Evolving IP Marketplace – Comment, Project No. P093900

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0.   INTRODUCTORY REMARKS

I thank the Federal Trade Commission (FTC) for giving me the opportunity to speak at the hearings on February 11, 2009 and to provide these written comments.   There has been much discussion about the need for patent reform generally, and about the need for reform in the area of patent damages particularly.   Thus, the time is right for the FTC to provide this forum to discuss the issues.

There is no question that there have been some unreasonable patent damage awards.   The most visible of these unreasonable awards have been large as well.   Although they might be few in number, large unreasonable damage awards skew the damage award distribution, which can have undesirable effects on litigating parties' incentives during litigation.   In my opinion, the problem of unreasonable large damage awards can be substantially reduced by addressing three areas in the legal framework for calculating damages.   First, for both lost profits and reasonable royalty damages, the governing legal cases (e.g., *Panduit*, *Georgia-Pacific*, etc.) set forth only a list of "factors" to consider in the damages analysis rather than a coherent and complete conceptual framework for calculating damages.[2]   Second, in the absence of a conceptual framework, experts are not constrained in their damages analyses and therefore sometimes stray far from sound economic principles.   Third, in contrast to antitrust litigation, judges in patent litigation seem unwilling to exclude unreliable expert testimony.

My proposed solution is the following: (1) establish a conceptual framework for calculating damages that is based on sound economic principles; (2) encourage judges to use their authority under *Daubert* to exclude experts who stray from the conceptual framework.   Most of the unreasonable large damage awards would have been avoided by imposing a requirement that an economically sound conceptual framework be used to calculate damages.

In what follows, I expand upon these points, while answering the specific questions posed by the FTC Staff.

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[1] Senior Vice President, NERA Economic Consulting.   My comments reflect my own views and not necessarily those of my colleagues at NERA Economic Consulting or my co-authors.

[2] A further problem is that some of the factors are incorrectly framed as "necessary" conditions (e.g., Panduit Factor 1), while other factors have sometimes been applied by damages experts in a way that makes no economic sense.

1.   BASIC PRINCIPLES

- *Why is it important to get the damages calculation right?   What are the negative effects of over-compensation?   Of under-compensation?*

In patent infringement litigation, damage awards potentially play two roles.   First, properly calculated compensatory damage awards ensure that patentees receive the full benefit to which they are entitled under the patent laws.   The patent laws were enacted to provide incentives to innovate.   The new products and technologies that result from innovation are an important source of economic growth, and successful new products typically generate substantial consumer surplus.

In principle, properly calculated compensatory damage awards help to ensure that innovators receive a return on their innovations, thereby fostering the incentives to innovate in accordance with the purpose of the patent laws.   Thus, damage awards that systematically "under-compensate" would tend to reduce the incentives to innovate below the levels the patent laws intended, while damage awards that systematically "over-compensate" would tend to increase the incentives to innovate above the levels the patent laws intended.

The actual situation potentially is somewhat more complicated than this because damage awards create an incentive to *patent*, which may or may not be coincident with the incentive to *innovate*.   Some economics research has raised the possibility that a patent on an innovation can hinder subsequent innovations that build on the original innovation.[3]   In that case, "under-compensating" on damages awards might lead to less patenting and thus more innovation.   Another consideration is that "fully" compensating the winner of patent race may lead to excessive investment in innovation from a social point of view.[4]   In that case, "under-compensating" on damage awards might reduce innovation, but in a way that is socially desirable.   However, given the current state of economic knowledge with respect to these complicating considerations, it is difficult to know the extent to which they are important.

The second potential role of damage awards is in providing deterrence.   This is discussed below.

- *Should the goal of damages law be only to compensate the patentee for the infringement? Should damages law have other goals, such as deterring infringement by punishing infringers?*

Under the prevailing legal framework, reasonable royalty damages awards in a patent case likely have little deterrent effect.   To see this, consider a simple model.   A potential infringer ("the defendant") faces the following decision.   It could test the patent by going forward with a design that may infringe, in which case it will be sued and incur litigation costs L.   Alternatively, the defendant could design around the patent at cost C.   Suppose that the probability is θ that the patent will be found valid and the defendant's product will be found to have infringed the patent.   Then, the defendant's expected cost of testing the patent is $\theta D + L$, where D is the damage award that the defendant would have to pay if the patent is found to be valid and infringed.   The defendant will choose to test the patent if the expected cost of doing so is less than the cost of designing around, or if $\theta D + L < C$.   For a given

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[3] See, e.g., Nancy T. Gallini, *The Economics of Patents: Lessons from Recent U.S. Patent Reform*, 16 J. ECON. PERSPECTIVES. 131 (2002); James Bessen & Eric Maskin, *Sequential Innovation, Patents, and Imitation* (2006), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=206189.

[4] See, e.g., Carl Shapiro, *Patent Reform: Aligning Reward and Contribution* (2007), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=989952, for a discussion of this point.

probability of validity and infringement, testing the patent would be deterred only if D or L were sufficiently high.

Under the prevailing legal framework, the maximum reasonable royalty that could be awarded in this circumstance (if calculated correctly) is C, so that $D \leq C$.[5]   Ignoring litigation costs for the moment (i.e., setting $L = 0$), we have $\theta D \leq \theta C < C$.   This means that, for any value of C, the defendant would not be deterred from testing the patent by the prospect of paying a reasonable royalty damages award. Once litigation costs are added back in, they can be sufficiently high relative to C so that $\theta D + L > C$ and the defendant would be deterred from testing the patent.   But, it remains the case that the reasonable royalty damage award itself, because of the way it is calculated, will not deter potential infringers from testing the patent.   (If we took the next step in the modeling exercise and allowed the parties to settle once the litigation was initiated, in this model parties with symmetric litigation costs and assessments of θ would settle by entering into a licensing agreement with a royalty equal to θD.[6] However, in real world situations, parties often have differing views of θ, which is an additional reason that cases get litigated.)

Lost profits damages awards, in contrast to reasonable royalty damage awards, potentially have a deterrent effect in addition to their compensatory effect.   Before *Grain Processing*, a lost profits damage award was often calculated under the assumption that the infringer was not able to offer a non-infringing product had it not infringed the patent (in the so-called "but for" world).   This could potentially mean substantial lost profits for the patentee.   If lost profits damages are large enough, $D > C$.   Thus, $\theta D + L > C$ was quite possible, particularly when θ was large.   In this case, lost profits damages awards potentially deterred the testing of patents.   However, after *Grain Processing*, infringers were able to claim that they would have turned to an "available" non-infringing substitute in the "but for" world even though they did not do so in the actual world.   This potentially leads to a reduction or even elimination of lost profits awards in some cases.[7]   In *Grain Processing* itself, for example, the court denied lost profits on the basis that the defendant had a non-infringing alternative "available" in the "but for" world and thus awarded reasonable royalty damages only.   The broad effect of *Grain Processing* may therefore be to reduce or eliminate the deterrence effects of lost profits damages awards in patent cases.

If it is deemed to be good public policy to deter the testing of patents, it would appear to be necessary to provide for punitive damages, especially when the plaintiff is a "non-producing entity" ("NPE") that has no lost profits damages in most cases.   However, do we want to deter the testing of patents? There are a number of reasons to think not.   First, unlike many other forms of property, the "boundaries" of a patent right (i.e., validity and infringement of the patent) is uncertain until the court

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[5] Under certain circumstances, as discussed below, a reasonable royalty damages award might exceed C.   For the purposes of this discussion, I assume those circumstances are not present.

[6] In general, the patent owner's decision to bring litigation must also be taken into account.   In this example, if $\theta C < L$, so that the expected reasonable royalty damages award would not cover the patent owner's litigation costs, the patent owner would not find it in its best interest to bring litigation.   Knowing this, the potential infringer would choose to infringe regardless of θ or L.

