



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

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The marketplace for patent rights is a complicated setting for understanding price formation. One reason for that complexity is that a patent represents, at least initially, unperfected property rights, because upon issuance its reach and 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;¹ an understanding of what constitutes infringement, for example, depends both on the specific claims of the patent (and how those claims will be interpreted by the courts), and on the specific nature of the products or technologies being accused of infringement. Therefore, the fuzzy boundaries of patent rights become sharpened or clarified only as litigation 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 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 patent's boundaries have been clarified at the time that the license is negotiated. Consequently, when a patent is licensed, or when patent damages must be calculated, the courts or the licensing parties must often develop benchmarks from which to determine

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¹ See, e.g., Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSP. 75 (2005).

appropriate reasonable royalty rates that reflect both the inherent fuzziness of the boundaries of patent rights and the evolving nature of these rights (and their value) over time.²

Any negotiation over patent value is further complicated by the ability of potential licensees to use patented technologies without a license. Unlike holders of tangible assets, who can generally refuse to deliver the assets unless or until the customer pays, patent holders often cannot prevent others from using their patented technologies up front, but instead must 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 might be relatively easy, at least in the first instance.³ When faced with potential infringement, the patent owner must go to court and seek an injunction or monetary damages to protect his patent rights. In many jurisdictions, injunctions are not easy to secure. These particular features of patents (and some other forms of intellectual property) (especially when combined with the inherently fuzzy nature of patent rights) mean that patent holders sometimes receive less value for their technology licenses than would be expected, particularly if those licenses are negotiated in the early days of a licensing program, if they have limited enforcement resources, or if the number of infringers is large—that is, if there is widespread infringement. Widespread infringement—the focus of this article—can sometimes lead to a value paradox where widespread adoption of a patented technology before a successful licensing program is implemented can, because of transaction costs and litigation-related risks, lead to lower, not higher, license rates. The corollary is that a reasonable royalty for patent damage purposes might, in some circumstances, be considerably higher than observed royalty rates.

The trespassing concerns that arise in the context of widespread infringement raise interesting transaction cost issues, although the transaction costs at issue are perhaps somewhat more Coasean⁴ than Williamsonian. Although the early Williamson framework emphasized the costs of negotiating, writing, and enforcing contracts,⁵ the costs emphasized in Williamson's subsequent work are primarily those associated with contractual holdups and re-contracting, not those associated with entering into contracts in the

² Edward Sherry & David J. Teece, *Royalties, Evolving Patent Rights, and the Value of Innovation*, 33 RES. POL'Y 179 (2004).

³ In fact, parties at substantial risk of such trespass (for example, firms that make products that are likely to use others' patented technologies) sometimes have explicit policies to avoid any review of issued patents or pending patent applications, so as to mitigate the risk of willful infringement, which can lead to enhanced damages.

⁴ Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 5–6 (1960).

⁵ See, e.g., OLIVER E. WILLIAMSON, *MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS* (Free Press 1975).

first place.⁶ In the context of patents, both costs exist, but the latter can sometimes be more important than the former. Patent owners might need to bring potential licensees to the courthouse to get them to agree to a contract. However, once they have succeeded against one infringer, part of the battle might be over, because any subsequent infringement will generally be easier to enforce as some of the fuzzy boundary issues will at least temporarily have been resolved.⁷

Thus, to begin developing a base of paying licensees in the context of widespread infringement, patent 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 patent, by providing a source of cash to fund subsequent enforcement actions, and (perhaps) by clarifying the boundaries of the patent rights.

I. DEFINING TRANSACTION COSTS

According to Williamson, transaction costs “are the economic equivalent of frictions in physical systems.”⁸ 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 transaction 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.”⁹ 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 might legitimately disagree about the patent’s scope and validity. *Ex post* costs¹⁰ take several forms, including maladaptation costs (where the contract drifts out of alignment), haggling costs (incurred when trying to correct *ex post* misalignment), the costs of governance, and possibly

⁶ See, e.g., OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING* (Free Press 1985) [hereinafter WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*].

