

Don't Feed The Trolls?

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*Different entities use the patent system in different ways, depending on their respective business models. It is important to acknowledge this dynamic when evaluating the propriety of revising the patent system to combat trolling or promote other goals.*¹

Many vociferous opponents to patent trolls claim that trolls are a drag on society. Patent trolls are accused of using the patent system to extort unreasonable royalty payments from companies who benefit the economy by developing products that consumers want. The extortionary royalty payments, it is said, constitute a “tax” that ultimately leads to less product development and higher prices for consumers.

But, is there an economic case to be made against trolls? Would society be better off without them? In this paper, we examine a range of issues surrounding patent trolls. We begin by defining what kind of patent owner qualifies as a troll; we find that the answer to this question is not so clear-cut. We then seek to understand the effects of troll activity on innovation. Next, we consider the question of whether or not trolls should be allowed to exclude from the market entities that produce goods that embody their patents, in light of the recent Supreme Court opinion in *MercExchange v. eBay*. Finally, we discuss competing considerations regarding the ultimate public policy question—what can be said about whether restrictions, or a downright prohibition, on trolls would increase or decrease social welfare?

What is a Patent Troll?

The term “patent troll” was first coined by an assistant General Counsel at Intel, Peter Detkin, in 2001 and has since come into common use.² Mr. Detkin was describing firms “that try to make a lot of money off a patent that they are not practicing and have no intention of practicing and in most cases never practiced.”³ Justice Kennedy appeared to have been referring to the “troll” phenomenon when

he referred to “an industry [that] has developed in which firms use patents not as a basis for producing and selling goods but, instead, primarily for obtaining licensing fees.”⁴

A Congressional sub-committee that held hearings on patent trolls in the context of proposed patent reform defined them as follows.

According to its critics, the troll is an individual who invents a patented product or process of suspect legal integrity or who acquires such a patent from a third party. The owner is characterized as someone who makes money by extorting a license from a manufacturer who allegedly has infringed the patent. Fearing the possibility of an injunction that will force the manufacturer to cease operations, the company settles. Critics of the patent system, including many high-tech and software companies, believe that trolls contribute to the

proliferation of poor quality patents. Ultimately, these critics assert, trolls force manufacturers to divert their resources from productive endeavors to combat bogus infringement suits.⁵

Each of these definitions presents a series of tensions and grey areas. These tensions arise from the diverse ways in which firms organize and utilize their intellectual property assets. Even firms that are not commonly thought of as patent trolls share certain

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1. See Comments from Chairman Lamar Smith, Opening Comments, Hearing Before the Subcommittee on Courts, the Internet, and Intellectual Property of the Committee on the Judiciary, House of Representatives, 109th Congress, 2nd Session, June 15, 2006. Serial No. 109-104. p. 2 (“IP Committee Hearing”).

2. See, for example, *Wikipedia*, “Patent Troll,” *en.wikipedia.org/wiki/Patent_troll*

3. Murray, Alan. “War on ‘Patent Trolls’ May be Wrong Battle.” *The Wall Street Journal*. 22 March 2006, pg. A2.

4. Supreme Court of the United States. Opinion of the Court. *eBay Inc. et. al. v. MercExchange, LLC*. May 15, 2005.

5. Hearing Before the Subcommittee on Courts, the Internet, and Intellectual Property of the Committee on the Judiciary, House of Representatives, 109th Congress, 2nd Session, June 15, 2006. Serial No. 109-104. p.1.

characteristics with the so-called trolls. For example, firms may find it profit-maximizing not to vertically integrate their R&D and manufacturing processes, choosing instead to set up patent-holding companies that focus on development, acquisition, maintenance and licensing of intellectual property. These entities do not practice the patents and their revenues come exclusively from licensing; therefore, they would fit under some definitions of a “patent troll.” Similarly, a university that holds patents but does not manufacture any physical product would fall under certain definitions of a troll. Likewise, a sole inventor who seeks to license his innovation to a large corporation may be seen, from the corporation’s point of view, as engaging in troll-like behavior. The patent-holding company, the university, and the sole inventor are not the type of entities generally contemplated by those using the phrase “patent troll” in a derogatory manner. However, practically-speaking, it is quite difficult to craft a definition of “troll” that does not sweep other types of entities into its net.

