that some of those offerings may not infringe, either because they do not use the teachings of the licensed IP, or because they are manufactured, used, and sold in jurisdictions outside the reach of the IP. Such terms are adopted because it is often difficult and costly to track the particular characteristics of each individual product offerings to determine whether it infringes patents in the portfolio.¹⁷ In short, the transactions costs of sorting the subset of explicitly infringing sales from a broader set of products may be difficult, controversial, and expensive – leading both licensor and licensee to prefer a royalty based on a simple and readily observable metric (e.g., total sales of a product category), where the royalty rate is adjusted to reflect the agreed royalty base.

From an economic perspective, selecting a readily observable metric for the royalty base is likely to increase the efficiency of the transaction for both parties. Setting aside risk-sharing considerations, the parties will generally be expected to be indifferent between (a) a higher rate calculated on a narrower base, and (b) a lower rate calculated on a broader base, so long as each yields approximately the same payment. Further, if there were costs and complexities associated with identifying, monitoring and reporting infringing products/services, then both parties would be expected to prefer the latter structure, so as to avoid those costs.

2. Portfolio Licenses

Companies that are successful technologically often accumulate large portfolios of patents in a particular technological domain; such portfolios are common, for example, in electronics and telecommunications. Patent portfolios present a number of special issues and challenges for license structure which, for transactions cost and other reasons, lead to licenses being granted on a “portfolio” basis.

In order to understand why certain companies often use portfolio licenses, it is worth discussing certain features of patent enforcement.¹⁸ First, patent litigation is costly and complex, frequently costing each party millions of dollars.¹⁹ Second, the complexity of patent litigation (especially with respect to issues of validity and infringement) tends to increase with the number of patents asserted and with the number of accused products. Third, licensing (in the electronics and communications industries, for example) often involves (i) a large number of patents, (ii) a large number of products or services on which the patents might read, and (iii) ongoing and rapid turnover in patents and products. In these circumstances, it is generally not practical to try to negotiate licenses on a product-by-product (or service-by-service), patent-by-patent, country-by-country basis, as the transactions costs would be prohibitive. Thus, licensees often want the so-called “design freedom” that comes with a broad portfolio-wide license.

¹⁷ This is a particular problem when the patent is infringed only under specific types of use after sale.

¹⁸ See, e.g., Peter Grindley and David J. Teece, “Managing Intellectual Capital: Licensing and Cross-Licensing in Semiconductors and Electronics,” *California Management Review*, Vol. 39 No. 2 (1997), pp. 1-34.

¹⁹ For example, the 2013 AIPLA Economic Survey reports median litigation costs of \$3.25 million per party through the end of discovery and all-inclusive costs of \$6 million per party, for cases with more than \$25 million at stake. AIPLA, Report of the Economic Survey, 2013, p. 34, available at http://library.constantcontact.com/download/get/file/1109295819134-177/AIPLA+2013+Survey_Press_Summary+pages.pdf.

As a result, license negotiations outside litigation tend to focus on a “proud list” of patents, although licensees typically wish to extend the license to all potentially relevant patents in the licensor’s portfolio and all of the licensee’s potentially relevant products (or, at least, all those in a given category or field of use). Similarly, patent holders generally tend to not bring suit over every patent that they might assert against the defendant, but rather choose to sue over a relatively small group of patents (a “proud list”) that have the greatest likelihood of being seen as (i) valid, (ii) infringed by a significant portion of the prospective licensee’s product and service offerings, and (iii) valuable (i.e., contribute significant additional profit to the sales of those products).

Different patents in patent portfolios generally expire at different times. Despite this, it is common practice in many industries for a patent license to extend to, and for the licensee to pay royalties based on, the expiration of the last-to-expire of the patents in the licensed portfolio. Moreover, it is common practice in many industries for the licensee to agree to pay the same royalty rate for the entire life of the license, even though both parties know that some of the licensor’s patents will expire prior to the end of the license term.