⁷ After parties execute a patent license, the licensee will sometimes subsequently seek to invent around the patent, and in some cases the patent holder will then sue if the invent-around effort’s success was questionable. Moreover, a licensee can also sometimes challenge patent validity and infringement even after having taken a license. Thus, even with an initial license in place, which might have helped sharpen the boundaries of the fuzzy patent rights, subsequent developments can again render those boundaries fuzzy.

⁸ WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM*, *supra* note 6, at 19.

⁹ *Id.* at 20.

¹⁰ *Id.* at 21.

even bonding costs. Re-contracting hazards and costs, which receive much attention in Williamson's work, are *ex post* transaction costs.

Although they receive less attention in Williamson's transaction cost economics framework, *ex ante* transaction costs are nevertheless the focus of much of the literature in finance and sometimes in economics (for example, in the Austrian School perspective, which focuses on the discovery of prices). The literature on patents, however, has paid relatively little attention to transaction costs of either type, beyond some attention given to issues of "holdup."

In this article, we explore the transaction costs associated with alignment and negotiations as patent licensing programs commence in circumstances of widespread infringement. In such circumstances, there is often an associated reluctance of firms to pay for the use of others' patented technologies if they see that their rivals do not pay; a firm that pays might put itself at a competitive disadvantage relative to one that does not pay. The only method of effective discipline for widespread infringement might be through use of the judicial system, but this is usually cumbersome and costly. Where potential infringement is widespread, infringers might understand that the patent owner's costs and risks will be higher, and therefore that the likelihood of successful enforcement will be lower. As noted, this raises issues with respect to benchmarking and calculating reasonable-royalty damages in some circumstances.

II. THE LEGAL CONTEXT FOR CALCULATING REASONABLE ROYALTY DAMAGES

U.S. law provides that damages for patent infringement be "adequate to compensate for the infringement but in no event less than a reasonable royalty."¹¹ There are fifteen well-established factors, delineated in the *Georgia-Pacific* case,¹² that are traditionally considered in efforts to estimate a reasonable royalty.

The fifteenth factor is the most general, and is typically the most significant from an economic 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: (1) the parties are "prudent" entities seeking to negotiate a mutually acceptable licensing rate and are not under compulsion to reach an agreement;¹³ (2) the hypothetical

¹¹ 35 U.S.C. § 284.

¹² *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970).

¹³ In other words, the "willing licensee" concept rests on the licensee's willingness or ability (or both) (1) to walk away from the business or (2) to substitute some noninfringing alternative (if one is available), should negotiations fail and the patent holder enforce the patent. Similarly, the "willing licensor" concept

negotiation occurs on or around the date of first infringement; (3) the patent is known by both parties to be valid, infringed, and enforceable; and (4) both parties know all information that might be relevant to the outcome of the negotiation.¹⁴

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 generally have imperfect information about many relevant factors, including issues related to validity and infringement, which can have substantial effects on expected outcomes.

A. Hypothetical License Structure

Patent licenses can be structured in many ways. Some involve only a single patent, whereas 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, one common structure is for licenses to provide for an up-front fee and a running royalty rate¹⁵ based on some observable metric (for example, 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 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 patent, even if sales by the licensee do not materialize. A running royalty, on the other hand, shares both downside risk

rests on the licensor's willingness to deny the license. That is, 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.

¹⁴ *Georgia-Pacific*, 318 F. Supp. at 1122 (“[*Georgia-Pacific*] 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.”). The “marshaling of all of the pertinent facts” is generally assumed to include the consideration of various alternatives available to the alleged infringer.

¹⁵ Capital flows are an increasingly common feature of running royalties, particularly where there is considerable heterogeneity in context or amongst licensees.