[7] *Grain Processing* effectively allows defendants to maintain their option to switch to a non-infringing alternative until the time of judgment, when the uncertainty on validity and infringement is resolved, because under *Grain Processing* defendants can claim that they would have switched to the alternative, which allows them to avoid having to pay lost profits damages.   As a result of providing potential infringers with this "free option," *Grain Processing* encourages potential infringers to test patents and may decrease the returns to innovation.   See Jerry A. Hausman & Gregory K. Leonard, *Real Options and Patent Damages: The Legal Treatment of Non-Infringing Alternatives and the Incentives to Innovate*, 20 J. ECON. SURVEYS 493 (2006).

determines them.   It can be economically inefficient for a defendant to incur a design around cost of C when there is only a probability $\theta < 1$ that the patent is invalid and infringed in which case a payment of C will compensate the patentee.   Second, there are positive social externalities to the boundaries of the patent right being determined with certainty.[8]   Finding a patent to be invalid can remove an obstacle from the paths of several innovators.   Thus, there is social value to testing patents. Third, because testing a patent is a public good (the firm that tests the patent pays the costs, but other firms reap the rewards of rendering the patent invalid), however, the classic problem of the under-provision of public goods suggests that testing of patents already occurs too infrequently from a social point of view.[9]   On the other hand, because of negative externalities (e.g., litigation costs to the patentee and society), there is likely some level of θ above which it is no longer efficient from a social point of view to test the patent.   This seems to be anticipated by the provision for trebling of compensatory damages with willful infringement, which can be interpreted as infringement when θ is at or near one.

To conclude, infringement that is truly willful should be deterred, and the trebling of compensatory damages should be effective in that regard.   Lost profits damages can have a deterrence effect, although this likely has decreased since *Grain Processing*.   Reasonable royalty damages have little deterrence effect.   We do not want too much deterrence as testing of patents can be economically the right outcome, given that the boundaries of the patent right are not known with certainty until determined in the litigation process.[10]   It is hard to see how a workable system could be designed that would provide a "better" level of deterrence than is currently provided.[11]

2.   THE DATA

- ***What message can we take away from the Janicke-Levko and Lemley-Shapiro data?   Does it indicate a problem with patent damages law?   What other data would be helpful in answering that question?***

These data indicate what I believe to be the case based on personal experience: while many awards are not particularly large, there are some "outlier" cases that substantially skew the distribution of awards to the right.   We should be concerned about the outliers, if they are also "unreasonable,"

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[8] Unfortunately, it would seem that infringement typically cannot be determined with certainty for all potential infringers since infringement is often implementation-specific and different potential infringers may use different implementations.

[9] See Shapiro, supra note 4, for a discussion of this point.   The oft-complained of "patent troll" activity may be an example of the public good problem.   Suppose a troll with a low quality (low θ) patent approaches each of a group of defendants that allegedly infringes the troll's patent and offers a settlement for an amount less than the defendant's litigation costs.   It is therefore in each defendant's individual interest to settle, even though θ is low.   However, the group of defendants (and society) would be better off if one of the defendants decided to litigate instead of settle (because the patent would likely be found to be invalid or not infringed).   But, this will not happen unless the group of defendants was able to get together and share the cost of litigation.

[10] I understand that our legal system views settlement of litigation as beneficial and thus encourages it.   While this is undoubtedly correct up to a point, it has been noted in other contexts that, without at least some cases being litigated to conclusion, there would be no opportunity in a common law system for the law to develop.   This is an example of litigation having a positive externality.   In the patent context, a further positive externality of litigation is the setting of the boundaries of the patent right.   Thus, there can be "too much" settlement of patent litigation from a social point of view.

[11] Another possibility would be providing potential infringers the opportunity to challenge a patent's validity and infringement before committing to using the technology.   *Medimmune* made it easier for potential infringers to bring declaratory judgment actions.

because even a relatively low probability of an excessive damage award can have serious effects on market behavior and outcomes.

The data alone do not allow us to know whether the outliers were in fact unreasonable (or, for that matter, whether the non-outliers were "reasonable").[12] But, my review of available information on the outlier cases suggests that some of them (e.g., *Microsoft*) were, in fact, unreasonable.

3.   LOST PROFITS

- ***Are the Panduit factors a useful method for determining when to award lost profit damages? Do they construct the "but for" world?***

The analysis of lost profits is fundamentally an economic analysis.   The Panduit Factors set forth requirements that must be met in order for a patentee to make a lost profits claim, and there seems to have been an attempt to link these requirements to economic principles.[13]   However, the Panduit Factors are problematic for several reasons.   First, the language used in some of the Panduit Factors is ambiguous and easily can be misinterpreted, especially by non-economists.   Second, the Panduit Factors are stated as a set of necessary conditions, when in fact they are not necessary for the patentee to have sustained lost profits.   Third, the Panduit Factors are essentially a list of conditions for when a lost profits claim can be made.   It would be preferable instead to provide litigants with a coherent and complete framework for calculating lost profits damages based on sound economic principles.   This framework could then be used to answer, in a unified way, both the question of whether a lost profits claim is viable and the question of what the amount of lost profits damages should be.

Panduit Factor 1

Panduit Factor 1 sets forth the requirement that there be "demand for the patented product."   This is ambiguous on several levels.   First, what is meant by "the patented product"?   Is it only the defendant's product?   The patentee's product?   Any product that uses the patented technology?   Second, to an economist, "demand for the patented product" would be trivially demonstrated in every patent case by the mere fact that the patented product was purchased.

Thus, Panduit Factor 1 must mean something else, at least in cases where the patent covers only a feature of a product, rather than the entire product.   I (along with other economists) have concluded that Panduit Factor 1 is intended to mean "demand for the patented feature in the defendant's product." This interpretation makes sense because, if the patented feature was not "demanded," in the "but for" world, where the defendant offered the product without the patented feature, the defendant would face the same demand and make the same level of sales of its product at the same prices as it did in the actual world.   Accordingly, there would be no lost profits for the patentee.   However, this line of reasoning presumes that the patented feature is separable from the rest of the product so that the defendant could in fact offer a product without the infringing feature in the "but for" world.   If, instead, the defendant could not offer a version of the accused product without the patented feature in the "but for" world, the patentee would have a viable lost profits claim even if there was no "demand for the patented feature."   For example, consider a product that has a "feature" that is transparent to

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[12] The reasonableness of a damage award depends not only on the size of the award, but on the facts of the case.   A $5 million award (roughly the median) might be reasonable in one case and unreasonable in another.

[13] The Panduit Factors largely concern lost profits from lost sales.   Another form of lost profits damages is "price erosion," where the patent owner charged a lower price than it would have in the absence of the infringement.

the customer, but makes the product technically feasible. There is no customer "demand" for the feature by itself, but there would be no product to offer without the feature. Thus, Panduit Factor 1 is not a necessary condition for lost profits. In addition, Panduit Factor 1 can be assessed only in conjunction with Panduit Factor 2 (see below); both supply and demand need to be considered together.

In considering Panduit Factor 1, it is useful to note that economists view products as bundles of features or characteristics. Customers have preferences over characteristics, and these preferences vary across customers. A customer chooses among products by applying his or her preferences to the particular characteristics that each product offers. From an economics point of view, it is not meaningful to talk about the "demand" for a feature. There is demand for a product, and the demand for the product might change if a feature of the product is added or dropped. Accepted economic techniques exist for determining the amount by which sales would increase and prices rise as a result of incorporating features into a product. Therefore, if the Panduit factors were to be retained, I would replace Panduit Factor 1 with the following: "A necessary condition for lost profits is that the demand for the defendant's product would have been reduced in the 'but for' world where the defendant took its best non-infringing action instead of infringing."

Panduit Factor 2

Panduit Factor 2 sets forth the requirement that there is no "acceptable non-infringing substitute." This again is ambiguous. What is meant by "acceptable"? I have concluded that Panduit Factor 2 must be intended to mean that the <u>defendant</u> must not be able to offer a <u>perfect</u>[14] non-infringing substitute for its own infringing product.[15] This interpretation makes sense because, if the defendant could offer what is essentially a perfect non-infringing substitute (from the point of view of customers), then all of the customers who bought its infringing product in the actual world would have bought its non-infringing substitute in the "but for" world and there would therefore be no scope for lost profits.

No other interpretation makes economic sense. For example, if "acceptable substitute" can include something less than a perfect substitute, the defendant in principle would lose some of its sales in the "but for" world by offering this imperfect non-infringing substitute and thus the potential for lost profits would exist. This goes back to the concept that consumers differ in their preferences. If the non-infringing version of the product has different features than the infringing version, it might be "acceptable" to some, but in general would not be acceptable to all. Only if the non-infringing substitute were a perfect substitute (i.e., <u>all</u> customers view it as the same in terms of features) would there be no scope for lost profits.