Definitions that focus on reliance on suspect patents as a critical trait of the patent troll, such as the definition proffered by the Congressional sub-committee, are also problematic. Determining the validity of a patent generally requires lengthy and expensive litigation. The patents of several so-called trolls have survived invalidity challenges relatively unscathed. Conversely, patents held by entities that produce a product that embodies a patented technology have been found to be invalid. On an *ex ante* basis, therefore, it is difficult to identify a patent troll. Even *ex post*, patent validity does not seem to be a good way of discerning trolls from “legitimate” holders of IP assets, since even firms who manufacture products embodying patented technology sometimes discover in litigation that their patents are invalid.

Are Trolls a Drag on Innovation?

For economists, the debate about trolls would be little more than a question of equity in dividing the rents associated with intellectual property were it not for the possibility that troll activity negatively impacts economic efficiency and economic growth. These negative effects may come from a drag on innovative activity and from litigation costs. Many economic commentators argue that the activities of trolls have a negative impact on innovative activity. Defenders of patent trolls argue exactly the opposite. One key reason for this disparity in viewpoints may be a profound disagreement over the concept of “innovation.” Essentially, both sides embrace a different definition of this term. Those who believe innovation refers to the development and commercialization of

an economically viable product assert that the behavior and activity of most patent trolls has a negative and inhibitive effect. Those who believe innovation refers to novel inventive activity tend to assert that patent trolls enhance the rights and value of inventive behavior.

An economic evaluation of both sides’ positions finds that both arguments have merit. More specifically, the activities of patent trolls can inhibit development activity of producing firms, while at the same time providing incentives for increased inventive activity. Accordingly, there is no simple, single answer to the question of patent trolls’ net effect on economic efficiency and economic growth. Instead, the answer involves a balancing of the two seemingly disparate effects. In the end, some parties win while others lose from patent troll enforcement activities, regardless of the overall social welfare considerations. It is no wonder, then, that we see such vehement debate from both sides on this issue.

Since the debate stems from each side’s different interpretation of “innovation,” we first need to ask, what is innovation? The standard dictionary definition equates innovation with invention:

a creation (a new device or process) resulting from study and experimentation; synonym-invention.⁶

Many business people, on the other hand, view innovation as including more than pure invention. Definitions used by business people can include:

“Innovation is people creating value by implementing new ideas;” “The starting point for innovation is the generation of creative ideas. Innovation is the process of taking those ideas to market or to usefulness;”⁷

“The distinction between “invention” and “innovation” is that invention is the creation of a new idea or concept, and innovation is turning the new concept into commercial success or widespread use;”⁸ or more succinctly, “Innovation = Invention + Exploitation”⁹

The different interpretations of innovation go a long way towards explaining the discordant viewpoints on the question of effect. Those who find that innovation is synonymous with invention answer the question from the point of view of how troll behavior

6. Webster’s Revised Unabridged Dictionary (1913).

7. http://www.creativeadvantage.com/innovation_definition.html

8. http://www.creativeadvantage.com/innovation_definition.html

9. http://www.creativeadvantage.com/innovation_definition.html

affects inventive activity. Those who relate innovation to exploitation or commercialization of new ideas focus instead on how troll behavior affects business decisions with respect to development and sales of a product.

Given the different results of economic analysis depending on the viewpoint evaluated, it is natural to ask which viewpoint economists tend to take. The answer is neither of the two positions discussed so far. Most economists would agree that innovation is a combination of invention and commercialization. For example, Trajtenberg suggests that:

Pressed for a definition, most economists probably agree that innovation means the creation of new, economically valuable knowledge. In other words, innovations can be thought of as increments to the stock of knowledge available to a society, which take the form of improvements in (or additions to) the set of available goods, services, or production processes, and hence have a direct bearing on our well being.¹⁰

Similarly, Tirole discusses three types of “research” that lead to innovation: “basic research aimed at deriving fundamental knowledge...applied research associated with engineering...and development, which brings products and processes into commercial use.”¹¹ By implication, an economist will assess the impact of patent troll activity by evaluating the net benefit (or loss) to social welfare, taking into account the effects on both inventive behavior and development activity.