Similarly, parties often expect that the licensor will continue to develop new patents that should be included in any spanning portfolio license – and, indeed, that such patents may already be pending but not yet issued; thus it is common practice in many industries for agreements to allow the licensed portfolio to expand over time. Again, it is common practice for the licensee to agree to pay the same royalty rate for the entire life of the license, even though both parties expect that new patents will enter the portfolio over time.

C. Best Available Non-Infringing Alternative

An important factor driving the analysis of a reasonable royalty is the determination of the best commercially viable non-infringing alternative, and of the costs associated with that alternative, at the time of the hypothetical negotiation. That determination typically raises technical, legal, and economic questions that are generally tied both to the date of the hypothetical negotiation and to the understanding of the parties at that time.

In analyzing those questions, one typically assumes that any viable non-infringing alternative must avoid infringement not only of the patents at issue in the damages analysis, but also all of other non-asserted patents, held by the patent holder or another party. One adopts this broader framework so to avoid allowing the alleged infringer to force patent holders to engage in a “daisy chain” of litigation, moving from one approach to the next, each of which is covered by different patents, and thereby imposing upon the patent holder the cost and delay of serial litigation. This same logic suggests that any viable non-infringing alternative should also consider the cost of licensing – or avoid infringing – any other existing non-asserted patents (whether held by the plaintiff or by third parties). In other words, the defendant should not be able to avoid the “frying pan” (i.e., infringement of the asserted patents) by “jumping into the fire” (i.e., infringement of other non-asserted patents).²⁰

It is not uncommon to find that defendants have been aware of, and have been using, the technology embodied in the asserted patents for quite some time. In those cases the

²⁰ Analysis of such is complicated by the legal structure of the Hypothetical Negotiation under the *Georgia-Pacific* framework. Under that framework the patents at issue are assumed to be valid, infringed, and enforceable. Other patents, however, are not subject to the same assumption. The appropriate treatment of such alternatives will thus depend on the facts and circumstances of the case.

defendant has effectively taken for itself the non-exclusive “right” to the patented technology, subject to the possibility of having to subsequently pay damages if and when it is found to infringe. An interesting question that often arises in the context of patent damages is what reasonable economic inferences can be drawn from this fact pattern – i.e., that a defendant has chosen to use the patented technology instead of some available non-infringing alternative technology.

From an economic perspective, if there were a commercially-viable, non-infringing alternative to the patented technology, available at a lower net cost than the expected cost of infringement damages and/or of a license to the patented technology, one might expect that it would be in the defendant’s economic interest to adopt that alternative, rather than to incur those expected costs.²¹ The fact that a defendant did not do so is, therefore, consistent with the view that the costs of the available alternatives were greater than the expected cost of infringement damages.

That expected cost of infringement damages, however, is not simply based on the proffered royalty rate, but rather will be discounted by the potential licensor to account for the possibility that the patent(s) are invalid or non-infringed. If the defendant has decided to run the litigation risk that it will be found to have infringed valid patents, despite the ability to switch to a known non-infringing alternative, one might infer that the defendant has attached a probability to the patents in suit being found valid and infringed that was sufficiently low that the net expected cost of infringement was lower than the net known cost of taking a license or of moving to the alternative.

Another possibility is that the defendant (recognizing that discovery of relevant knowledge can be costly) may simply be ignorant of the nature and extent of its (alleged) infringement of the patented technology and/or potentially commercially viable non-infringing alternatives. In such circumstances it may be that no reasonable inference can be drawn from the mere fact that the defendant has not adopted a non-infringing alternative. These alternate possibilities imply that caution, and a careful study of the specific facts and circumstances of the matter at hand, are necessary before inferences can sensibly be drawn.