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

and upside potential between licensor and the licensee. If sales of products that make use of the patent are lower than expected, the licensee will earn lower profits from that patent than expected, but will likewise 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 Royalty Base

The issue of the choice of an observable metric to govern the total royalties to be paid is somewhat more complex. To reduce disputes and economize on transaction costs, the parties to licensing agreements sometimes negotiate provisions calling for royalties on certain specific licensee product offerings, even when both parties acknowledge that some of those offerings might not infringe, either because they do not use the licensed patent, or because they are manufactured, used, and sold in jurisdictions outside the reach of the patent. Such terms are adopted because it is often difficult and costly to track the particular characteristics of each individual product offering to determine whether it infringes a patent.¹⁷ In short, the transaction costs of sorting the subset of explicitly infringing sales from a broader set of products might be difficult, controversial, and expensive—leading both licensor and licensee to prefer a royalty based on a simple and readily observable metric (such as total sales of a product category), where the royalty rate is adjusted to reflect the agreed-upon 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 often be indifferent between (1) a higher rate calculated on a narrower base, and (2) a lower rate calculated on a broader base, so long as each yields approximately the same expected total payment. Further, if there were costs and complexities associated with identifying, monitoring, and reporting infringing products, then both parties might prefer the latter structure, so as to avoid those costs.

2. Portfolio Licenses

Companies that are technologically successful often accumulate large portfolios of patents in a particular technological domain; such portfolios are common, for example, in the electronics and telecommunications industries. Patent portfolios present a number of special issues for license structure,

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

which, in part due to transaction costs and other reasons, often lead to licenses being granted on a portfolio basis.

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 (1) a large number of patents, (2) a large number of products or services on which the patents might read, and (3) 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, patent-by-patent, or country-by-country basis, as the transaction costs would be prohibitive. Thus, licensees often want the so-called “design freedom” that comes with a broad, portfolio-wide license.

Consequently, in such contexts license negotiations outside litigation tend to focus on a relatively small number 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 tend not to bring suit over every patent that they could assert against the defendant, but rather choose to sue over a relatively small group of patents that has the greatest likelihood of being seen as (1) valid, (2) infringed by a significant portion of the prospective licensee’s product and service offerings, and (3) valuable (that is, the patents contribute significant additional profit to the sales of those products).

Different patents in patent portfolios generally expire at different times. Nevertheless, it is common practice in many industries for patent licenses to extend to, and for the licensee to pay royalties based on, the expiration of the last-to-expire patent 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 before the end of the license term.

Similarly, parties often expect that the licensor will continue to develop new patents and, indeed, that such patents might already be pending but not yet issued. Thus, it is common practice in many industries for agreements

¹⁸ See, e.g., Peter Grindley & David J. Teece, *Managing Intellectual Capital: Licensing and Cross-Licensing in Semiconductors and Electronics*, 39 CAL. MGMT. REV. 1 (1997).

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 34 (2013), <http://files.ctctcdn.com/679ee274201/0a80a8a9-22e7-4249-ado4-6f7fa8140203.pdf>.

to allow the licensed portfolio to expand over time. Again, it is common practice for the licensee 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.

B. The Best Available Noninfringing Alternative

An important factor often driving the analysis of a reasonable royalty is the determination of the best commercially viable noninfringing 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 noninfringing alternative must avoid infringement not only of the patents at issue in the damages analysis, but also of all other non-asserted patents held by the patent holder or unlicensed from another party. As such, any noninfringing alternative should generally consider the cost of licensing—or of avoiding infringing—any other existing non-asserted patents (whether held by the plaintiff or by third parties). In other words, one typically assumes that the defendant cannot avoid the frying pan (that is, infringement of the asserted patents) by jumping into the fire (that is, 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 some time. In those cases, the defendant has effectively taken for itself the non-exclusive “right” to the patented technology, subject to the possibility of having to pay damages subsequently if and when it is found to infringe. An interesting question that sometimes arises in the context of patent damages is what reasonable economic inferences can be drawn from the fact that a defendant has chosen to use the patented technology instead of some available noninfringing alternative technology.

From an economic perspective, if there were a commercially viable, noninfringing alternative to the patented technology that was available at a lower net cost than the expected cost of infringement damages 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

²⁰ Analysis of these issues can be 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 potential noninfringing alternatives will thus depend on the facts and circumstances of the case.

expected costs.²¹ The fact that a defendant did not do so is therefore consistent with the view that the expected 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 is invalid or noninfringed. If the defendant has decided to run the litigation risk that it will be found to have infringed valid patents, despite having the ability to switch to a known noninfringing 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.