Let us first examine the effect of troll behavior on invention. The argument espoused by the patent trolls and individual inventors is that patent troll activity helps even the playing field between the individual inventor and the large corporation. Without the ability to use the courts to force a large corporation to the table or to transfer the enforcement rights to an entity that is more capable of sustaining a protracted litigation with an infringer with deep pockets, individual inventors would find themselves at a significant disadvantage. Such an outcome, so goes the argument, inhibits individual inventors from deriving the full value of their inventions. This inability to capture the value of the invention will reduce the incentives to invest in inventive activity. Given the importance of inventive activity to social

welfare, this effect is argued to be undesirable.

The behavior and activities of patent trolls have the potential to even the playing field. It is for this reason that supporters of patent troll behavior sometimes refer to them as “patent angels.” As discussed earlier in this paper, patent trolls come in a variety of configurations. In most configurations, their behavior tends to increase the value of patents. The increase in value results, primarily, from increased liquidity in the market for the transfer of patent rights. The result of increased patent value is an increase in patenting activity.

Assets freely traded in liquid markets are worth more than identical assets traded in illiquid markets. Illiquidity increases the risk of holding the asset and buyers require a discount to compensate for that additional risk. The activities and behavior of patent trolls has led to increases in the frequency, visibility, and competitiveness of transfers of patent rights. Examples of such market changes include recent moves to establish open auctions for patents, the entry of hedge funds and other investors in the market for patents, and the realization and activity on the part of producing entities to procure patents in the space surrounding their products. All of these activities have made the market for the transfer of patent rights more liquid and have thereby increased patent value.

The increase in patent value leads to increased incentives to create new patented inventions. The increase in new patents can come from two sources. First, there is increased incentive to engage in new research and development activities that may lead to previously undiscovered inventions. Every research and development activity has a probability of success. Evaluations of these probabilities, and the corresponding costs and rewards associated with the activity, results in a decision regarding whether to undertake the activity. As the value of the resulting invention increases, some activities previously found to not be economically justified will now be undertaken, thus increasing inventive activity and, most likely, actual inventive output as well.

The other source of the increase in patented inventions can come from inventions that would otherwise exist, but that would be held as trade secrets rather than be publicized through the patent process. The economic decision-making process regarding whether to patent an invention or retain it as a trade secret is similar to that described for new research and development activities. A company (or individual) that discovers a new commercially valuable invention can choose either to seek a pat-

10. Manual Trajtenberg, *Economic Analysis of Product Innovation: The Case of CT Scanners*.

11. Jean Tirole, *The Theory of Industrial Organization*, MIT Press, 1988, p. 389.

ent, which results in the invention becoming public knowledge, or it can keep the invention secret and seek to profit from it without the invention becoming public. This decision will be made based on a comparison of the relative benefits of the two alternatives. As the value of the patent becomes greater, some inventions that previously would have been kept as trade secrets will now be patented.

While patent trolls arguably have the effect of increasing inventive activity, their effect on development and commercialization activity are not so favorable. A company considering a new product offering carefully evaluates the costs and benefits associated with the product offering. This cost-benefit analysis will attempt to account for every potential risk factor, including an analysis of the patent space surrounding the product offering. While the company's patent analysis will likely have identified and addressed any patents that were clearly related to the product offering, it may well not have been able to identify the multitude of patents that are not clearly related to the product offering, but that, in the hands of a patent troll, may nonetheless be asserted against the company. It is this potential outcome that increases risk, and correspondingly inhibits commercialization.

The perceived risk from the point of view of commercializing entities is that of an increasing number of assertions from patent trolls that employ more of a venture capitalist approach to patent infringement litigations. The trolls, free from cross-complaints based on patent infringement or antitrust allegations, may attempt to stretch the coverage of a patent's claims and sue producing companies that would not otherwise have anticipated a patent challenge to their product. From the point of view of the troll, one significant "win" will more than pay for a large number of misses.