Again, Panduit Factor 2 (as I have interpreted it) is not a necessary condition for the patentee to have sustained lost profits. Suppose that the defendant can offer a perfect substitute for its infringing product, but only at a higher cost per unit. Most economic models would suggest that the defendant would charge a higher price and lose sales as a result. Some of these sales might have gone to the patentee and the patentee might have been able to charge a higher price. Thus, there could be lost profits despite Panduit Factor 2 failing to hold.[16]

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[14] By "perfect" substitute, I mean a substitute that is essentially identical in terms of non-price attributes to the accused product.

[15] In principle, if a competitor other than the defendant offers a perfect (non-infringing) substitute for the defendant's product and the patentee's product is an imperfect substitute, that might also leave no scope for lost profits.

[16] This point is discussed with reference to the *Grain Processing* case in Hausman & Leonard, note 7 supra, at 505-509.

Panduit Factor 3

Panduit Factor 3 sets forth the requirement that the patentee have sufficient capacity (manufacturing, marketing, etc.) to supply the additional demand it would have in the "but for" world. While this factor is certainly important, it also cannot be viewed in isolation. Specifically, the patentee may be able to expand capacity at some cost. Thus, Panduit Factor 3 may have to be analyzed in conjunction with at least Panduit Factor 4, and perhaps the other Panduit Factors as well.

Panduit Factor 4

Panduit Factor 4 sets forth the requirement that the patentee establish the profits it would make on the lost sales. This factor is typically satisfied by analyzing the incremental costs that the patentee would have incurred in making the sales (including, perhaps, capacity expansions required to meet Panduit Factor 3).

The economic principles involved in determining incremental costs are straightforward. However, some misuse still arises at times. For example, suppose it is determined that a patentee's sales would have doubled in the "but for" world. Would the patentee's sales force expenses also have doubled in the "but for" world? They likely would not have doubled if the patentee's sales force already called on the customers to whom the defendant sold the infringing product. In that case, the patentee may not have had to hire any additional sales people in the "but for" world. But, surely the sales force commissions paid to each sales person would increase? Again, this is not necessarily the case. The labor market for sales people is quite competitive. The total compensation required to entice a sales person to join the company is therefore set by the market. The patentee would have to meet this compensation level for a given level of effort (which it did in the actual world), but would have no incentive to go any higher in the "but for" world. Thus, in the "but for" world, the patentee may have readjusted its commission thresholds so that it ended up paying the same compensation to sales people as it did in the actual world. In other words, the commission expenses may not have been higher.

Framework for the Calculation of Lost Profits

I would replace the Panduit Factors with a requirement that the "but for" world be constructed using the following two-step framework:[17]

1. Identify the defendant's next best alternative to infringing that the defendant would have pursued in the "but for" world. The next best alternative might involve, for example, (1) withdrawing from the market, (2) offering a version of the accused product with the infringing feature removed, if feasible, (3) offering a version of the product based on a design-around, if feasible, or (4) offering an older version of the product that used prior art technology. It should ultimately be the defendant's burden of proof to establish what its next best alternative was. However, because typically the plaintiff offers its damages claim first, the plaintiff generally will have to make a provisional conclusion as to the defendant's next best alternative, and should be allowed to supplement its analysis after the defendant's reply. The next best alternative should be "available" (as in *Grain Processing*) during the time period at issue, and should not be based on speculation.

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[17] See also Gregory K. Leonard & Lauren J. Stiroh, *A Practical Guide to Damages* in ECONOMIC APPROACHES TO INTELLECTUAL PROPERTY: POLICY, LITIGATION, AND MANAGEMENT (2005).

2.   Given the defendant's next best alternative, the market outcome in the "but for" world where it pursued its next best alternative instead of infringing must be determined.   This analysis takes into account the supply conditions of the various competitors (including the capacity and cost structure of the patentee), and the preferences of customers (including their preferences regarding the patented feature or product).   If, for example, customers do not care about the patented feature and the defendant feasibly could have offered a version of the product without the patented feature at the same cost, then the "but for" market outcome would have been approximately the same as the actual market outcome and lost profits would be zero or negligible.

- ***The apportionment problem in a lost profits calculation arises from the recognition that not all of the patent owner's lost profit is necessarily attributable to the use of the patented invention. That invention may be only one feature of a product. How does the law respond to this problem? How should it respond?***

Compensatory damages should return the patent owner to the financial condition it would have been in absent the infringement.   Appropriate construction of the "but for" world—as described in the framework I laid out above—is essential for determining the financial impact of the infringement on the patent owner.   Having identified the defendant's best non-infringing action in the "but for" world, and customers' best responses to the set of products that would exist in the "but for" world, the "apportionment problem" is immediately solved.   The patentee will receive as damages only the financial injury related to the infringement.   Two extreme cases illustrate this point.

First, suppose that, although the patent covers only a feature of the defendant's product, the product would not be economically viable without that feature.   For example, suppose that the patent covers the use of an engine in an automobile, but not the rest of the automobile.   The defendant could in principle have sold an automobile without an engine in the "but for" world, but its sales would have been zero because no customer would buy such a product.   Thus, in this case, the defendant's best non-infringing course of action would be to stay out of the market in the "but for" world.   Customers who bought the defendant's automobile in the actual world would have turned to one of the automobile products that still would have been available in the "but for" world.   This is true even for those customers who say they bought the defendant's automobile because of its features other than the engine, e.g., its exterior design.   The defendant's ability to offer its exterior design is contingent on its ability to offer an engine.[18]   Some of the customers who bought the infringing automobile in the actual world might have turned to the patent owner's product in the "but for" world, and the sales to these customers would form the basis for the lost profits analysis.

In the other extreme case, suppose that the patent covers a feature that could be eliminated from the defendant's product, leaving a product that some consumers would still purchase.   For example, the patent might cover the intermittent wiper feature on the automobile.   In this case, in the "but for" world, the defendant could offer the same automobile, but with the intermittent wiper feature removed. Customers who did not care about the intermittent wiper feature and instead bought the defendant's automobile because of its exterior design would have bought the non-infringing version of the defendant's automobile in the "but for" world.   Customers with a strong preference for the intermittent wiper feature would potentially have turned to another company's automobile in the "but

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[18] In principle, the defendant could argue that, in the "but for" world, it would have sold its exterior design to one of the other firms in the market that, say, was licensed under the patent, and this firm would then have made the defendant's sales. However, in the absence of any evidence demonstrating that this strategy was viable in the real world, it would appear to be highly speculative and thus likely inadmissible under governing legal standards.

for" world. Economic methods exist for determining how the demand for the defendant's automobile would change with the loss of the intermittent wiper feature. Again, an economically sound analysis would implicitly take care of the "apportionment problem."

- ***The entire market value rule allows the patent owner to recover the entire profit he would have earned on sales of a product incorporating a patented feature, when the feature is the "basis for customer demand" for the product. Is this rule useful or necessary in calculating damages that fully compensate patentees for lost profits?***

The application of the "entire market value rule" (EMVR) in the lost profits context has led to serious economic mistakes as well as considerable confusion. Thus, I would recommend that it be replaced by the framework I have laid out above.

First, the EMVR errs by looking only at the demand side. The supply side must also be considered. In particular, it is entirely possible that the patent does not relate to a feature that "is the basis for customer demand" for the product, and yet the patent owner nevertheless sustained lost profits as a result of the infringement. For example, suppose the patent covered a method for manufacturing the product. Absent infringement, the defendant could have produced the exact same product, but at a higher cost using a different manufacturing method. Most economic models would predict that the defendant would have charged a higher price in the "but for" world and thus would have made lower sales, with some customers turning instead to other products, including potentially the product of the patentee (moreover, the patentee might have been able to charge a higher price). Thus, the patent owner potentially sustained lost profits damages despite the fact that the patented feature was not "the basis for customer demand."

Second, assuming the term "product" is meant to refer to the defendant's product, in some cases the evidence might make it appear that the patented feature was not the basis for customer demand for the product even when it was "important" to some customers. For example, suppose that the patentee's product also has the patented feature and that the patentee and the defendant are the only two suppliers in the market. Customers choosing between the two products would necessarily do so only on the basis of those features that <u>differed</u> between the two products. Since both products have the patented feature, it may appear (incorrectly) from business documents, customer feedback, and other evidence that the patented feature was not important to "customer demand."