Other factors can further complicate the issue. For example, another possibility is that the defendant (recognizing that discovery of relevant knowledge can be costly) might simply be ignorant of the nature and extent of its (alleged) infringement of the patented technology, or of potentially commercially viable noninfringing alternatives. In such circumstances, it might be that no reasonable inference can be drawn from the fact that the defendant has not adopted a noninfringing 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.

C. *The Expected Outcome of the Hypothetical Negotiation*

There are several factors that are typically considered in analyzing the expected outcome of a hypothetical negotiation for a patent license. Those factors include: (1) the relative negotiating skills of the parties, (2) the anticipated profits that would be lost by a practicing inventor should it license to a competitor, compared to the royalties earned, (3) the anticipated profits earned by the licensee, and (4) the profitability and commercial acceptance of the products made using the patented technology.²²

The above concepts implicitly accept that the value of a patent is context dependent and that patents are not commodities that are priced in highly liquid markets. One common analytical approach to assessing the expected

²¹ Here, “net cost” refers to the net effect on the defendant’s profits of moving to that alternative. An alternative technology might be, for example, cheaper to license than the patented technology, but might force performance limitations that would create commercial risks (for example, 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 might be costs (for example, redesign costs) associated with switching to an alternative.

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

outcome of the hypothetical negotiation in such circumstances is to construct a so-called “bargaining range.”²³

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 that 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 examine the overall value to the licensee of using the patented technology compared with the next-best available noninfringing alternative—that is, the difference between (1) the expected profits that the licensee would have earned by using the patented technology, and (2) 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. The licensor’s minimum willingness to accept will sometimes 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 (or on previously negotiated licenses). Where the patent holder does not itself practice the patented invention, the direct costs, although perhaps non-trivial in some instances, will often be relatively small compared with the potential impact on past licenses and future negotiations, especially in the context of widespread infringement.

Where a patent holder is attempting to license its patents widely, it would be expected to be concerned not only 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 get that same rate (or even a lower rate) for their own license. Such knowledge by potential licensees is sometimes present in the actual world, and thus presumably would also be a relevant consideration when using actual license rates to inform the outcome of the hypothetical negotiation, and would present a deterrent to the patent holder from agreeing to an unduly low rate. Similarly, if the patent holder were to grant a new license at rates that were lower than the rates that it was charging earlier licensees, and if the earlier licensees became aware of that fact, those earlier licensees might object to a later licensee receiving more favorable terms (especially if their licenses had “most favored licensee”

²³ See J. Gregory Sidak, *Bargaining Power and Patent Damages*, 19 STAN. TECH. L. REV. 1 (2015).

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 that are generally considered, such as the relative discount rates of the parties. Another consideration is that, 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 might include entrepreneurial risk-taking, financial backing, design and manufacturing capabilities, wholesale distribution facilities, advertising and marketing skills, retail distribution networks, and so forth. In this context, the economic rents from collaboration to commercialize innovations tend to flow disproportionately to those who control scarce resources, or what might be termed the bottleneck assets.

III. INTERPRETING ACTUAL ROYALTY RATES IN THE CONTEXT OF WIDESPREAD INFRINGEMENT

Where there is widespread infringement, the transaction costs associated with litigation might be such that infringers believe that they can attach a relatively low expected cost to infringement, thus reducing their willingness to pay for a license. Because each infringer knows that there are many other infringers, each infringer might believe that the probability that it will get sued first (or at all) is low; and it might also believe that there is a good possibility that the licensing program and associated enforcement of the patent owner’s rights will not commence successfully because the patent owner might not be able to raise the resources to litigate, or the patent owner might wish to avoid the distraction from business that litigation so often entails. This suggests a transaction cost problem, akin to that which Ronald Coase recognized in *The Problem of Social Cost*.²⁵ Here, the Coasean transaction 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

²⁴ See, e.g., David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RES. POLY 285 (1986); DAVID J. TEECE, *MANAGING INTELLECTUAL CAPITAL* (Oxford Univ. Press 2000).