From the producing company's point of view, however, the risk that a new product may be subject to one or perhaps a number of such unforeseen patent claims adds significant costs to the product development project. For some potential projects, the anticipated benefits will still outweigh the costs, and the projects will go forward regardless of the existence of troll activity. For other products, however, the added risks of patent litigation with trolls will tip the cost-benefit balance against the project and it will be shelved. The reduction in commercialization activities as a result of troll behavior has negative consequences for economic efficiency when such reductions occur due to risks associated with irrelevant or invalid patents that otherwise should not be addressed by the commercializing entity.

What is the net effect of the patent troll on economic technological progress? We find that the answer requires an analysis of the benefits and costs associated with the two components of innovation. Patent troll activity may tend to an increase in the amount of inventive activity through its positive effect on patent value. At the same time, patent troll activity may inhibit development and commercialization of new inventions by adding unwarranted costs to the commercialization process. In the end, whether the net effect of troll behavior is positive or negative is an empirical question and the answer will depend on, among other things, the nature of the patents being alleged, the relationship between those patents and the trolls' targets, and the validity of the alleged patents.

Trolls and the Four-Factor Test

Patent trolls, we have argued, are not easily characterized. Much depends on the circumstances. The effect of these hard-to-define entities on innovation, we have also argued, is subject to an empirical assessment of costs and benefits on a case by case basis. In the *eBay* decision, the Supreme Court ruled that district courts must rigorously apply the traditional four-factor test in order to determine whether to grant a permanent injunction after a finding of validity and infringement in a patent case. We now analyze the four factor test from an economic point of view; the four factors are:

If an injunction were not granted, would the plaintiff sustain irreparable harm?

If an injunction were not granted, would the plaintiff have an adequate remedy at law?

What is the balance of hardships between the parties?

Would an injunction further the public interest?

How might the evaluation of the four factors differ depending upon whether the plaintiff/patent owner was a troll or other non-producing entity? Under the four-factor test, should trolls and other non-producing entities be less likely to be granted permanent injunctions post-judgement?

If an Injunction Were Not Granted, Would a Troll Sustain Irreparable Harm?

From a legal perspective, irreparable harm is "the principle that equitable relief (such as an injunction) is available only when no adequate legal remedy (such as monetary damages) exists."¹² Given that monetary damages (one remedy) are often calculated based on economic fundamentals, it is appropriate to ask how economics might be relevant in the assessment of

factors, such as irreparable harm, considered in the application of other remedies (i.e., injunctions).

What are the legal remedies available to a non-producing entity that owns a patent that has been found to be valid and infringed? Monetary damages are a legal remedy, providing backward looking compensation for harm previously incurred. For a troll, these damages usually take the form of a reasonable royalty. Reasonable royalty damages are calculated by thinking about the hypothetical bargain that would have occurred between the licensor and the licensee at the time of first infringement. Under *Georgia Pacific Corp. vs. United States Plywood Corp.*, several factors are considered in determining the range of values over which the parties would have negotiated and where in that bargaining range the parties would ultimately end up. These factors include, for example, the rates paid for comparable patents, the duration of the patent and terms of the license, and the infringer's use of the patent.

Given this damages remedy, a non-producing entity with a valid, infringed patent is likely only harmed if it is deprived of the appropriate reasonable royalty payments. Since reasonable royalties are usually quantifiable, it would seem difficult to argue that no remedy at law exists for non-producing entities. However, are there some circumstances where the patent owner might nevertheless be irreparably harmed? One can think of situations where the defendant would be unable to pay the patent owner royalties adequate for the infringed party to be "made whole," should the infringer not be constrained by an injunction. In any such situation, the lack of an injunction could result in irreparable harm. One such example is when the defendant may not be commercially viable and is in danger of going out of business before damages are recovered. In this circumstance, the harmed party would not be made whole for the infringement.