Third, in general, as discussed above, different customers have different preferences regarding a given feature, and a product is a bundle of multiple features. The patented feature might have been "important" for some customers, and not "important" for others. Thus, it is not useful to attempt to identify "the" basis for customer demand, a concept that makes no economic sense in many situations. For example, the intermittent wiper feature on the defendant's automobile might have been important only for a few customers. In that case, the patentee's automobile might have picked up a small number of additional sales in the "but for" world where the defendant offered its automobile without the intermittent wiper feature. From an economics point of view, the patentee would be entitled to the full incremental profit on those additional sales.[19] Any attempt to award only a fraction of the incremental profit on the additional sales citing the EMVR would be misguided from an economics point of view.

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[19] Additionally, it is possible that the patentee would have been able to charge a higher price since it would face less competition from the lower quality product of the defendant in the "but for" world. In that case, the patentee would also be entitled to price erosion lost profits damages.

Fourth, there has been substantial confusion regarding, and criticism of, the EMVR in the case where the patentee sells a complementary unpatented product in conjunction with the patented product (the "primary product").[20]   If the patentee can establish that increased sales of its primary product would have led (in a causal sense) to increased sales of the complementary products, the patentee should be entitled to lost profits on the incremental sales of the complementary products.   The EMVR may actually be too restrictive here, as under *Rite-Hite* it requires a functional relationship between the primary product and the complementary products.   In contrast, some have argued that the EMVR in this context should be further restricted, so that lost profits would not be awarded on complementary products that have "independent value."   However, this argument is flawed as a matter of economics, as a simple example illustrates.   Suppose the defendant sells the complementary product at a profit in two distinct markets: market A and market B.   In market A, the defendant also sells its infringing primary product in competition with the patentee's primary product.   Suppose that it is a demonstrated market fact that all customers in market A purchase the complementary product from the same supplier from which they purchase the primary product (they "sole source").   Finally, suppose that the defendant has no non-infringing alternative for the infringing primary product and thus would have had no primary product to sell in the "but for" world.   Because the defendant would sell no units of the primary product in the "but for" world, it would sell no units of the complementary products either (given the demonstrated preferences of customers to single source).   The patentee might pick up some of the defendant's primary product sales and, if it did, it would necessarily pick up additional complementary product sales also.   Thus, the patentee sustained lost profits on both the primary and complementary products.   Yet, the defendant's complementary product has "independent value" given that it is sold and generates a profit in market B.   Thus, a showing of "independent value" is not enough to rule out a lost profits claim related to the complementary products.   Instead, the showing must be of "independent value" in market A.   For example, if customers frequently "mixed and matched" primary and complementary products from different suppliers, the patentee's ability to claim lost profits on the complementary products would be reduced or even eliminated because the defendant may have retained some of its complementary product sales in the "but for" world even though it would not have offered a primary product.   Again, this possibility would be addressed by an economically sound lost profits analysis.

The framework I laid out above appropriately accounts for both the demand side (consumer preferences) and the supply side (the possibilities available to the defendant) and thereby correctly identifies the amount of lost profits the patent owner sustained as a result of the infringement.   In so doing, it addresses both the concerns that apparently lie behind the EMVR as well as the concerns that lie behind criticisms of the EMVR.

4.   REASONABLE ROYALTIES GENERALLY

▪ *Under what circumstances should a patentee who makes the patented product be awarded a reasonable royalty rather than lost profits?*

The best way to approach this question is to first perform the lost profits analysis, which will involve dividing the infringing sales into two categories: (1) the infringing sales that would have been made by the patentee in the "but for" world, and (2) the infringing sales that would have been made by another company or not at all in the "but for" world.

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[20] It is also possible that the patentee's product that competes with the defendant's infringing product does not itself incorporate the patented technology.   The same analysis would apply to that case.

I understand that a patentee is entitled to at least a reasonable royalty on each infringing sale. Assuming the patentee calculates lost profits damages on the infringing sales in category (1), it would be entitled to at least a reasonable royalty on each infringing sale in category (2). This leads to a "hybrid" damages analysis, where lost profits are calculated on category (1) and reasonable royalty on category (2). An important issue to consider here is the potential for double-counting.[21] Since the lost profits analysis has already accounted for the effects of competition on the sales in category (1), the competition between the parties with respect to these sales should play no role in the determination of the reasonable royalty for the infringing sales in category (2).

If the patentee chooses not to calculate lost profits damages on the infringing sales in category (1), it is still entitled to calculate a reasonable royalty on both category (1) and category (2) infringing sales.[22] This reasonable royalty analysis may take into account the competition from the infringing product that is associated with the category (1) infringing sales. Specifically, the prospect of making the defendant's product more attractive to customers (thereby losing the category (1) sales) would affect the minimum royalty that a patentee would require to license the defendant.

However, I would require that the same level of rigor be used in a reasonable royalty analysis as in a lost profits analysis. A patentee with a shaky lost profits claim should not be allowed to get it in through the "back door" by claiming that competition from the defendant would increase the royalty rate (under Georgia Pacific Factor 5). Courts should require the same level of rigor for claims under Georgia Pacific Factor 5 as they do for a lost profits claim.[23]

- ■ *Is the hypothetical negotiation the right construct for calculating reasonable royalty damages? What are its short-comings?*

Compensatory damages should be designed to return the plaintiff to the financial condition it would have been in but for the infringement. Reasonable royalty damages based on an analysis of a hypothetical negotiation between the patentee and the defendant can achieve this goal, because "but for" the infringement, the parties in many cases would have negotiated a license agreement under which the patentee would have received royalty payments.[24] The hypothetical negotiation is a reasonable approach to determine what these royalty payments would have been. (However, as discussed above, a compensatory damages award of this type will have little or no deterrence value.)

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[21] Another important issue with the hybrid approach is whether the lost profits component of the damages award completely compensates the patentee so that the reasonable royalty component represents damages above the compensatory level (even though the law expressly allows for such a component) One way to look at this issue is that, in the "but for" world, the patentee would make the sales in category (1) (and the profits on those sales) itself and license the defendant to make the sales in category (2). From that perspective, the hybrid approach would not result in a damages award above the compensatory level, although the "but for" world scenario described may be unrealistic in some cases.

[22] It is possible, for example, that the patentee does not claim lost profits on the category (1) sales because it would not have made an incremental profit on those sales.

[23] The question, however, may be somewhat different in the two analyses. In the reasonable royalty analysis, the question concerns the level of sales and profits the patent owner expected to lose as of the time of the hypothetical negotiation, while in the lost profits analysis, the question concerns the level of sales and profits the patent owner actually lost.

[24] The one sense in which the hypothetical negotiation differs from a negotiation in the real world is the assumption that the patent has been deemed to be valid and infringed. I discuss this issue further below.

That said, however, a number of important issues have arisen in the practical application of the hypothetical negotiation approach. It would be beneficial for these issues to be addressed, whether through legislation or some other means.

The Date of the Hypothetical Negotiation

The date that is chosen for the hypothetical negotiation can have a significant effect on the outcome of the analysis if there are sunk costs and design lock-in, or if the set of non-infringing alternatives available to the defendant changed over time. Consider the following example. Company A, the defendant, invests $1 million in sunk costs to develop a product. It expects to earn profits of $2 million after the product is launched. The defendant has no alternative to the patented technology and thus would have no product to sell without a license. If the hypothetical negotiation is assumed to be held at the time of product launch, the $1 million investment would play no role in the analysis because that cost had already been sunk by that point in time and could not be recovered. It would play no role in the forward-looking hypothetical negotiation. Thus, Company A would be willing to pay up to $2 million in royalties to obtain a license at that point. Conversely, if the hypothetical negotiation is assumed to be held prior to the sinking of the $1 million investment (e.g., at the outset of the design process), Company A would only be willing to pay up to $1 million ($2 million in profits less the $1 million investment) in royalties. Thus, Company A's bargaining position is substantially different depending on when the hypothetical negotiation is assumed to be held.

Similarly, consider a situation where Company A could design around the patent. Suppose that, at the time of the product launch, Company A would have required six months to achieve the re-design because it was already locked into the infringing design. Two years before the first sale, Company A could have re-designed much more quickly because it was not too far down the design road and thus was not yet locked into a particular design. Placing the hypothetical negotiation at the time of product launch would again lead to a higher reasonable royalty than placing it at a point in time prior to the design being finalized.