D. Expected Outcome of the Hypothetical Negotiation

There are several factors that would typically affect the outcome of a hypothetical negotiation between a willing buyer and a willing seller, including:

- The relative negotiating skills of the parties,
- The anticipated profits that would be lost by a practicing inventor should it license a competitor, compared to the royalties earned,
- The anticipated profits earned by the licensee,

²¹ Here “net cost” refers to the net effect on the defendant’s profit of moving to that alternative. An alternative technology might be, for example, cheaper to license than the patented technology, but force performance limitations that would create commercial risks (e.g., in the form of adverse effects on customer satisfaction), or would reduce the products’ selling price and thus its profit margin by an amount greater than the incremental cost of a license to the patented technology. There also may be costs (e.g., redesign costs) associated with switching to an alternative. In that case, the defendant would view the net cost of the alternative as higher than that of the patented alternative, even though its gross cost is lower.

- The profitability and commercial acceptance of the products made using the patented technology, and
- The market potential.²²

The above concepts implicitly accept that the value of IP is context dependent and that patents (and other IP) are not commodities that are priced in highly liquid markets. One common analytical approach to assessing the expected outcome of negotiations in such circumstances is to construct a so-called “bargaining range.”

The top of the bargaining range is defined by the licensee’s maximum willingness-to-pay for the right to use the patented technology, which is determined by the licensee’s expectation of the economic value that it would gain from the license. For a patent or patent portfolio which allows licensees to reduce costs, for example, that value would be expected to reflect the expected cost savings conferred by use of the patented technology. From an economic standpoint, therefore, one should look at the overall value to the licensee of using the patented technology compared to the next-best available non-infringing alternative i.e., the difference between (a) the expected profits that the licensee would have earned by using the patented technology, and (b) the expected profits that the licensee would have earned if it did not use the patented technology. This difference in expected profits reflects the licensee’s maximum willingness-to-pay for access to the patented technology.

The bottom of the bargaining range is defined by the licensor’s minimum willingness-to-accept in exchange for granting a license. Where the patent holder is not seeking lost profits, the licensor’s minimum-willingness-to accept will generally be determined not only by the direct costs of granting the license, but also by the potential impact of licensing at a low rate on future negotiations (and/or on previously negotiated licenses).²³ The direct cost, while perhaps non-trivial in some instances, will often be relatively small compared to the potential impact on past and future negotiations, especially in the context of widespread infringement.

Where a patent holder is attempting to license its patents widely, and has perhaps licensed its patents to a significant number of firms, it would be expected to be not only concerned about the economics of a single license, but rather about the economics and strategic dynamics of an overall licensing program. If the patent holder were to grant a license to a prospective licensee at a relatively low rate, and if future potential licensees became aware of that rate, then they might attempt to attain that same rate (or even a lower rate) for their own license. Such knowledge by potential licensees is often present in the actual world, and thus presumably would also be a relevant consideration in the hypothetical negotiation (at least when using actual license rates to inform the outcome of the hypothetical negotiation), and would present a significant deterrent to agreeing to a relatively low rate. Similarly, if the holder were to grant a new licensee a license at rates that were lower than the rates that it

²² *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970).

²³ Some have argued that, in situations in which the patent holder does not itself practice the patented invention and thus must rely on licensing others in order to obtain income, the patent holder’s minimum willingness-to-accept is likely to be very low, on the grounds that, if it does not license its patent, it receives no income. From an economic perspective, that argument is often invalid, because if the patent holder allows one firm to use its patents in exchange for a very low royalty, that may not only cut into its royalty income from other licensees (who may, in some instances, lose sales to the low-rate licensee and thus may pay lower total royalties than they would otherwise pay), but it may also adversely affect the royalty rates that the patent holder may be able to charge its other licensees.

was charging earlier licensees, and if the earlier licensees became aware of that fact, it is likely that those earlier licensees would object to a later licensee receiving more favorable terms (especially if their licenses had “most favored licensee” provisions) and attempt to renegotiate their own rates downward in the light of that new information.