Contrast this situation with that of a producing entity with a valid, infringed patent. In this circumstance, the possibility that the plaintiff has suffered irreparable harm may be more likely. Why? A producing entity could potentially have a lost profits damages claim. Lost profits are meant to compensate the plaintiff for sales they would have otherwise

made of a product if the infringement had not occurred. But, certain types of lost profit damages are not necessarily legally recoverable (e.g., certain types of convoyed sales may be difficult to recover under existing case law). Similarly, other types of lost profits are hard to recover, such as future lost profits caused by the infringement but not yet incurred at the time of the damage phase.

Accordingly, the question of irreparable harm is one that will require an economic evaluation of the parties, products and markets. Only through such a rigorous exercise can a determination of irreparable harm (or lack thereof) be conclusively made.

Is the Balance of Hardships Analysis Different if One Party is a Troll?

Justice Kennedy's concurring opinion in *eBay* echoes the arguments of those who are opposed to granting patent trolls (or NPEs in general) permanent injunctions. Justice Kennedy wrote:

...an injunction...can be employed as a bargaining tool to charge exorbitant fees to companies that seek to buy licenses to practice the patent...

The concern is that an injunction (or the threat of an injunction) changes the bargaining positions of the parties in a way that provides additional bargaining leverage to the patent owner. This additional leverage allows the patent owner to obtain higher royalties than it would have obtained had an injunction not been granted. The increased royalties, in turn, represent a "hardship" to the defendant, which may tip the balance of hardships in its favor.

How does the granting of an injunction increase the patent owner's bargaining leverage? To explore this question, we need to compare the bargaining outcomes with and without an injunction. We model the negotiation that takes place after the court has reached a judgment that the patent is valid and infringed. In this negotiation, the parties attempt to reach agreement on a license that allows the defendant to keep selling the infringing product post-judgment. The outcome of this negotiation is bounded by the alternatives available to each of the parties, and these alternatives, in turn, depend on whether an injunction has been granted by the court. If an injunction has not been granted, the defendant has the alternative of continuing to infringe post-judgment, in which case the plaintiff will likely seek a "second round" of damages. If, on the other hand, an injunction has been granted, continued infringement is not an option for the defendant.¹³

12. *Black's Law Dictionary*, (8th ed. 2004). See *irreparable injury-rule*.

To illustrate the implications of granting injunctions, we work through an example that captures many of the salient economic features of a real world patent case. We then explore how the outcomes in the example change depending on whether the court has a policy to grant injunctions automatically or, alternatively, a policy against granting injunctions. This exercise provides insights into the conditions under which an injunction creates bargaining leverage.

In our example, a company called ACME is developing a product that incorporates a particular technology. ACME needs to invest \$1000 in order to design the product. Thereafter, ACME anticipates making sales of the product over a two year period. In the first year, ACME's revenues from selling the product are expected to be \$1000 and its profits on these sales are expected to be \$100. In the second year, ACME's revenues and profits are expected to be \$4000 and \$1000, respectively. Therefore, ACME's overall sales from the product are expected to be \$5000 (\$1000+\$4000), and its overall profits are expected to be \$100 (\$100+\$1000-\$1000).¹⁴

ACME's plans work to perfection through year 1.¹⁵ After investing the \$1000 in design costs, ACME meets its year 1 sales goal with \$1000 in revenues and \$100 in profits. However, at the end of year 1, a patent owner called NPE, Inc. appears, sues ACME for patent infringement, and obtains a judgment of validity and infringement.

The court awards reasonable royalty damages to NPE, Inc. based on ACME's past infringing sales in year 1. The court calculates the reasonable royalty damages based on an analysis of a hypothetical negotiation between the parties set at the time when ACME was considering embarking on the project (just prior to first infringement). The outcome of this hypothetical negotiation depends on the bargaining positions of the two parties. The bargaining positions of the parties, in turn, are based on their respective "walk-away points."

A licensee's walk-away point is the maximum royalty that it is willing to pay to obtain a license. In the case of ACME, if it obtained a license, it would earn

\$100—the total expected profits from the project—whereas it would earn nothing if it did not obtain a license. Therefore, the maximum royalty that ACME would have been willing to pay in the hypothetical negotiation would be the overall expected profit on the product (\$100) divided by the revenues from the product (\$5000), or 2 percent. ACME would not pay a royalty greater than this amount because such a royalty would make the product unprofitable for ACME and it would rather forego development of the product.