As I understand it, the law says that the hypothetical negotiation should be placed at the time of first infringement. This is ambiguous because "first infringement" could be interpreted as occurring during the design stage or at the time of first sale (unless the product was introduced prior to the patent issuing, in which case the date of first infringement is not ambiguous). Given this ambiguity and the importance of the date for the outcome of the reasonable royalty analysis, the parties to the litigation frequently disagree on the appropriate date to use. In my view, the law should be clarified to set a specific time frame for the hypothetical negotiation so as to eliminate a source of conflict and uncertainty in patent litigation.

What date should this be?[25] Setting the date of the hypothetical negotiation at a time when the defendant still has flexibility (i.e., has not sunk any costs, has not chosen a design) would result in a reasonable royalty that reflects better what might be termed the "inherent value" of the patented technology, excluding any lock-in value.[26] However, in the real world, royalties frequently

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[25] A distinction should be drawn between the hypothetical negotiation analysis used at trial to determine past damages and the hypothetical negotiation analysis used post-judgment to determine post-judgment damages. Arguably, the date of the latter hypothetical negotiation should be set at the time of judgment given that infringement beyond the date of judgment is willful. I have not explored this question in these comments since it is the subject matter of a different panel.

[26] The "laches doctrine" gives potential infringers some protection against patent owners deliberately waiting until potential infringers are locked in before alleging infringement.

incorporate lock-in value. Moreover, the overall "value" of a given technology may result from an interaction of factors "inherent" to the technology with factors that are not "inherent" to the technology itself, thus making the concept of "inherent value" ambiguous. Consider, for example, a technology that takes one month to implement and a second technology that takes two months to implement. Both technologies yield physically the same product. However, suppose the market for the product would have entirely dried up after two months. In this case, the second technology is "worthless," while the potential licensee would pay a significant royalty for a license to the first technology. Yet, the first technology's only advantage is its speed in implementation, which is itself important because of its interaction with the particular nature of market demand.

It is also important to note that the problems caused by lock-in and sunk cost are potentially quite large in cases where the patent issues after the defendant's product is already on the market. At that point, the defendant often has expended substantial sunk costs, is locked into the design, and faces a substantial time off of the market to re-design the product. Current law would place the hypothetical negotiation at the time the patent issues and thus all of the costs of design around would enter into the hypothetical negotiation. Yet, at the time the choice of the patented technology was made, that choice was not an infringing choice (the patent had not yet issued).

In my view, the date of the hypothetical negotiation should be set at the time when the defendant was designing the product to incorporate the patented technology. This would help to lessen the extent to which reasonable royalty awards incorporate lock-in value, while still ensuring that significant innovations are rewarded with substantial royalties.

"Willing Licensor"/"Willing Licensee"

The assumption of a willing licensor and a willing licensee is often questioned because the parties would not be in litigation unless one or both parties had been unwilling to enter a license. However, it is important to recognize that this unwillingness to license occurred in the real world where there was uncertainty about validity and infringement (and likely disagreement between the parties on this issue), while in the hypothetical negotiation, the patent is assumed to be valid and infringed. Thus, the assumption of willing parties is not necessarily inconsistent with the real world events.

In my view, the assumption of a willing licensor and licensee is also useful because it decreases the ability of one party subjectively (and self-servingly) to argue that they would "never" have entered in a license with the other party and therefore deserve a favorable royalty.

A more important issue is that even cool-headed parties with full knowledge may not be able to reach an agreement if economic conditions are such that there are no "gains to trade" that can be divided between the parties, making them both better off with a license than without a license. For example, consider the case of a generic drug manufacturer. If it enters with a generic version of a brand name drug, it will sell 90 units at a per unit profit of $1, while the brand name manufacturer will sell 10 units at a per unit profit of $2. If the generic does not enter, the brand name manufacturer will sell 100 units at a per unit profit of $2. In this case, there is no royalty that (1) makes the brand name manufacturer better off with the generic in the market, and (2) leaves the generic manufacturer with a profit. The largest royalty the generic would be willing to pay is $1 per unit (the entire profit). Then, the branded manufacture's total profit would be $90 in royalties plus $20 in profits on its own sales, or $110. If the branded manufacturer did not license, its profits would be $200. Hence, there is no "middle ground" that would provide a basis for the parties to reach agreement on a license. In economic terms, the patentee's minimum acceptable royalty exceeds the defendant's maximum

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acceptable royalty. Clearly, under this condition, the assumption of willing licensor and licensee cannot be maintained.

This outcome will generally be more likely when (1) the competition between the parties will be sharpened significantly by the defendant's use of the patented technology, and (2) the defendant's incremental profit margin on its product is lower than that of the patentee. The brand name-generic drug case is a classic example.

What should be done from a damages perspective when there is no common ground for a licensing agreement? In my view, because a compensatory damages award should return the patentee to the position it would otherwise have been in absent the infringement, reasonable royalty damages in this situation should be based on the patentee's minimum acceptable royalty.

Book of Wisdom

From the point of view of an economist, the hypothetical negotiation should be analyzed using the information that the parties had on hand at the time of the negotiation. Particularly useful are the parties' forecasts regarding the future sales and profitability of the products at issue. Sometimes, however, information on the parties' forecasts from the relevant time period is not available or is not be credible. In that case, information from after the time of the hypothetical negotiation may be useful to approximate what was known at the time. For example, actual sales might be a reasonable guide to the parties' forecast of sales at the time of the hypothetical negotiation if there is no evidence that the parties were substantially surprised by actual events. Such information may also useful in validating projections that were made contemporaneously with the hypothetical negotiation.

In some patent cases, however, a further step is taken. Even if actual events were a surprise to the parties, for the purposes of the hypothetical negotiation, they are nevertheless assumed to have known exactly what would happen. This is called "the book of wisdom."[27] The motivation for using the "book of wisdom" appears to be related to fairness: a defendant who was anticipating a profitable product seemingly should not have to pay a large royalty if in fact the product turned out to be unprofitable, and a patentee seemingly should be entitled to a larger royalty if the defendant's product turned out to be wildly profitable even though not much was expected at the time of the hypothetical negotiation.

In my view, use of the "book of wisdom" in this way should be prohibited. Analysis of the hypothetical negotiation should be based on what was known at the time. Actual events after the date of the hypothetical negotiation should be relied on only to the extent that they are used to gain information as to what the parties knew at the time.

- ▪ *Is there a danger that an award based on what the infringer would have paid in a license will encourage disregard of patents? (Why put a quarter in the parking meter if the fine is only a quarter?) How does and should the law address this issue?*

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[27] The term "book of wisdom" is sometimes used to encompass any use of actual data. However, as I mentioned above, use of actual data to help determine what the parties knew at the time of the hypothetical negotiation is a valid procedure and thus I would reserve the "book of wisdom" label for the situation where the parties are assumed to have known at the time of the hypothetical negotiation about subsequent events that in the real world were a "surprise."

In principle, a properly calculated reasonable royalty <u>should</u> generally exceed what the infringer would have paid in an actual world license. The reason for this is that an actual world negotiation takes place (in most cases) with the parties uncertain as to the patent's validity and infringement. The hypothetical negotiation construct, on the other hand, assumes that the parties treat the patent as valid and infringed with certainty. All else equal, this should result in a higher royalty in the hypothetical negotiation than in a corresponding real world negotiation. Sometimes this basic economic fact is ignored, however, particularly when the reasonable royalty is based on actual world licenses, which were negotiated under uncertainty about the patent's validity and infringement.

The so-called "Panduit kicker" can address this problem, by increasing the reasonable royalty rate above the royalty rates in actual world licenses. But, a Panduit kicker is not always applied in practice. Moreover, it is not clear whether the Panduit kicker represents the "correct" adjustment to the reasonable royalty rate.

Even if the reasonable royalty is increased to account for the certainty regarding validity and infringement, as discussed above, reasonable royalty damages do little to deter firms from testing patents. Whether the law should address this depends on how we view the property right conferred by a patent. As I understand it, a patent provides the right to sue to exclude, not the right to exclude. As discussed above, the testing of patents can have social benefits.

If it was desired to increase the property right conferred by a patent, a system of punitive damages would be needed to deter firms from testing patents. The amount of a punitive award could be based on the fact finder's assessment as to the probability of validity and infringement at the time of the hypothetical negotiation. But such a system seems difficult to administer in practice.