In assessing the expected outcome of the hypothetical negotiation under a bargaining range approach, there are a number of factors which are generally considered (e.g., relative discount rates of the parties). One consideration that is often relevant is that in order to exploit an innovation commercially, it is often necessary to use a range of “complementary assets” and capabilities in conjunction with the innovation.²⁴ Those may include entrepreneurial risk-taking, financial backing, design and manufacturing capabilities, wholesale distribution facilities, advertising and marketing skills, retail distribution networks, etc. In this context, the economic rents from collaborative to commercialize innovations tend to flow disproportionately to those who control scarce resources, or what may be termed the bottleneck asset(s).

IV. Interpreting Actual Royalty Rates in the Context of Widespread Infringement

A. Introduction

Where there is widespread infringement, the transactions cost associated with litigation may be such that infringers believe they can attach a relatively low expected cost to infringement, and thus be willing to pay only a correspondingly low price for a license. Because infringers know there are many other infringers, they may believe that the probability they will get sued first (or at all) is low; and they may also believe that there is a good possibility that the licensing program and associated enforcement of the patent owner’s IP rights will not get off the ground because the patent owner may not be able to raise the resources to litigate, or wish to suffer the distraction from business that litigation so often entails. This suggests a potentially serious transactions cost problem, akin to that Ronald Coase recognized in “The Problem of Social Cost.”²⁵ Here the Coaseian transactions costs are not only the litigation costs associated with bringing suit and proving validity and infringement, but also the costs of communicating litigation risks effectively to defendants. This involves signaling not only a good chance of validity, infringement, and enforcement, but also a good chance of being awarded substantial money damages.

Moreover, in the context of patent infringement litigation and the assessment of reasonable royalty damages, this phenomenon creates an interesting set of questions with respect to the weight that should be given to the royalty terms in actual licenses (or the rates offered in actual term sheets), when determining a “reasonable royalty” for proven-valid-and-infringed patents. As we explain below, there are reasons why actual (unadjusted) license rates may provide only limited guidance with respect to the likely royalty rate outcome of the hypothetical negotiation. Specifically, we outline two factors that can sometimes cause

²⁴ See, e.g., David J. Teece, “Profiting from Technological Innovation: Implications for integration, collaboration, licensing and public policy,” *Research Policy*, 1986, Vol. 15, No. 6, pp. 285-305; and David J. Teece, *Managing Intellectual Capital*, 2000, Oxford University Press.

²⁵ Ronald H. Coase, “The Problem of Social Cost,” *Journal of Law and Economics*, 1960, pp. 5-6. See also Ronald H. Coase, “The Nature of the Firm,” *Economica*, 1937, pp. 386-405

actual rates in the marketplace, in the context of widespread infringement, to understate the rates that would result from the hypothetical negotiation:²⁶

- The impact of uncertainty about validity, infringement, and enforcement on actual license rates; and
- The impact of widespread infringement on actual license rates.

B. Impact of Uncertainty about Validity, Infringement, and Enforcement on Actual License Rates

In real-world licensing negotiations the licensor and licensee are likely to be uncertain and to disagree about (a) whether the licensor's patents are valid; (b) whether the licensee's products infringe those patents; and (c) whether the licensor can enforce those patents against the licensee. Actual negotiated rates would therefore generally be expected to reflect a discount to deal with that uncertainty and/or disagreement about these issues. In the hypothetical negotiation, however, that uncertainty and disagreement has been eliminated by construction. Consequently, real world license rates should typically be adjusted in some fashion in order to eliminate that likely discount before using them as a metric for estimating rates that would be agreed in the hypothetical negotiation, in which (by construction) such uncertainty is not present. Thus, the appropriate reasonable royalty for the purposes of assessing damages for past patent infringement can sometimes be significantly higher than typical actual negotiated royalty rates for the same patent.²⁷

By way of illustration, suppose that the parties agreed that an appropriate reasonable royalty rate for a known-valid-and-infringed patent would be 20%, but they also agreed that there was only a 60% chance that, if challenged, the patent would be found valid, infringed, and enforceable against the infringer in question). In such a situation, a reasonable compromise license for an "untested" patent might be a royalty rate of 12%, reflecting the 60% chance that the patent would be found valid-and-infringed (and thus worth a 20% royalty) and the 40% chance that the patent would be found invalid, not infringed, and/or unenforceable (and thus worth nothing in the situation at hand).