²⁵ Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 5–6 (1960); see also Ronald H. Coase, *The Nature of the Firm*, 4 *ECONOMICA* 386 (1937).

determining a reasonable royalty for proven-valid-and-infringed patents. As we explain below, there are reasons why, in some circumstances, actual (unadjusted) license rates might provide only limited guidance with respect to a reasonable royalty. Specifically, we outline two factors that can sometimes cause actual rates in the marketplace, in the context of widespread infringement, to understate the rates that would result from the hypothetical negotiation:²⁶ (1) the impact of uncertainty about validity, infringement, and enforceability on actual license rates; and (2) the impact of widespread infringement on actual license rates.

A. The Impact of Uncertainty Regarding Validity, Infringement, and Enforceability on Actual License Rates

In real-world licensing negotiations, the licensor and licensee are likely to disagree about (1) whether the licensor's patents are valid, (2) whether the licensee's products infringe those patents, and (3) whether the licensor can enforce those patents against the licensee. Actual negotiated rates therefore generally (though not always) reflect a discount to deal with uncertainty and disagreement about these issues. In the hypothetical negotiation, however, that uncertainty and disagreement is eliminated by construction. Consequently, real-world license rates should, where possible, typically be adjusted in some fashion to eliminate that likely discount before they are used as a metric for estimating rates upon which parties would agree in the hypothetical negotiation, in which (by construction) such uncertainty is not present. Thus, an appropriate reasonable royalty can sometimes be significantly higher than actual royalty rates for the same patent.²⁷

By way of illustration, suppose that the parties agreed that an appropriate reasonable royalty rate for a patent known to be valid and infringed would be 5 percent, but they also agreed that there was only a 60 percent 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 3 percent, reflecting the 60 percent chance that the patent would be found valid and infringed (and thus worth a 5 percent royalty) and the 40 percent chance that the patent would be found invalid, not infringed, or unenforceable (and thus worth nothing in the situation at hand).

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 upon which the parties would have agreed in the hypothetical negotiation.

²⁷ This logic is laid out in Stephen H. Kalos & Jonathan D. Putnam, *On the Incomparability of "Comparables": An Economic Interpretation of "Infringer's Royalties"*, 9 J. PROPRIETARY RIGHTS 2 (1997); Edward Sherry & David J. Teece, *Royalties, Evolving Patent Rights, and the Value of Innovation*, 33 RES. POL'Y 179 (2004).

As a result, to determine a reasonable royalty in such circumstances, one should generally consider 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 need 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 required to pay merely what everyone else agreed upon before that finding was made, then, setting aside factors such as litigation costs, the infringer faces no downside risk; she pays only what she would have needed to pay anyway (the “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, because one can directly observe only actual royalty rates, the often-challenging empirical task is to gain insight into the appropriate reasonable royalty by estimating how significant that “certainty adjustment” might be, and, where possible, by adjusting actual rates 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 in question have been clarified.

The probability of success by the patent holder in any particular litigation is a function of the specific circumstances of that litigation; accordingly, the appropriate 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 have argued elsewhere that such data suggest that it might be reasonable to infer that an appropriate reasonable royalty for a patent known to be valid and infringed would on average be roughly twice what one would expect to see parties actually agree upon for “untested” patents, assuming an average degree of uncertainty about validity, infringement, and enforceability.²⁹

B. The Impact of Widespread Infringement on Actual License Rates

Any given patent might 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 might be infringed by many

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

²⁹ Sherry & Teece, *supra* note 27; see also Jean O. Lanjouw & Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?*, 47 J.L. & ECON. 45 (2004).

parties, over a wide range of products. From an economic perspective, the latter case— here referred to as “widespread infringement”—has potentially important implications for the interpretation of some actual license rates.

First, widespread infringement might reflect above-average doubt about validity, infringement, and enforceability. If so, as a conceptual matter, the logic discussed above 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 sometimes 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 might draw an inference from the behavior of other firms. 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 noninfringed or not enforceable. Conversely, if firms observe that many other firms have taken licenses, they might be more likely to infer that the patent is valid, infringed, and enforceable.³⁰ In the former case then, those who choose to pay to take a license might be willing to pay less as a consequence of the observed widespread infringement. This could occur even absent any direct competitive pressure (for example, the inference might 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 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 generally do not 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 might 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 in actual licenses.³¹

³⁰ One caveat here is that patent holders might license at sufficiently low royalty rates so 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 might 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, enforceable, and infringed; 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.