- ***At what point in time should the law place the hypothetical negotiation? Should the hypothetical negotiation be placed in time prior to the infringer incurring any sunk costs associated with the patented technology?***

I addressed this above. In my view, the hypothetical negotiation should be placed at the time the patented technology was incorporated into the product. This would be true whether the patent issued before or after the defendant launched its product.

- ***How should the law approach the timing of the hypothetical negotiation in the circumstance of a patent that covers a standard?***

A patentee with a patent that covers some aspect of a standard may be able to demand a higher royalty rate after the standard has been set than they could have before because of design lock-in, sunk costs, and coordination problems.[28] Thus, for the reasons discussed above, the hypothetical negotiation should be set at a time prior to the standard being set, when the defendant and standard setting organization still had flexibility regarding the choice of technologies.

5.   REASONABLE ROYALTY AWARDS, AS LITIGATED

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[28] See, e.g., Joseph Ferrell, John Hayes, Carl Shapiro & Theresa Sullivan, *Standard Setting, Patents and Hold-up*, 74 ANTITRUST L. J. 603 (2007).

- *How should judges and juries determine the bargaining range for the hypothetical negotiation and a particular royalty within that range? Is the goal of the reasonable royalty calculation to award damages that correspond to the market value of the invention?*

The goal of a reasonable royalty analysis is to determine the award that would make the patentee whole with respect to the infringement. Thus, the hypothetical negotiation should be designed to replicate the negotiation that would have taken place between the patentee and the defendant (with the added assumption that the patent is valid and infringed). A technology can have different values to different parties. In the reasonable royalty analysis, we are interested in the specific value to the parties in question. We are not seeking to determine "the" market value of a technology.

Economic theory suggests that parties to a negotiation would be influenced by their alternatives to reaching agreement, as well as their discount rates.[29] Their alternatives to reaching agreement are often called their "walk away points." For the patentee, there is a minimum acceptable royalty. For the defendant, there is maximum acceptable royalty. The negotiated royalty must fall between these bounds in order to be acceptable to both parties.

As discussed below, economic analysis can be used to determine the bounds of the bargaining range. How does one determine where within the range the negotiated royalty would fall? There are two approaches. First, economic models of bargaining make predictions about how parties will split the potential gains to trade.[30] The predictions of these models can be used to determine the negotiated royalty. Second, actual licenses for the patented technology entered into by the patentee may be informative about where within the bargaining range the negotiated royalty rate would fall in the hypothetical negotiation. As always when looking to actual licenses, one should make sure the licenses and the parties involved are valid "comparables." An actual license may not be comparable because (1) it was negotiated under uncertainty about whether the patent was valid and infringed; (2) it had different licensing terms (e.g., cross licensing provisions or exclusivity); (3) it involved parties under different economic conditions than the parties to the hypothetical negotiation (e.g., selling different products with different supply and demand conditions); etc. Adjustments may be required to account for such points of incomparability. If reliable adjustments are not possible, the actual licenses may not be useable.

Another, more subtle point, is that actual licenses may not be valid comparables because of a "sample selection problem." The decision to license versus litigate is not made randomly. It depends on the economic conditions of the parties involved. We might expect that parties with more at stake would be more likely to litigate and, in particular, we might expect that situations involving high value would be more likely to be litigated to conclusion, while situations involving low value would be more likely to end without litigation. In that case, the royalty rates in the actual licenses for non-litigated low value situations would not provide a valid basis of comparison for the royalty rate that would result from the hypothetical negotiation for a high value situation. In short, the actual licenses may not be "representative" of the hypothetical license for the patent-in-suit.

i. *What determines the minimum amount the patentee would be willing to accept?*

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[29] See, e.g., Ariel Rubinstein, *Perfect Equilibrium in a Bargaining Model*, 50 ECONOMETRICA 97 (1982); Ken Binmore, Avner Shaked & John Sutton, *An Outside Option Experiment*, 104 Q. J. ECON. 753 (1989).

[30] Binmore, et al., note 29 supra, lays out a model of how a pie will be split when the parties have outside options and provided the results of an experiment that were generally consistent with the model's predictions.

The minimum amount the patentee would be willing to accept generally depends on the profit opportunities that the patentee would expect to give up by allowing the defendant to practice the patented technology. These lost opportunities might include: (1) lost profits on lost sales of competing products and complementary products, (2) price erosion, (3) a higher cost structure due to loss of economies of scale or scope, (4) lost royalties from existing licensees, (5) the lost ability to offer an exclusive license, (6) the lost ability to market the patented technology itself, etc.[31] (Again, however, if a "hybrid" lost profits/reasonable royalty approach is being used, the lost profits factors should not be double-counted in the reasonable royalty analysis.) Future lost opportunities should be discounted to present value using a discount rate that reflects the systematic risks of the business line in question.[32] Typically, information useful for determining the patentee's lost opportunities can be obtained from company documents, deposition testimony, and other sources.

ii. What determines the maximum amount the infringer would be willing to pay?

The maximum amount the defendant would be willing to pay generally depends on the profits that the defendant would expect to gain by using the patented technology. These expected gains might include: (1) greater sales of the product (and potentially future products), (2) a higher price for the product, (3) lower costs (either lower product costs or the avoidance of design-around costs), (4) greater sales of complementary products, etc.[33] Future benefits and costs should be discounted to present value using a discount rate that reflects the systematic risks of the business line in question. Typically, information useful for determining the defendant's expected gains can be obtained from company documents, deposition testimony, and other sources.

- ***What methods are used in establishing reasonable royalties to a judge or jury? How valuable are they? What restrictions should a court place on the use of such evidence by damages experts? Under what circumstances, if any, should such evidence resulting from such methods be kept from reaching the jury?***

The economic analysis of the hypothetical negotiation is a reliable method for determining reasonable royalty damages. Other methods—such as rules of thumb (e.g., the "25 percent rule") or benchmarking (e.g., to "comparable licenses" or to industry average royalty rates)—often are not reliable because they do not take into account the specific economic conditions that determine the outcome of a negotiation between the specific parties at issue. For this reason, rules of thumb and using an average industry royalty rate as a benchmark would generally not be acceptable under the *Daubert* standard--they are "one size fits all" approaches that fail to "fit" the facts of the specific case at hand. Proponents of the "25 percent rule" might argue that they use the rule only as the "starting point" for their reasonable royalty analysis. However, this argument fails because any reasonable royalty rate derived from an unreliable "starting point" is likely itself to be unreliable.

Benchmarking to "comparable" licenses involving the patents-in-suit can sometimes provide useful information, as long as the licensing terms and the economic conditions of the parties involved in these actual negotiations were actually comparable to those in the hypothetical negotiation. However, too often points of incomparability are ignored. Examples of important licensing terms and economic conditions for which comparability must be established are: (1) the patents being licensed, (2) cross

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[31] Leonard & Stiroh, note 17 supra, at 54.

[32] See, e.g., Richard Brealey & Stewart Myers, PRINCIPLES OF CORPORATE FINANCE (2003), at 244.

[33] Leonard & Stiroh, note 17 supra, at 55.

licensing provisions, (3) exclusivity provisions, (4) field of use restrictions, (5) fixed milestone, lump sum, or minimum royalty payments, (6) other "consideration" such as technology transfer, (7) grant-back provisions, (8) "most favored nations" provisions, (9) the product, industry, and market position of the licensee, and (10) the time the license was negotiated.   Without comparability (or reliable adjustments for points of incomparability), royalty rates cannot be compared across licenses. This is no different than attempting to compare house prices without first adjusting for differences between the houses in number of bedrooms, number of bathrooms, lot size, city, date of transaction, etc.

The use of "industry average" royalty rates as a benchmark is particularly unreliable since such an average is taken across many different licenses without any adjustment of any kind for differences across the licenses in the terms or economic conditions of the parties.

In general, use of "comparable" licenses should be a complement, not a substitute, for the economic analysis of the hypothetical negotiation.