As a result, in order to determine a reasonable royalty in such circumstances, one should generally make what might be termed a "certainty adjustment" to reflect the fact that, when calculating patent infringement damages, one is supposed to assume that the patent is known to be valid, infringed, and enforceable. Otherwise, the infringer is allowed to play something akin to a "heads I win, tails I break even" game. If the patent holder is unable to prove validity or infringement, the infringer does not have to pay anything (the "heads I win" side of the coin). If, following a finding that the patent is valid and infringed, the infringer is merely required to pay what everyone else agreed before that finding was made, then the infringer faces no downside risk; he pays only what he would have had to pay anyway (the

²⁶ This logic does not imply that reasonable royalties are always necessarily larger than actual negotiated royalty rates. In some circumstances, actual negotiated royalty rates can be a good estimate of the rates that would have been agreed to in the hypothetical negotiation.

²⁷ This logic is laid out in Stephen H. Kalos and Jonathan D. Putnam, "On the Incomparability of 'Comparables': An Economic Interpretation of 'Infringer's Royalties,'" *Journal of Proprietary Rights*, April 1997, Vol. 9 No. 4, pp. 2-5; and Edward Sherry and David J. Teece, "Royalties, evolving patent rights, and the value of innovation," *Research Policy*, 2004, Vol. 33, No. 2, pp. 179-191.

“tails I break even” side of the coin). Among other things, under these circumstances, the infringer has little incentive to negotiate a license absent litigation to force him to do so.²⁸

As a practical matter, since one can directly observe only actual negotiated royalty rates, the empirical task is often to gain insight into the appropriate reasonable royalty by estimating how significant that “certainty adjustment” might be, and adjusting actual rates upward to reflect that adjustment. It is worth noting that this logic does not impose a “penalty” on the infringer for exercising its legal right to compel the owner of the intellectual property to prove validity and infringement. Rather, it simply causes the infringer to pay an appropriate rate once that uncertainty has been resolved and the fuzzy boundaries of the patent(s) in question have been clarified.

The probability of success by the patent holder in any particular litigation is clearly a function of the specific circumstances of that litigation; accordingly, the appropriate uncertainty adjustment for that litigation is also idiosyncratic. Drawing on their own study of win rates in patent litigation and other similar studies, Sherry and Teece (2004) have argued elsewhere that such data suggest that it may be reasonable to infer that an appropriate reasonable royalty for a known-valid-and-infringed patent would on average be roughly twice that one would expect to see actually agreed to for “untested” patents, assuming an average degree of uncertainty about validity, infringement, and enforcement.²⁹

C. Impact of Widespread Infringement on Actual License Rates

Any given patent may be infringed by relatively few products and parties – where, for example, a relatively small range of infringing products is made by only a few manufacturers. Other patents may be infringed by many parties, over a wide range of products. From an economic perspective, the latter case – referred to here as “widespread infringement” – has potentially important implications for the interpretation of actual license rates.

First, widespread infringement might reflect above-average doubt about validity and infringement. If so, as a conceptual matter, the certainty adjustment logic discussed in the preceding section suggests that actual rates should be adjusted, all else equal, by a larger factor to account for the assumption in the hypothetical negotiation that the patents in suit are valid, infringed, and enforceable. Put somewhat differently, widespread infringement can amplify “baseline” uncertainty, creating what is akin to a “reverse bandwagon” effect. There are a number of ways in which this reverse bandwagon effect might operate.

The first way relates to beliefs and how they are formed. Given the choice between licensing the patented technology or risking infringement, a potential licensee may draw inference from the behavior of other firms. Indeed, observation of widespread infringement might lead a potential licensee to adopt a strong belief, based on others’ observed behavior, that the patent is invalid or non-infringed or not enforceable. (Conversely, if firms observe that many other firms have taken licenses, they may be more likely to infer that the patent is

²⁸ The incentive to avoid litigation costs, a form of transactions costs which can be nontrivial, does provide some incentive to negotiate a license without actual litigation.