A licensor's walk-away point is the minimum royalty that it would be willing to accept to give a license. In the case of NPE, Inc., the royalty would be willing to accept would be zero since it does not sell a competing product. We further assume that it would lose no licensing opportunities if it licensed ACME.

The negotiated royalty necessarily must lie between the two walk-away points since one of the parties would refuse to enter a license for a royalty outside this range. Put another way, only royalties within this range would leave both parties better with a license than without it. We assume that the parties have equal bargaining power, which suggests that the negotiated royalty would lie halfway between the two walk-away points, or at 1 percent. Having determined that the hypothetical negotiation would have yielded a 1 percent royalty, the court awards past damages based on this rate (1 percent times the year 1 sales of \$1000, or \$10).

In addition to calculating damages on past sales, the court must decide whether to issue an injunction. We consider two alternative policies: that the court automatically grants injunctions and that the court never gives injunctions. We start with the policy of automatic injunctions.

(i) Automatic Injunctions

Suppose the court issues an injunction. Then, ACME can continue selling its product in year 2 only if it can negotiate a license with NPE, Inc. We analyze the outcome of this (actual) negotiation, starting with the parties' walk-away points. It is crucial to recognize that the parties' walk-away points will be entirely forward-looking starting from the date of the negotiation, which is at the end of year 1. In particular, only the future profitability of the product matters; expenses incurred by ACME in the past are irrelevant (as long as these expenses are sunk, like the design cost).

If ACME can continue selling the product, it expects to earn revenues of \$4000 and profits of \$1000 in year 2. Thus, ACME's walk-away point is

13. We understand that if the defendant continued to infringe once an injunction had been granted, it would be subject to contempt of court proceedings and the harsh penalties that would accompany a finding of contempt. We assume for the purposes of our analysis that these penalties are so extreme that they would not be risked by the defendant.

14. For simplicity of exposition, we ignore discounting of future cash flows.

15. NPE, Inc. is not entitled to lost profits because it does not produce a competing product.

a royalty rate of 25 percent. NPE, Inc., on the other hand, stands to make nothing if a license is not agreed upon. Therefore, its walk-away point is zero. With equal bargaining power, the negotiated royalty would be 12.5 percent.

Therefore, if an injunction is granted, the parties reach agreement on a license that would allow ACME to sell its product in year 2, but at a royalty of 12.5 percent.

(ii) Injunctions Not Granted

If an injunction is not granted, ACME has three alternatives. It could forego selling the product, it could seek a license from NPE, Inc., or it could sell the product without a license in year 2. Of course, if it sells in year 2 without a license, NPE, Inc. would seek a “second round” of damages at the conclusion of year 2. Consider what would happen if ACME sought a license from NPE, Inc. for year 2. The (actual) negotiation between the parties would be conducted under the threat of what would happen if no license were agreed upon, specifically what would happen if ACME made unlicensed sales in year 2 and then NPE, Inc. sought and received a second round of damages.

We will see that the outcome of this negotiation depends crucially on how the court would calculate damages in a second round. For the moment, assume the court would award damages using a reasonable royalty rate of R . How would this shape the licensing negotiation between the parties? ACME’s walk-away point in the negotiation would be a royalty of R . It would not pay more than R to obtain a license because it knows that it has the option of selling unlicensed and then paying damages at rate R . Similarly, NPE, Inc.’s walk-away point is also a royalty of R . It would not accept a royalty lower than R because it knows that without a license ACME would have the incentive to sell unlicensed and then the court would award NPE, Inc. damages at rate R . With both parties having a walk-away point of R , the licensing negotiation would result in a negotiated royalty rate of R . Thus, we see that the licensing negotiation between the parties at the end of year 1 is completely shaped by the fact that the court would award damages in a second round at rate R .