I suggest that courts more frequently use *Daubert* to weed out unreliable expert testimony regarding reasonable royalty damages.

i. *Evidence of what actions the infringer would have taken in the absence of the patent, and the impact of such alternate actions on the profits of the infringer and the patentee?*

Such evidence is crucial to understanding what the bargaining positions of the patentee and the defendant.

ii. *Application of the Georgia Pacific list of factors?*

Georgia Pacific provides a list of sometimes overlapping factors (the "GP factors"), without giving a framework in which to evaluate those factors.   In fact, many of the GP factors are already incorporated into the economic analysis of the hypothetical negotiation.   I would replace the list of GP factors with a requirement that the litigants provide an economic analysis of the hypothetical negotiation, taking into account the various considerations that I have discussed above.

iii. *Evidence of industry average rates?   Royalty rates on "comparable" patents? Established royalties for the patent-in-suit?*

As discussed above, I do not believe industry average royalty rates are a reliable guide to the appropriate reasonable royalty rate in general.   Suppose the average industry rate is 1 percent, with a range from 0.1 percent to 30 percent.   Why is there such large variation in royalty rates across licenses in the industry?   The answer is that the economic conditions faced by the parties and the specific terms of the licenses differed substantially from license to license.   The conclusions to be drawn from this are: (1) an "average" royalty rate is a poor guide to what the royalty rate should be in any given situation, (2) the economic conditions of the parties and the licensing terms have a substantial effect on the royalty rate, and therefore (3) one cannot reliably determine the royalty rate that would have resulted from the hypothetical negotiation without understanding the specific economic conditions that were faced by the patentee and defendant.

How long would a shoe store stay in business if it offered shoes only in size 10, the average men's size?

How satisfied would customers be with the store's explanation that the average shoe size should fit everyone well? The store would be much more successful if it offered shoes in all sizes, so as to properly fit shoes to the feet of each individual customer.

As discussed above, royalty rates on "comparable" licenses can provide useful information as a complement to the economic analysis of the hypothetical negotiation if the comparability of the licenses is well-established. Even actual licenses for the patent-in-suit must be subjected to a comparability analysis before they are used. If the parties to the actual licenses were positioned differently from the parties to the litigation, or if the licensing terms of the actual licenses were different from those of the hypothetical license, these actual licenses may not be valid comparables for the hypothetical license.

iv. Application of rules of thumb regarding division of profits resulting from infringement?

Under the "25 percent rule," the most commonly used of the rules of thumb, the reasonable royalty is set at 25 percent of the operating profit of the accused product.[34] However, it defies economic logic to claim that this "rule" fits every set of facts. For example, the rule would apparently give the same answer for both for a "large" component and a "small" component, which makes no economic sense. To be reliable and credible, a reasonable royalty analysis must take account of the specific facts of the case at hand.

6. REASONABLE ROYALTIES AWARDED FOR A PATENTED COMPONENT OF A MULTI-COMPONENT PRODUCT

- *How should courts and juries determine the reasonable royalty when the patented invention is a small component of the accused product? What evidence is relevant? How are they approaching the issue?*

The issue to which this question refers is when large reasonable royalty damages are awarded for a patented invention that intuitively appears to be of relatively low importance and thus is a "small component," or one that accounts for only a "small" part of the value of the accused product.

In principle, the "small component" situation should cause no problem for a reasonable royalty calculation that is performed in accordance with sound economic principles. Generally a component will have small value for one of two reasons. First, it will have small value if it can be dropped from the product without having much of an impact on the demand for the product or the profit the defendant earns on the product. For example, suppose that the accused product could be made non-infringing by dropping the patented component. If the defendant had offered this non-infringing version of the product, it would have sold 999 units instead of the 1000 units it actually sold of the accused product, and would have earned a profit per unit of $9.99 instead of $10. The value to the defendant of being able to offer the small patented component is the difference in profit with and without the component, or $10*1000 - $9.99*999 = $19.99. The maximum royalty rate that the defendant would be willing to pay for a license is $19.99/$10000 = 0.2 percent of the revenue of the accused product. A reasonable royalty should necessarily be bounded at 0.2 percent of sales.

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[34] Robert Goldscheider, John Jarosz & Carla Mulhern, *Use of the 25 Percent Rule in Valuing IP*, 37 LES NOUVELLES 123 (2002) at 124.

The second reason a component might have low value is if there exists a design-around that (1) can be implemented at relatively low cost, and (2) has little impact on demand for the product and on the defendant's profit margin on the product. Suppose that in the previous example, the patented component could be replaced by a design-around that could be implemented at a cost of $10, and result in a product that was a perfect substitute from the point of view of consumers and cost the same amount for the defendant to manufacture. In that case, the maximum royalty the defendant would be willing to pay is $10/$10000 = 0.1 percent of revenue of the accused product. A reasonable royalty would necessarily be bounded at 0.1 percent of sales in this case.

If the small component situation should not be problematic for a sound reasonable royalty calculation, why have there been what seem to be unreliable large reasonable royalty awards? There are three reasons. First, some experts do not use an economically correct approach to reasonable royalty determination. Second, in some cases, the economically correct approach is applied, but in a way that incorporates lock-in value into the reasonable royalty. Third, the component is not actually small at all, and thus a sizable reasonable royalty is appropriate. I discuss each of these reasons in turn. I then address the relationship between "independent value" of components and "apportionment."

Failure to Use Economically Correct Approaches to Reasonable Royalty Determination

Unreliable large reasonable royalty outcomes typically arise when a plaintiff's expert uses one of the unreliable approaches to determining the reasonable royalty, e.g., blind application of rules of thumb or benchmarks, instead of the economic analysis of the hypothetical negotiation taking into consideration the defendant's non-infringing alternatives and customer preferences.

As discussed above, in my view, experts should be required to use an approach to reasonable royalty determination that is consistent with economic principles. Judges should use their gate-keeping power under *Daubert* to throw out expert testimony that does not meet this standard.

The Reasonable Royalty May Incorporate Lock-In

An expert may use the economically correct approach and still end up with what seems to be a large royalty for a "small" component if the royalty incorporates lock-in value in addition to the "inherent" value of the patented technology. For example, suppose that the date of the hypothetical negotiation is set at the time of first sale. The patented component is "unimportant" in the sense that consumer demand for the product and the defendant's profit margin on the product would be only negligibly affected if the infringing component were dropped. However, in order to drop the component, the product would need to be redesigned and this would take six months to achieve, resulting in a six month delay in the launch of the defendant's product. During that time, the defendant would lose market leadership and thus have a much smaller market share over the life of the product. In this case, the correct economic analysis, applied to a hypothetical negotiation at the date of first sale, could well lead to a large reasonable royalty even though the patented component is of little inherent value.

The large reasonable royalty in this case is not due to a "problem" with the way the analysis was conducted. Instead, it is due to the legal framework and, specifically, the date that the hypothetical negotiation was assumed to be held. If the negotiation were moved back in time to when the defendant was designing the product, perhaps it could have dropped or replaced the patented component at virtually no cost and thus the reasonable royalty would be substantially smaller.

The "Small" Component is Actually a "Big" Component

Sometimes the perception that a component is "small" is simply incorrect.   For example, suppose that a computer is run by a processor chip.   The architecture of the processor chip is covered by a patent. The computers are sold for $1000 each, with a $100 profit per computer for the defendant.   The processor chip costs $5.   The defendant argues that the processor must be a "small" component because it only costs $5, as compared to the $1000 price for the computer.   The defendant also argues that there are many other components in the computer, including memory chips, the LCD screen, and the promotion and marketing of the computer.   Surely, the defendant claims, the portion of the $200 profit that should be associated with the processor chip is very small.

This analysis is incorrect, however, if the defendant has no non-infringing substitute for the processor chip.   It is true that there are other components in the computer and that the defendant spent marketing dollars to promote the computer (note, though, that all of these costs would have already been subtracted out from the price to obtain the $200 profit and therefore have already been "reimbursed" before any royalty is paid).   However, neither the components nor the marketing would generate any value at all without the processor chip, because no consumer would buy a computer that did not function.   Thus, although the processor chip seems "small," it is actually the driver of the value of the computer.   The defendant would be willing to pay up to the entire $200 in profit in order to get a license to use the processor chip.

The situation would change if the defendant had an alternative non-infringing processor to which it could turn and achieve essentially the same results at little additional cost.   Suppose an alternative non-infringing processor chip was available at a cost of $6 per chip, and that this processor chip was just as good as the patented processor chip.   In that case, the value of the patented processor chip is low (i.e., the $1 in cost savings that it would provide), and the defendant would be willing to pay only a small fraction of the $200 in profit as a royalty (up to $1).

"Apportionment" and "Independent Value" of Components

As discussed above, some have argued that the concept of "independent value" of the non-patented components must be assessed in order to "apportion" the "correct" value to the patented component. These arguments have sometimes confused the economic principles involved.   In particular, in a discussion of apportionment one must be very careful as to whether the quantity to be apportioned is the <u>gross value</u> of the product, or the "<u>gains to trade</u>" associated with the product.