²⁹ Edward Sherry and David J. Teece “Royalties, evolving patent rights, and the value of innovation,” *Research Policy*, 2004, Vol. 33, No. 2, pp. 179-191. See also Jean O. Lanjouw and Mark Schankerman, “Protecting Intellectual Property Rights: Are Small Firms Handicapped?” *Journal of Law and Economics*, 2004, pp. 1-5.

valid, infringed, and enforceable.³⁰) Similarly, those who choose to pay to take a license may be willing to pay less as a consequence of the observed widespread infringement. This could occur even absent any direct competitive pressure - e.g., the inference may be drawn even where each potential licensee operates only in a distinct geographic market. Thus, all else equal, a pattern of widespread infringement is consistent with a situation in which there is significant (and above-average) uncertainty in the marketplace regarding validity, infringement, and enforceability.

The second way in which a reverse bandwagon effect might operate relates to competitive pressure. Firms do not generally want to be at a competitive disadvantage relative to their rivals. If a firm is asked to pay royalties, and it observes that many other firms are not paying, it has to be concerned that it will be at a competitive disadvantage relative to those other firms if it agrees to pay. This will in turn reduce the firm's willingness to pay royalties, and thus will tend to reduce the rates that *are* agreed to in those licenses that *are* entered into.³¹

The third way in which a reverse bandwagon effect may operate relates to the fact that when there are many infringers, each infringer may believe that there is a perceived "safety in numbers," as each infringer may believe that the chance of it being pursued is low. This is particularly true if the patent owner is not a large corporation with perceived easy access to enforcement resources. Patent rights are not "self-enforcing" – in order to get compensated for any alleged patent infringement, the patent holder may have to sue the alleged infringer i.e., the patent holder can withhold its permission to use the technology, but it cannot "refuse to supply" the technology in the same way that suppliers of tangible goods can. Such litigation is both costly³² and time-consuming.³³ Consequently, all else equal, this dynamic will tend to lower the royalty rates as the owner of the patented technology has a harder job getting his or her licensing program established.

The greater the degree of infringement, the greater the prospect that the rates in actual licenses have been depressed as a result of these considerations. We would therefore expect to see that, in general, royalties negotiated in a marketplace characterized by widespread infringement will be lower than those that would be negotiated in circumstances where infringement was less common. However, while one can be confident of the directional

³⁰ The caveat here is that patent holders may license at sufficiently low royalty rates that others take licenses, not so much because they believe the patents (if challenged) would likely be found valid and infringed, but to avoid the cost of litigation.

³¹ Note that this same logic does not necessarily hold for the license under discussion in the Hypothetical Negotiation. It may well be that at the time of that Negotiation the Defendant's competitors were also infringing the patent at issue, and therefore that for the Defendant to pay an otherwise reasonable royalty would put it at a significant cost disadvantage compared to those competitors. One might argue that that cost disadvantage should be taken into account in the Hypothetical Negotiation. That argument is problematic from an economic perspective – in the Hypothetical Negotiation the patent at issue is known to be valid and has been used without the necessary legal rights; that others are also using the same patent in the same unlicensed way should not, in general, be used as a lever to discount the value of the patent.

³² See, e.g., Suzanne Scotchmer, *Innovation and Incentives*, 2000, *MIT Press*, p. 200.

³³ The fact that patent rights are time-limited (due to statute of limitations issues) can amplify the patent owner's enforcement problems in the context of widespread infringement. So can the fact that it can be difficult and/or costly, in some circumstances, for a patent owner to determine whether and the extent to which any particular potential defendant is infringing the patent owner's patent(s).

impact of the effect, it is likely often to be difficult (and in some cases impossible) to obtain sufficient data to be able to quantify it.