What value would the court use for R ? Two possibilities suggest themselves. First, the court might use the same royalty rate as it did when it calculated past damages on the sales in year 1; specifically, $R = 1$ percent. Thus, in this case, the royalty rate that NPE, Inc. would obtain without an injunction, 1 percent, is substantially lower than the royalty rate

it would obtain with an injunction, 12.5 percent. In this case, the injunction has the effect of shifting the bargaining leverage in favor of NPE, Inc. This shift occurs because of the existence of the design costs. Because these costs are sunk, they are not considered when the parties negotiate the license at the end of year 1 after an injunction has been granted. At that point, ACME has already sunk the design costs. Thus, ACME is locked into the patented technology and NPE, Inc. can exploit this to extract a higher royalty. In contrast, the design costs were considered when the court determined the reasonable royalty rate for calculating past damages because the hypothetical negotiation was set at a time when the design costs had not yet been sunk. The implicit asymmetric treatment of the design costs creates the shift in the bargaining leverage.

The second possibility is that the court might determine R by analyzing the outcome of a hypothetical negotiation between the parties just prior to year 2, i.e., at the initiation of the second round of infringement. This hypothetical negotiation has the same structure as the actual negotiation between the parties after an injunction has been granted. In particular, the walk-away points are 25 percent for ACME and zero for NPE, Inc., with a negotiated royalty of 12.5 percent. R would then be 12.5 percent and the negotiated royalty NPE, Inc. obtained in the actual post-judgment negotiation would be the same whether an injunction had been granted or not. NPE, Inc. has the same leverage even without an injunction because the court’s method of calculating a second round of damages does not consider the design costs (the associated hypothetical negotiation is set prior to year 2 after the design costs have already been sunk).

With regard to the question of the balance of the hardships in an individual patent case, we consider whether an injunction would increase the hardships on the defendant and thereby tip the balance of the hardships in favor of the defendant. From an economist’s point of view, the royalty for a patented technology should be based on its “*ex ante*” value—the value that exists prior to sunk costs being incurred by the licensee. As we have seen, once the licensee has sunk costs, a patent owner can extract greater royalties from the licensee and an injunction provides the patent owner with an opportunity to do so. However, these greater royalties reflect an appropriation by the patent owner of returns to the sunk costs rather than the inherent value of the patented technology. One could view this appropriation as a hardship on the licensee caused by the injunction.

The plaintiff, on the other hand, would suffer no hardship (i.e., it would not get less than it “deserved” on an *ex ante* basis) if an injunction were not granted and damages in a second round were awarded at the same rate as in the first.

We conclude that, under the conditions we have analyzed in the example (and in particular, the existence of sunk costs), one would expect the balance of the hardships to tip in favor of the defendant. However, it is important to note that this conclusion does not depend on the plaintiff being a non-producing entity. It would hold true if the plaintiff were a producing entity as well because whether this particular hardship is created depends entirely on the characteristics of the defendant (i.e., did the defendant have to sink costs?) rather than the characteristics of the plaintiff (i.e., does the plaintiff sell a product incorporating the patented technology?).

Thus, we conclude that the balance of the hardships issue—while an important factor that should be considered by courts in deciding whether to grant injunctions—has little to do with the debate over non-producing entities.

Would an Injunction in the Case of a Troll’s Patent Further Public Interest?

The fourth prong of the four factor test for the granting of an injunction is the “public interest would not be disserved by the granting of an injunction.”¹⁶ A central concern of the field of economics is the assessment of the inherent trade-offs and social welfare implications of government policies and legal rules. To analyze the potential “public interest” questions related to the granting of an injunction to a non-producing entity, it is appropriate to think about both short run and long run considerations. Throughout the analysis, we focus on weighing the potential harm to the public of the injunction being granted and the defendant’s product no longer being made available to consumers.

A consumer buys a product because they believe there is some intrinsic value, or gain, from the product. This idea is the foundation of a market economy—consumers are made better off from purchases, and firms have incentives to produce items that consumers value (which is demonstrated through their willingness to purchase a product). Economists call the gains that consumers accrue from the availability of a product “consumer surplus.” In that sense, consumer surplus gives us one measure of the extent of the potential public harm—the greater the consumer surplus lost by the removal of a product from the marketplace (the

effect of an injunction), the greater the harm to the public interest.