Consider the following example.   Firms A and B each have an asset.   If Firms A and B bring their assets together, they can create and sell a new product that will bring <u>gross value</u> V (this is the value created before subtracting any payments to Firms A and B).   Instead of joining forces with Firm B, Firm A could put its asset to an alternative use that would bring value V_A.   This is the "independent value" of Firm A's asset.   Similarly, Firm B has an alternative use for its asset that would bring value V_B.   There are (strict) "gains to trade" (i.e., Firms A and B would be better off joining forces than using their assets for the respective alternative uses) if $V_A + V_B < V$.   Firm A will agree to join forces if its payoff P_A from joining forces exceeds V_A.   Similarly, Firm B will participate if its payoff P_B exceeds V_B.   Thus, the parties negotiate over how to split the <u>gains to trade</u> $G = V - V_A - V_B$.   It is true that Firm A's total payout P_A will be larger the larger is V_A.   However, it is <u>not</u> generally true that Firm A's share of the <u>gains to trade</u> G will be positively related to V_A.   For example, if the parties evenly split the gains to trade, Firm A's share of G will be <u>unrelated</u> to V_A.

The analysis above assumes that undertaking the alternative uses for their assets would preclude Firms A and B from joining forces. Thus, V_A and V_B are "opportunity costs"—by joining forces, Firm A gives up the opportunity to earn V_A on its asset, and similarly for Firm B. What happens if Firm A's asset can be employed in the alternative use in a way that does not preclude Firm A joining forces with Firm B? This can be true of an intellectual property asset, which can be simultaneously employed in several uses. In that case, Firm A does not forego V_A by joining forces with Firm B. The gains to trade become $G' = V - V_B$ and, generally speaking, Firm A's total payout P_A will decrease.

Now, to make the example concrete, suppose the firms join forces and the gross value of the new product is $100. Firm A provides intellectual property. Firm B provides a sales force. The cost of Firm B's sales force is $60. This cost represents the value of the alternative use, or opportunity cost, of Firm B's sales force because this is what the market would pay to get a sales force like Firm B's. The opportunity cost of Firm A's intellectual property is zero, assuming that the project with Firm B does not affect Firm A's ability to use its intellectual property for other projects. The gains to trade are therefore $40. If the parties evenly split the gains to trade, Firm B gets $80 and Firm A gets $20. The gross value of $100 has been divided in a way that reflects V_A and V_B, but the gains to trade of $40 have been split in a way that is independent of V_A and V_B.

- ***Patent claims can be drafted to recite an inventive feature as one limitation of a larger product. For instance, a claim may recite a computer containing a CPU that incorporates one inventive feature. What role should the relationship between the infringing product, the claim scope and the inventive feature play in the reasonable royalty determination?***

The economically correct way to address this issue again is to ask what the defendant could have done without access to the patented technology, and how consumers would have responded to the changed economic circumstances. Could the defendant have offered a computer containing a CPU without the inventive feature? How would consumer demand for this product have been different? Would the defendant have charged a different price, or had different costs? The answers to these questions determine how much the defendant would have been willing to pay to be able to use the patented technology.

- ***When the inventive feature is a small component of a larger product, how should the royalty base be determined? Can we call the inventive feature the "contribution over the prior art," as patent reform legislation did?***

A percentage royalty rate cannot be determined without reference to the royalty base to which the rate will be applied. Rational economic actors care about dollars, not percentage points.

In my view, typically a good way to proceed is to start by defining what the royalty base will be and then determining the royalty rate that is appropriate *given that royalty base*. Sometimes existing licenses provide useful information on "standard" practices of the parties or the industry in terms of how the royalty base is defined. It generally is preferable to use as the royalty base the revenue from a product for which there are actually transactions in the marketplace, rather than trying to "apportion" a product's revenue among its components.

But, it is important to recognize that, if the economically correct analysis is performed, *it does not matter for the dollar value of the damages award how the royalty base is defined—the dollar damages should be the same for any choice of royalty base*. Properly done, the royalty rate is determined conditional on the royalty base. Thus, if a different base is used, a different royalty rate also must be

used in order to maintain the same dollar royalty payments.   This cannot be emphasized enough.   If an expert claims that the choice of royalty base matters, then the expert is using an economically invalid approach to reasonable royalty.[35]

I demonstrate this point through an example.   Suppose that with a license to the patented technology the defendant would have sales of $1000 and a profit of $100, and without the patented technology, the defendant's profits would be only $90.   Thus, the defendant would be willing to pay at most $10 to get a license to the patented technology.   To turn this into a rate, we might first choose as a royalty base the sales of the product, or $1000.   In that case, the royalty rate would be $10/$1000 = 0.1 percent.   However, perhaps the defendant argues that the patented component is small, and thus that the cost of the component should be used as the royalty base.   Suppose the cost of the component is $100.   The appropriate royalty rate for this royalty base would have to be $10/$100 = 10 percent. Note that, even though the royalty bases and rates differ between the two cases, the damages award is $10 in both cases.

- *What role, if any, should the entire market value rule play in such reasonable royalty determinations?*

If the economically correct approach to determining reasonable royalty is used, the entire market value rule has no further role to play.   The concern that it would address has already been taken care of.

- *Jury forms often ask for a total damages award, rather than separate findings for an appropriate rate and base.   Why?   What are the pros and cons of asking for separate findings?*

The "why" is outside my area of expertise, but I would think that it would help to require the jury to be as specific as possible about how they reached their final damages figure.

7.   PROPOSED LEGISLATIVE CHANGES TO REAONABLE ROYALTY LAW

- *Do juries and courts need better guidance on how to calculate patent damages? If so, what would be the best source of that guidance?   Legislation?*

Juries and courts need better guidance, particularly on how to calculate reasonable royalties. Essentially, I believe that *Georgia Pacific* needs to be replaced with a more unified and detailed framework for how to calculate reasonable royalties based on sound economic principles.   Judges then need to apply *Daubert* in a gate-keeper role to ensure that expert testimony is consistent with this basic economic framework.

It is outside my area of expertise as to whether this framework should be established in legislation or perhaps by the CAFC.

- *Patent reform legislation proposed changes, or perhaps clarifications, in reasonable royalty determinations.   How might they be implemented in court? Would they be beneficial?*

     i.   *Allowing damages to be based on the entire market value of an infringing product*

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[35] Although the same damages award should result regardless of the choice of base, I recognize that there may be legal strategy issues that affect the choice of base.   For example, a 10 percent royalty on a base of a $100 may sound more "fair" to a jury that has found infringement than a 0.1 percent royalty on a base of $1000.

when the invention's specific contribution over the prior art is the predominant basis for market demand.

This has always struck me as a clumsy approach, because it calls for making a "yes-no" binary choice when real situations are typically nuanced. It would also be an ambiguous approach since "predominance" is not easily defined. Why not just analyze the value to the defendant of using the patented technology based on sound economic principles? My proposed framework would do exactly this, ensuring that the reasonable royalty would appropriately reflect the value of the patented technology to the overall product.

ii. When licenses for the same patent or sufficiently similar substitutes are not available, basing the royalty on the economic value of the infringing product attributable to the claimed invention's specific contribution over the prior art.

My proposed framework calls for this, but I would not use the "prior art" language. I would use "non-infringing alternatives" instead.

iii. Restricting the damage theories and expert testimony that can be submitted to a judge or jury as the basis for a patent award.

I endorse this proposal. Specifically, I would require that litigants (and their experts) take an economically valid approach, such as my proposed framework. Experts who do not take an economically valid approach should be excluded under *Daubert*.

iv. Decreasing the use of reasonable royalties as the basis for damage awards by making it easier for plaintiffs to establish lost profits?

The problems with reasonable royalty outcomes seem to be more prevalent in cases where the plaintiff is an NPE and thus lost profits are not an option, so this proposal may not help much. In any event, I do not think the problem is that the standard for lost profits is too high, that the reasonable royalty framework is conceptually flawed, or that reasonable royalties are difficult to calculate. Instead, the problems arise from litigants and their experts using approaches for calculating reasonable royalties that make no economic sense. If a high standard of economic rigor were imposed, most of the problems with reasonable royalty calculations would be avoided.