In this regard, it is worth emphasizing the significant and asymmetric risks that a patent holder faces as it tries to enforce its patent rights against a long line of (potential or actual) infringers. Assuming that the outcome of any specific litigation is at least somewhat uncertain, and hence that the patent holder runs at least some risk in litigating its patents, it may have a strong disincentive to litigate too aggressively (or, viewed differently, the plaintiff may have a strong incentive to keep its rates low as compared to the actual value of the patented technology). This is so because of the potential “spillover” effects of any particular piece of litigation onto subsequent litigation, and onto subsequent licensing efforts; such spillover may even extend onto previously negotiated licenses, if those licenses contain terms that cover subsequent court verdicts. A single finding of invalidity, for example, could significantly compromise the plaintiff’s ability to seek any further royalties from potential future licensees.

Intuitively, patent holders who face the prospect of having to litigate repeatedly against multiple infringers have to be concerned about what might be termed a “one-way ratchet” effect. If the patent holder wins one case against one infringer, that does not mean that others will agree to take a license; they may believe that the earlier defendant failed to make the best arguments. However, if the patent holder ever loses a case – especially on validity grounds – then there is likely to be a significant adverse effect on the patent holder’s ability to gain license revenues from that patent in the future. In effect, the patent holder has to “win them all,” while the infringers may only have to “win one.”³⁴ In this way widespread infringement can create a situation where a patent holder faces the prospect of serial litigation against many infringers/licensees, and significant flow-on risks associated with a single loss (*e.g.*, on validity) on the future stream of potential licensees (and hence royalties), and transactions costs and/or enforcement problem, could lead to a set of rates in the marketplace that are significantly depressed relative to actual value.

V. Conclusion

The extent of the property rights bestowed by the issuance of a patent is inherently unclear (at least initially) and may be context dependent. The fuzzy boundaries of patent rights, therefore, only become sharpened or clarified as litigation and/or licensing activities build a legal and market-based picture of those boundaries. Given the inherently fuzzy nature of property rights associated with patents, the transactions costs associated with attempting to enforce patents rights in the context of widespread infringement may have important implications for the inferences that can be drawn from observed license rates. Specifically, when infringement is widespread patent owners may have difficulties in establishing licensing rates which reflect the true value of their patents. We outline a number of possible reverse bandwagon effects which suggest that the set of license rates observed in circumstances of widespread infringement may, in some circumstances, significantly

³⁴ Thus, in situations where there are multiple potential defendants in patent litigation, the defense of a patent suit by one defendant can confer external benefits on other potential defendants.

understate the value of the patented technology due to transactions costs considerations and litigation-related risks.³⁵

When using observed license rates to help determine a reasonable royalty in litigation, we describe a “certainty adjustment” that is often considered in order to account for the fact that the hypothetical negotiation takes place under the assumption that the patents at issue are valid, infringed, and enforceable. Such a certainty adjustment can help account for the fact that observed license rates may be discounted due to uncertainty or disagreement about validity, infringement, and/or enforceability. In the context of widespread infringement, which can lead to the further depression of observed license rates relative to actual value, an even greater adjustment may be warranted to account for this greater degree of rate depression. Hence, observed prices for patent rights may not reasonably reflect market prices in meaningful ways, making it sometimes difficult to assess the value of inventions which achieve widespread adoption ahead of the successful rollout of a licensing program.

³⁵ This “widespread infringement” dynamic may have certain parallels to the case of recorded music in the era of widespread illegal downloads. With widespread piracy, for example, Apple’s iTunes music service must set the rate for legal downloads relatively low to encourage legitimate usage. If piracy was more limited, and/or if the record companies could be confident in preventing illegal downloads, iTunes could likely charge more for legal downloads. The impact of widespread illegal online music file-sharing on the pricing and sales of music in the legal marketplace has been noted by a number of authors, including Zentner (2006), Rob and Waldfogel (2006) and Liebowitz (2006).