What factors determine the size of the consumer surplus from a given product? First, consumers generally derive greater benefits from products that have fewer substitutes (all else equal). Products with fewer substitutes (or limited substitutes) are likely to have more inelastic demand; consumers are less price sensitive for these products because of the value they derive from them and the fact that there are limited alternatives to turn to even in the face of price increases. As a result, an injunction that removes a product from the market creates a “negative externality” on consumers—the consumers are made worse off by the removal of the product. The public loss would generally be greater when the defendant’s product is highly differentiated from other products on the market; this situation, in turn, is more likely when the product at issue is based on an unexpired patented technology. The loss would be even greater when the patent holder is a non-producing entity with no commercial product of their own on the market. The more highly differentiated the product, the fewer substitutes that exist for consumers to turn to if an injunction is granted, and the greater the extent the consumers are ultimately harmed.

Exhibit A shows a simple graph of the price paid and the quantity purchased for a product with many substitutes. As shown in the graph, the demand for this product is relatively elastic; as the price of the product increases, consumers cut back their purchases of the product in large quantities and turn to substitutes. The blue shaded triangle represents the consumer surplus for this product. Contrast that with Exhibit B, which shows the same graph for a different product with few substitutes. The demand for this product in Exhibit B is relatively inelastic—as the price of the product increases, consumers cut back their purchases by a much smaller amount because there are few substitutes to turn to. The blue shaded triangle in Exhibit B shows the consumer surplus. A comparison of the relative size of the consumer surplus for each product shows that the product with few substitutes is more likely to incur greater public harm if it were to be withheld from the marketplace.

A related principle has been used in the past by courts that have refused to give injunctions when

16. Supreme Court of the United States. Opinion of the Court. *eBay Inc. et. al. v. MercExchange, LLC*. May 15, 2005.

the infringer's product had significant public health value. A medicine has significant public health value only when there are no close substitutes for it.

Given the potential for harm to the public interest, it would seem to be in the best interest of all involved to reach a settlement that allows the defendants to continue to produce the product at interest. For this reason, it would be incorrect to assume that granting injunctions will automatically lead to products being taken off the market. Yet, licensing negotiations can break down due to many factors, including informational asymmetries—the concept that the parties involved in the negotiation do not have full information regarding each other's bargaining position and therefore try to game each other. For example, in the Blackberry dispute, RIM, the commercial manufacturer, claimed to have a non-infringing technology that would allow it to design around the patent. There was no way for the parties to assess the validity of this claim. Ultimately, RIM paid over \$600 million to license the technology, which may imply that the cost of the design around strategy was far greater than RIM had claimed.

The long run considerations relevant to weighing the potential public harm from granting an injunction relate to the effects of granting injunctions on innovation. While a court's action in any particular case is unlikely to have much effect on innovation overall, a rule or practice by courts that makes injunctions more or less likely to be granted may well

affect incentives to innovate. As with the question of whether trolls lead to more or less innovation, the question of whether liberal granting of injunctions would lead to more or less innovation is not easily answered. On the one hand, liberal granting of injunctions would tend to increase the value of patents, which would tend to lead to more patenting activity. On the other hand, the prospect of facing an injunction after sinking costs would tend to discourage development and commercialization activities.

Conclusions

The debate over patent trolls is likely to continue in the policy arena, the court system and the economy as a whole. In this paper, we have demonstrated that there are no simple answers to questions involving patent trolls: whether it be simply defining the term, determining their potential impact on innovation, or understanding the economic implications of the four factor test. Economics can provide a set of guiding and disciplined frameworks for the analysis, with sometimes surprising results (such as our finding that whether or not an entity is a non-producing entity has little effect on the ultimate effects from an injunction). The only certainties in the study of patent trolls are that the debate will likely continue, and that thoughtful analysis is required with a focus on the specific issues relevant to the patents, products, industry, and parties involved in any dispute. ■