The third way in which a reverse bandwagon effect might operate relates to the fact that when there are many infringers, each infringer might believe that there is a perceived safety in numbers, as each infringer might believe that the chance that it will be pursued is low. This is particularly true if the patent owner is not a large corporation with ready access to enforcement resources. Patent rights are not self-enforcing. To receive compensation for any alleged patent infringement, a patent holder might need to sue the alleged infringer. That is, 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 costly and time-consuming.³² Consequently, and all else equal, in the context of widespread infringement this dynamic will tend to lower the observed royalty rates because the owner of the patented technology has a harder job getting his 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 royalties negotiated in a marketplace characterized by widespread infringement will typically be lower than those negotiated in circumstances where infringement was less common. However, although one can predict the directional impact of the effect, it is often likely to be difficult or 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 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 might have a strong disincentive to litigate too aggressively (or, viewed differently, the patent holder might have a strong incentive to keep its rates low 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 might even extend to previously negotiated licenses, if those licenses contain terms that cover subsequent court verdicts. A single finding of invalidity, for example, could significantly compromise the patent holder's ability to seek any further royalties from potential future licensees.

Intuitively, patent holders who face the prospect of needing to litigate repeatedly against multiple infringers need to be concerned about what might be termed a "one-way ratchet" effect. If the patent holder wins one

³² See, e.g., SUZANNE SCOTCHMER, *INNOVATION AND INCENTIVES 200* (MIT Press 2000). 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 costly, in some circumstances, for a patent owner to determine whether and to what extent any particular potential defendant is infringing the patent owner's patent(s).

case against one infringer, that does not mean that others will agree to take a license; other infringers might 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 needs to “win them all,” whereas the infringers might only need to “win one.”³³ In this way, widespread infringement can sometimes create a situation where a patent holder faces the prospect of serial litigation against many infringers and potential licensees. The risks associated with a single loss on the future stream of potential licensees (and hence royalties), as well as the associated transaction costs and possible enforcement problems, could lead to a set of rates in the marketplace that are depressed relative to actual value.

CONCLUSION

The extent of the property rights bestowed by the issuance of a patent is inherently unclear (at least initially) and often context dependent. Therefore, the fuzzy boundaries of patent rights typically come into focus only as litigation or licensing activities build a legal and market-based picture of those boundaries. Given these fuzzy boundaries, the transaction costs associated with attempting to enforce patents rights in the context of widespread infringement can sometimes have important implications for the inferences that can be drawn from observed license rates. Specifically, when infringement is widespread, patent owners might have difficulties establishing licensing rates that reflect the true value of their patents. We outline a number of possible reverse bandwagon effects that suggest that the set of license rates observed in circumstances of widespread infringement might, in some circumstances, significantly understate the value of the patented technology due to transaction cost considerations and litigation-related risks.³⁴

When using observed license rates to help determine a reasonable royalty in litigation, we describe a “certainty adjustment” that is often considered to account for the fact that the hypothetical negotiation occurs under the

³³ 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.

³⁴ This “widespread infringement” dynamic might 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 were more limited, 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. *See, e.g.,* Alejandro Zentner, *Measuring the Effect of File Sharing on Music Purchases*, 49 J.L. & ECON. 63 (2006); Rafael Rob & Joel Waldfogel, *Piracy on the High Cs: Music Downloading, Sales Displacement, and Social Welfare in a Sample of College Students*, 49 J.L. & ECON. 29 (2006); Stan J. Liebowitz, *Research Note—Testing File Sharing’s Impact on Music Album Sales in Cities*, 54 MGMT. SCI. 852 (2008).

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 might be discounted due to uncertainty or disagreement about validity, infringement, or enforceability. In the context of widespread infringement, which can sometimes lead to the further depression of observed license rates relative to actual value, an even greater adjustment might be warranted to account for this greater degree of rate depression. Hence, observed prices for patent rights might not reflect a reasonable royalty in meaningful ways, sometimes making it difficult to assess the value of inventions that achieve widespread adoption ahead of the successful rollout of a licensing program.